Table of Contents

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

FORM 10-K

(Mark One)
☒ **ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

For the fiscal year ended December 31, 2021

OR

☐ **TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934 FOR THE TRANSITION PERIOD FROM TO**

Commission File Number: 001-40592

Rapid Micro Biosystems, Inc.

(Exact name of Registrant as specified in its Charter)

Delaware	**20-8121647**
(State or other jurisdiction of incorporation or organization)	**(I.R.S. Employer Identification No.)**
1001 Pawtucket Boulevard West, Suite 280	
Lowell, MA	**01854**
(Address of principal executive offices)	**(Zip Code)**

Registrant's telephone number, including area code: (978) 349-3200

Securities registered pursuant to Section 12(b) of the Act:

Title of each class	Trading Symbol(s)	Name of each exchange on which registered
Class A common stock, $0.01 par value per share	RPID	The Nasdaq Global Select Market

Securities registered pursuant to Section 12(g) of the Act:

None
(Title of class)

Indicate by check mark if the Registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act.
YES ☐ NO ☒

Indicate by check mark if the Registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Act.
YES ☐ NO ☒

Indicate by check mark whether the Registrant: (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the Registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. YES ☒ NO ☐

Indicate by check mark whether the Registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit such files). YES ☒ NO ☐

Indicate by check mark whether the Registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, a smaller reporting company, or an emerging growth company. See the definitions of "large accelerated filer," "accelerated filer," "smaller reporting company," and "emerging growth company" in Rule 12b-2 of the Exchange Act.

Large accelerated filer	☐	Accelerated filer	☐
Non-accelerated filer	☒	Smaller reporting company	☒
		Emerging growth company	☒

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act. ☐

Indicate by check mark whether the registrant has filed a report on and attestation to its management's assessment of the effectiveness of its internal control over financial reporting under Section 404(b) of the Sarbanes-Oxley Act (15 U.S.C. 7262(b)) by the registered public accounting firm that prepared or issued its audit report. ☐

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Exchange Act). YES ☐ NO ☒

The registrant was not a public company as of the last business day of its most recently completed second fiscal quarter and, therefore, cannot calculate the aggregate market value of its voting and non-voting common equity held by non-affiliates as of such date.

The number of shares of the registrant's Class A common stock, par value $0.01, outstanding as of March 21, 2022 was 36,386,948.
The number of shares of the registrant's Class B common stock, par value $0.01, outstanding as of March 21, 2022 was 5,553,379.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the registrant's definitive Proxy Statement relating to its 2022 Annual Meeting of Stockholders to be filed with the SEC within 120 days after the end of the fiscal year ended December 31, 2021 are incorporated herein by reference in Part III.

TABLE OF CONTENTS

FORWARD-LOOKING STATEMENTS

This Annual Report on Form 10-K contains forward-looking statements. We intend such forward-looking statements to be covered by the safe harbor provisions for forward-looking statements contained in Section 27A of the Securities Act of 1933, as amended (the "Securities Act"), and Section 21E of the Securities Exchange Act of 1934, as amended (the "Exchange Act"). All statements other than statements of historical facts contained in this Annual Report on Form 10-K may be forward-looking statements. In some cases, you can identify forward-looking statements by terms such as "may," "will," "should," "expects," "plans," "anticipates," "could," "intends," "targets," "projects," "contemplates," "believes," "estimates," "forecasts," "predicts," "potential" or "continue" or the negative of these terms or other similar expressions. Forward-looking statements contained in this Annual Report on Form 10-K include, but are not limited to, statements regarding:

- our business strategy for our Growth Direct platform and systems;
- our future results of operations and financial position, including our expectations regarding revenue, operating expenses and ability to generate cash flow;
- our expectations and assumptions related to our future funding requirements and available capital resources, which may be impacted by market uptake of our Growth Direct system, our research and development activities and the expansion of our sales, marketing, manufacturing and distribution capabilities;
- our ability to maintain and expand our customer base for our Growth Direct platform and systems;
- anticipated trends and growth rates in our business and in the markets in which we operate;
- our research and development activities and prospective new features, products and product approvals;
- our ability to anticipate market needs and successfully develop new and enhanced solutions to meet those needs, including prospective products;
- our ability to hire and retain necessary qualified employees to grow our business and expand our operations;
- our expectations regarding the potential impact of the ongoing COVID-19 pandemic on our business, operations and the markets in which we and our customers operate;
- our ability to adequately protect our intellectual property; and
- our ability to hire and retain necessary qualified employees to grow our business and expand our operations.

We caution you that the foregoing list may not contain all of the forward-looking statements made in this Annual Report on Form 10-K. We have based these forward-looking statements largely on our current expectations and projections about future events and financial trends that we believe may affect our business, financial condition and results of operations. Forward-looking statements involve known and unknown risks, uncertainties and other important factors that may cause our actual results, performance or achievements to be materially different from any future results, performance or achievements expressed or implied by the forward-looking statements, including, but not limited to, the important factors discussed in Part I, Item 1A, "Risk Factors" in this Annual Report on Form 10-K for the fiscal year ended December 31, 2021.

You should read this Annual Report on Form 10-K and the documents that we reference in this Annual Report on Form 10-K and have filed as exhibits to this Annual Report on Form 10-K with the understanding that our actual future

results, levels of activity, performance and achievements may be materially different from what we expect. These forward-looking statements speak only as of the date of this Annual Report on Form 10-K. Except as required by applicable law, we undertake no obligation to publicly update or revise any forward-looking statements contained in this Annual Report on Form 10-K, whether as a result of any new information, future events or otherwise.

TRADEMARKS

Solely for convenience, our trademarks and trade names in this report are referred to without the ® and ™ symbols, but such references should not be construed as any indicator that we will not assert, to the fullest extent under applicable law, our rights thereto.

SUMMARY RISK FACTORS

Our business is subject to numerous risks and uncertainties, including those described in Part I, Item 1A. "Risk Factors" in this Annual Report on Form 10-K. You should carefully consider these risks and uncertainties when investing in our Class A common stock. The principal risks and uncertainties affecting our business include the following:

- We have incurred significant losses since inception, we expect to incur losses in the future and we may not be able to generate sufficient revenue to achieve and maintain profitability;
- Our limited operating history makes it difficult to evaluate our future prospects and the risks and challenges we may encounter;
- Our success depends on the success of our Growth Direct platform, which may not be achieved or maintained.
- Our operating results have fluctuated significantly in the past and will fluctuate significantly in the future, which makes our future operating results difficult to predict and could cause our operating results to fall below expectations.
- Our revenue has been primarily generated from sales of our Growth Direct system, proprietary consumables and laboratory information management system, or LIMS, connection software, which require a substantial period of time to generate recurring revenue;
- If we cannot maintain the level of sales of our Growth Direct systems or the sales of our consumables and service contracts to existing customers declines, our future operating results would be adversely affected;
- We may need to raise additional capital to fund our existing operations, improve our platform or develop and commercialize new products or expand our operations;
- The COVID-19 pandemic has impacted, and may continue to impact, our operations and may materially and adversely affect our business and financial results;
- The continued success of our business relies heavily on establishing and maintaining our position in the market as a leading provider of automated microbial quality control, or MQC, testing;
- It may be difficult for us to implement our strategies for improving growth;
- We may not successfully implement our strategy to expand our Growth Direct platform to customers who manufacture cell and gene therapies;
- The size of the markets and forecasts of market growth for automated MQC testing and other of our key performance indicators are based on a number of complex assumptions and estimates, and may be inaccurate;
- New product development involves a lengthy and complex process and we may be unable to develop or commercialize products on a timely basis, or at all;
- Our customers use our Growth Direct platform as part of their quality-control workflow, which is subject to regulation by the U.S. Food and Drug Administration, or FDA, and other comparable regulatory authorities;
- If we are unable to support demand for the Growth Direct platform, and for our future product offerings, including ensuring that we have adequate capacity to meet increased demand, our business could suffer;

- We have limited experience in marketing and sales, and if we are unable to expand our marketing and sales organization to adequately address our customers' needs or to expand our customer base, our business may be adversely affected;

- We may be unable to manage our future growth effectively, which could make it difficult to execute our business strategy;

- If we cannot compete successfully, we may be unable to increase or sustain our revenue, or achieve and sustain profitability;

- We must develop new products, adapt to rapid and significant technological change and respond to introductions of new products by competitors to remain competitive;

- Due to the significant resources required to enable access in new markets, we must make strategic and operational decisions to prioritize certain markets, products and services. We may expend our resources to access markets and develop products and services that do not yield meaningful revenue or we may fail to capitalize on markets, products or services that may be more profitable or with a greater potential for success;

- The Growth Direct platform may contain undetected errors or defects and may not meet the expectations of our customers, which means our business, financial condition, results of operations and prospects could suffer;

- Potential product liability lawsuits against us could cause us to incur substantial liabilities and limit commercialization of any products that we may develop;

- If we lose key management, cannot recruit qualified employees, directors, officers or other significant personnel or experience increases in our compensation costs, our business may be materially harmed;

- If our sole manufacturing and development facility becomes damaged or inoperable or we are required to vacate our existing facility, our ability to conduct and pursue our manufacturing and development efforts will be jeopardized;

- Our manufacturing operations are dependent upon third-party suppliers, including single-source suppliers, making us vulnerable to supply shortages and price fluctuations, which could harm our business;

- If we are unable to obtain and maintain sufficient intellectual property protection for our technology, including the Growth Direct platform, or if the scope of the intellectual property protection obtained is not sufficiently broad, our competitors could develop and commercialize products similar or identical to ours, and our ability to successfully commercialize our products may be impaired;

- Patent terms may be inadequate to protect our competitive position on our products for an adequate amount of time; and

- The market price of our Class A common stock has been and may continue to be volatile and fluctuate substantially, which could result in substantial losses for our stockholders.

PART I

Item 1. Business.

Defining the future of pharmaceutical quality control

We are leading a global transformation toward fully automated microbial quality control within pharmaceutical manufacturing. Our products safeguard the most complex and critical bioprocessing workflows in the industry, enabling faster, safer, and higher capacity drug production. Through our unique expertise at the intersection of microbiology, robotic systems, and advanced vision algorithms, we are setting the foundation for end-to-end quality control automation to enable the future of advanced pharmaceutical manufacturing.

Overview

We are an innovative life sciences technology company providing mission critical automation solutions to facilitate the efficient manufacturing and fast, safe release of healthcare products such as biologics, vaccines, cell and gene therapies, and sterile injectables. Our flagship Growth Direct platform automates and modernizes the antiquated, manual microbial quality control, or MQC, testing workflows used in the largest and most complex pharmaceutical manufacturing operations across the globe. The Growth Direct platform brings the quality control lab to the manufacturing floor, unlocking the power of in-line / at-the-line MQC automation to deliver faster results, greater accuracy, increased operational efficiency, better compliance with data integrity regulations, and quicker decision making that our customers rely on to ensure safe and consistent supply of important healthcare products.

Our Growth Direct platform is the only fully automated, high-throughput and secure MQC solution. Developed with over 15 years of active feedback from our customers, Growth Direct was purpose-built to meet the MQC challenges posed by the increasing scale, complexity, and regulatory scrutiny confronting global pharmaceutical manufacturers. Our platform delivers the robust and scalable automation necessary to support rapidly expanding demand for novel and complex therapeutic modalities, such as biologics, vaccines, cell and gene therapies, and sterile injectables. Our systems are designed to absorb and automate the vast majority of daily MQC test volume in any pharmaceutical manufacturing

facility and can be operated in networked fleets of multiple systems per facility or campus to scale up with high-volume manufacturing.

MQC is a ubiquitous and critical testing process, executed daily at massive scale globally, that ensures pharmaceutical manufacturing facilities and products are free of microbial contamination from exogenous microorganisms such as bacteria, mold, and other foreign substances. MQC ensures the safety of final drug products released for patient use, via the constant testing for microbial contamination of raw materials, production environments, personnel, and in-process and final sterility testing for drug products. A single drug production facility may conduct anywhere from tens of thousands to over one million MQC tests per year to ensure product quality. This testing is mandated and closely monitored by the U.S. Food and Drug Administration, or FDA, and other global regulatory agencies to ensure the safety of all pharmaceutical products, with serious regulatory and financial consequences for lack of compliance.

The traditional method of MQC testing, or the traditional method, also known as the compendial method, involves detection of viable, potentially contaminating organisms by a process known as “growth promotion.” In this method, samples are manually collected on media plates, hand labeled and inventoried, physically transported to a centralized lab, and incubated at various temperatures for days to weeks. MQC specialists then visually inspect these plates manually, counting colonies of microbial organisms and recording their counts of thousands of plates by hand, which is a repetitive process predisposed to operator miscounts. In total, the traditional method can require 15 individual processing steps per sample. The benefit of this long-standing method is that it is trusted—a colony growing on media strongly implies the existence of viable, potentially contaminating organisms growing in the location or sample from which the assay was collected.

However, the manual traditional MQC method has become antiquated and is unable to match the growing scale of global pharmaceutical manufacturing—especially complex bioprocessing of biologics, cell, and gene therapies—principally because the process is slow to deliver results, entirely dependent on human labor, subject to technician fallibility and error, unsecured, and non-compliant with data integrity regulations. In time-sensitive, highly regulated pharmaceutical manufacturing operations, these process vulnerabilities can expose organizations to significant operational, financial, and reputational risks, including loss of valuable product batches, reduced manufacturing capacity, lengthy regulatory investigations, costly enforcement actions, and delayed release of life-saving products.

Our Growth Direct platform improves the traditional MQC process, maintaining the fundamental trusted method of growth promotion, but applying advanced robotic automation, powerful optical imaging, algorithmic vision analysis, and data management to render it more scalable and efficient for the future of advanced pharmaceutical manufacturing. Our proprietary technology works by replacing human counting of growing colonies with software and algorithm detection and counting based on image analysis. We exploit the natural autofluorescent properties of microbial organisms to count microcolonies by detecting minute changes to their brightness over time using proprietary vision algorithms, without any new reagents or additional sample prep. Our system wraps this core detection technology with fully automated, high-volume, walk-away robotic sample handling and incubation, locked behind a secured interface that enables compliance with data integrity regulations.

We believe the MQC market is poised for disruption and modernization via the widespread deployment of our Growth Direct platform, and we have embarked on the mission of transforming the MQC test market to standardize on our fully automated solution.

The Growth Direct platform fully automates and digitizes the process of pharmaceutical MQC and enables our customers to perform this critical testing process more efficiently, accurately, and securely. Our platform comprises the Growth Direct system, proprietary consumables, lab information management system, or LIMS, connection software, and comprehensive customer support and validation services. Our Growth Direct system is a fully automated, high throughput instrument for daily processing of MQC samples on our proprietary consumables—a microbiology quality control lab in a box. We have achieved an automated method that is faster and produces more accurate, reliable and accessible data than the traditional method. Growth Direct delivers faster results in half the time, and with its higher testing throughputs and capacity can absorb the vast majority of daily MQC testing in any facility. Our system increases

accuracy and efficiency through full automation of the MQC process. Customers depend on Growth Direct's robust security, connectivity, and data integrity capabilities, reinforced by its high reliability with >99% uptime.

We believe we are the first company to solve the existing barriers to MQC automation. Our product platform reflects our expertise at innovating and integrating across multiple technology disciplines, including systems design, robotic handling, microbiology, optical imaging, software image analysis, data management and security, and process automation. Our business was specifically built to meet the needs of pharmaceutical manufacturing and has developed a track record of delivering reliable results for our customers, which is why we believe we are the trusted standard in microbial automation.

On a global scale, we estimate nearly 360 million MQC tests are conducted annually in thousands of dedicated pharmaceutical manufacturing facilities responsible for producing billions of doses of therapeutics every year. We estimate our total addressable market, or TAM, to be approximately $10 billion in 2022, which we expect to grow to over $16 billion by 2027. Our TAM includes both a system sales opportunity and a recurring opportunity from sales of consumables and service contracts, the latter of which is estimated to be approximately $5 billion in 2022. As we embed our products within global pharmaceutical manufacturing operations and begin to automate and digitize their workflows, we believe our platform is exceptionally well-positioned to enable the future of quality control automation and unlock further significant TAM expansion opportunities.

We employ direct commercial and service teams that drive the adoption of our products globally. We create a superior user experience from pre-sales, to onboarding, consultative validation services, onsite technical training, and continued customer support throughout our relationship. We have a scalable commercial infrastructure including a direct sales force in North America and Europe. This is supplemented with an extensive and highly specialized customer service and validation infrastructure. This infrastructure ensures successful on-boarding of the Growth Direct through both initial validation and follow-on purchases throughout the entire customer site network, where the highest volume sites may require dozens of Growth Direct systems. We currently have customers across approximately 70 sites in 14 countries and the majority of our customers have multiple Growth Direct systems and have deployed Growth Direct across multiple facility locations.

We launched the latest generation of the Growth Direct system in 2017 and have placed 116 systems and sold over one million consumables globally. Our customer base includes over half of the top twenty pharmaceutical companies as measured by revenue and the manufacturers of 25% of globally approved cell and gene therapies, including 67% of approved gene-modified autologous CAR-T cell therapies. Once installed and validated in our customers' facilities, Growth Direct provides for recurring revenues through ongoing consumables and service contracts. Based on the significant value that our Growth Direct platform provides to our customers, we have experienced strong organic growth over the last two fiscal years, despite the impact of the COVID-19 pandemic, resulting in combined product and service revenue of $21.6 million and $14.1 million for the fiscal years ended December 31, 2021 and 2020, respectively, representing an annual growth rate of 53.6%.

We seek to establish Growth Direct as the trusted global standard in automated MQC by delivering the speed, accuracy, security, and data integrity and regulatory compliance that our customers depend on to ensure patient safety and consistent drug supply.

Industry background and challenges

MQC overview

MQC is the principal method by which pharmaceutical manufacturers ensure the ongoing sterility of their facilities and finished products by detecting and stopping contamination from any outside microorganisms, such as bacteria, mold, and other foreign substances. MQC is a critical component of the bioprocess and pharmaceutical production process and is regulated and mandated by the FDA under current good manufacturing practice, or cGMP, and by other international regulatory agencies. Current MQC testing methods are manual, laborious, have lacked innovation over the past several decades.

Most bioprocess and pharmaceutical manufacturing processes follow a conventional high-level workflow:

1. **Raw Materials:** Raw materials such as excipients, active pharmaceutical ingredients, or APIs, and water are received and prepared.

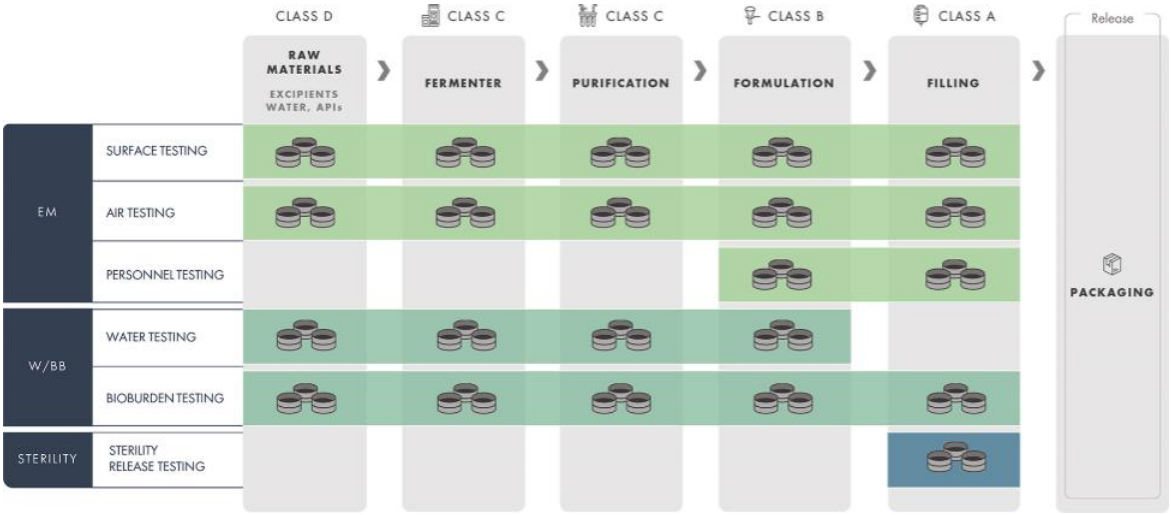
2. **Upstream Processing:** These raw materials are combined and transformed through various processing steps to produce drug product.

3. **Downstream Processing:** The drug product is formulated and aliquoted into its dosage form in a fill / finish operation.

4. **Fill/Finish:** Finally, finished doses are packaged and prepared for release.

These process steps occur in manufacturing suites in ISO designated clean rooms, with increasingly stringent controls denoted by escalating cleanroom class (with Class A the most controlled), as the process nears final product release.

Pharmaceutical manufacturing workflow



To guarantee the quality of the end products and the safety of patients who receive them, manufacturers must ensure that their products are free of potentially harmful microbial contamination. This requirement creates a considerable operational challenge, as the natural environment is rife with microorganisms that could pose serious risk to patients should they transit into these clean rooms and contaminate any aspect of the manufacturing process. Consequently, pharmaceutical companies must maintain strict sterility control in their manufacturing facilities by vigilantly monitoring their sites, equipment, and finished drugs, and responding quickly to any microbial contamination. This is accomplished through MQC testing, which generally encompasses four specific applications for testing of microbial contamination:

- **Environmental Monitoring (EM)**—tests the manufacturing environment, including circulating air, exposed surfaces, and personnel, and represents approximately 65-70% of global MQC test volume;

- **Water (W)**—tests any purified water used at any stage of the drug production process, including water for injection, or WFI, and represents approximately 15% of global MQC test volume;

- **In-Process Bioburden (BB)**—tests raw materials, drug substance and in-process product, and represents approximately 15% of global MQC test volume; and

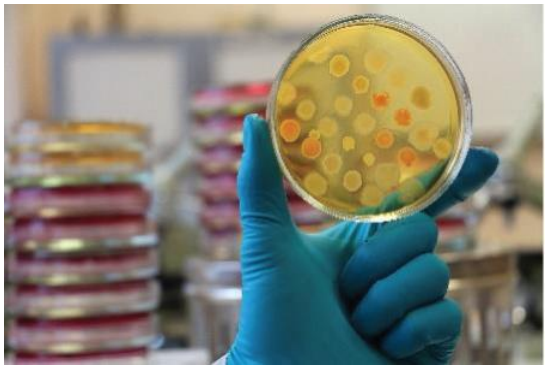
- **Sterility Release (ST)**—final testing of finished product to ensure sterility before the product is released for commercial sale, and represents less than 5% of global MQC test volume.

MQC testing occurs at high volumes due to its importance across all dimensions of a pharmaceutical manufacturing operation and must be executed daily and implemented across all production lines. As a result, pharmaceutical manufacturing facilities may conduct as many as tens of thousands to over one million tests per year.

Legacy MQC techniques and key challenges

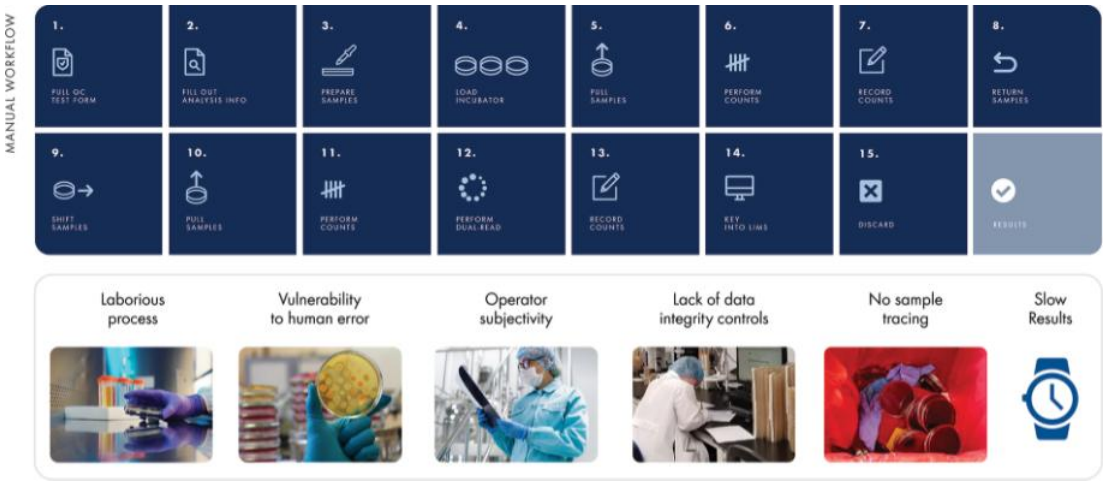
The traditional method of MQC testing, which we estimate accounts for over 95% of all MQC testing, involves detection of viable organisms by a process known as "growth promotion." In this process, samples are collected from a manufacturing site (e.g., on equipment, water, raw materials) and deposited by various methods onto plates with a matrix (typically agar) containing growth media with nutrients that encourage microbial growth. These plates are hand-labeled, inventoried, and physically transported to a centralized MQC lab. The plates are incubated under various conditions favorable for microbial growth; a manufacturing operation may simultaneously maintain multiple different incubation conditions and processes. If the original sample is contaminated with microbial organisms, the transferred organisms will divide and expand on the test plate, eventually forming visible colonies on the surface of the growth media. Technicians inspect these plates manually, counting colonies and recording their counts by hand. Visualization of colonies indicates the original presence of viable—that is, living—organisms from the sampled location or substance, and a likely microbial contamination for investigation and remediation.

The typical MQC lab today using the traditional method



A typical MQC testing process using the traditional testing method involves 15 or more manual steps per sample, including sample collection, labeling, transport, inventory, incubation, multiple reading and re-incubation steps, final counting, data recording, and data entry. The process is inherently inefficient, with some of the early sample collection steps occurring inside the manufacturing suites spread across a campus, and others centralized in campus MQC labs, requiring sample transport. The manual handling aspect of the traditional method makes it more prone to human error than an automated alternative and can lead to extensive labor and other direct and indirect costs given the thousands to millions of MQC tests required annually per manufacturing facility.

15-step process for traditional microbial MQC method



The traditional method poses several operational problems:

- **Delayed results** — Colonies must grow to a certain size, typically 10 million cells, before the human eye is able to detect them. Across the range of organisms and incubation protocols that facilities handle, this growth time can range from 5-14 days. Until then, no definitive result can be determined, which delays any dependent processes.

- **Test subjectivity** — Once growth has occurred, a human operator will count the colonies and decide whether the number of colonies meets or exceeds their organization's threshold for remediation. However, colonies can grow together or overlap completely, or can be mistaken for other artifacts, confounding operators' ability to generate an accurate, subjective count, especially given the fact that human operators can only check plates a few times during the incubation cycle.

- **Vulnerability to errors** — Operators must manually categorize, label, track and manage numerous plates through a complex multi-step, multi-day process of incubation and analysis, risking the loss or mishandling of samples. Manual analysis of samples also requires human data collection and entry, introducing risk of mistakes during recording and transcription of data.

- **Lack of data integrity and audit controls** — The manual, traditional method of data handling faces challenges in meeting the current regulatory standards requiring data integrity. Current processes, which are often paper based, introduce risk of erroneous or fraudulent data as critical data entry points are reliant on the experience, state of mind, and motives of the individual recording them.

- **Laborious process** — Manual growth promotion is a labor-intensive, multi-step process that requires operators to cycle samples through incubators multiple times per day as they check for growth and often requires physical transport from a manufacturing facility to a centralized lab.

Lapses in traditional MQC processes and potential contamination have resulted in increased regulatory scrutiny and organizational risk, leading to lengthy regulatory investigations and costly enforcement actions in addition to product loss and resulting lost revenue. The risks and costs of inadequate traditional MQC testing include:

- **Global data integrity risk** — 40-50% of all warning letters issued globally contain a data integrity component.

- **Lengthy regulatory investigations** — The time to resolution of FDA 483s and warning letters is approximately 6-24 months, and even longer in some cases.

- **FDA enforcement action risk** — Risk of significant and costly FDA enforcement actions, up to and including consent decrees.

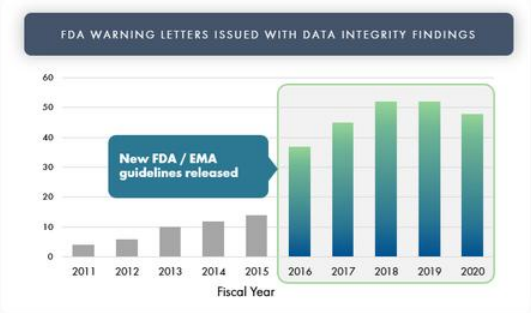
- **Significant product loss** — Up to $100 million annual product loss per company due to MQC failures has been observed in recent years.

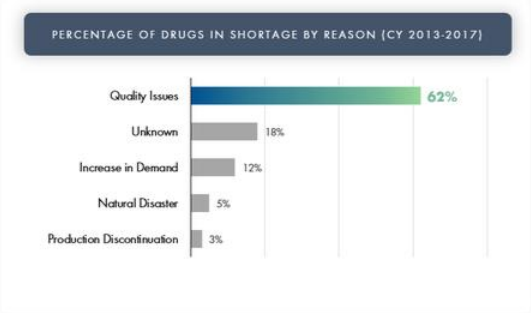
- **Shareholder value destruction** — Potential shareholder value destruction in the hundreds of millions to billions of dollars due to MQC issues, resulting product and financial issues, potential customer concerns, and impact from negative press.

In the last several years alone, there have been numerous publicized incidents involving leading pharmaceutical companies that highlight the risk of poorly controlled, manual MQC testing and protocols, resulting in lengthy site closures, CRLs, and delays to product approvals.

Furthermore, regulatory compliance pressures in the pharmaceutical industry have generally increased over the past decade, with the FDA issuing nearly 474 Form 483s and over 206 warning letters globally for various regulatory violations in 2021. More specifically, the proportion of FDA warning letters containing a data integrity complaint has risen in recent years, as the agency devotes greater attention to that topic. We expect there to be continued regulatory scrutiny as the industry shifts to more complex biological manufacturing and manufacturing returns domestically.

Increasing industry tailwinds





Key MQC automation growth drivers

We believe several industry trends are driving need for MQC automation, including:

- **Increasing regulatory scrutiny** — Regulatory compliance pressures in the pharmaceutical industry have increased over the past decade, as mentioned above. Moreover, between 2011 and 2020, FDA inspectors issued more than 280 warning letters related to data integrity problems, with a significant increase since new regulations took effect in 2016. Other international regulatory agencies are also defining and increasingly enforcing the highest standards for consistent data robustness, including the U.K. and the World Health Organization.

- **Data integrity and need for remote, real-time monitoring of facilities** — Facing increased data integrity scrutiny from regulatory authorities in their quality control lab and manufacturing areas, pharmaceutical manufacturers must focus on meeting these regulatory requirements as defined by the FDA and other

international regulatory bodies. Breakdown of data integrity, even if inadvertent, can result in warning letters, refusal to approve applications, and even product bans from a jurisdiction. Additionally, given the increasingly complex nature of biopharmaceutical manufacturing, there is a growing need to be able to monitor MQC testing in real-time and remotely to ensure the constant quality of production processes.

- **Expansion of high growth biologics and advent of new, more complex therapeutic modalities such as cell and gene therapies** — At $1 trillion in sales in 2021, the global prescription drug market is large and growing, driven by demand for new therapies, such as biologics and cell and gene therapies. The global biologics market is expected to grow at a 9.6% CAGR through 2026 according to EvaluatePharma, and account for 35% of prescriptions and 55% of total revenue of the top 100 drugs, driven in part by the rise in the burden of chronic diseases and growing demand for innovative therapies. Within the biotechnology segment, certain modalities are growing even faster, such as cell and gene therapies, where MQC testing volume is projected to grow at a 10-30% CAGR through 2026. Biologics, cell, and gene therapies require complex multi-step manufacturing processes which demand efficient automated MQC processes. These complex biologics have the highest MQC testing intensity per batch of manufactured product, given that they are often manufactured in a highly modularized fashion where each manufacturing batch often represents an individual dose to a specific patient. These dynamics extend to contract development and manufacturing organizations, or CDMOs, which continue to benefit from increased outsourcing and the need for contract partners that can manufacture these complex therapeutics.

- **Greater efficiency and focus on six sigma lean manufacturing principles** — The pharmaceutical industry is under significant pressure to commercialize products faster in order to maximize their patent life. There is continued focus on concepts such as lean manufacturing and six sigma to drive efficiencies in the manufacturing process and a greater emphasis on automating MQC testing to reduce errors and decrease manufacturing lead times and inventory requirements in supply chains. The complex nature of emerging biologics and novel therapeutics such as cell and gene therapy also require increased focus on efficiency and precision manufacturing. For example, autologous cell therapies require collection of patient tissue, ex vivo manipulation of these cells, and delivery via reinjection into patients—all steps which must be conducted within a short time span, and with absolute microbiological sterility. Such “vein-to-vein” processes require an intense focus on purity and contamination control throughout every step of the manufacturing workflow, given the value of the individualized ingredients and fast turnaround time required to deliver the therapy back to the patient.

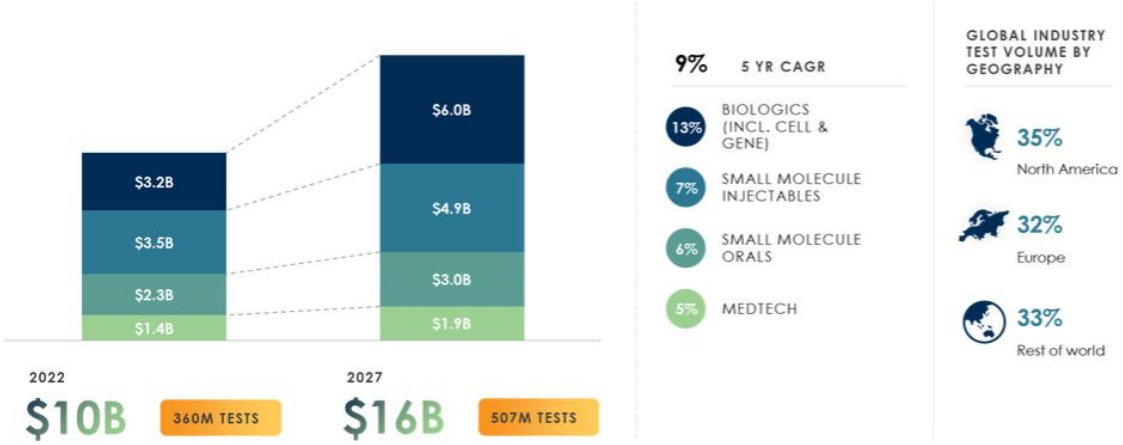
- **Rebuilding of domestic growth supply chain / increased scrutiny of outsourced materials with focus on reshoring drug development process** — The pharmaceutical industry has historically embraced a global supply chain which has provided cost advantages made available by offshoring certain services, such as drug and API manufacturing. However, many companies are pushing to re-shore their global supply chains to resume domestic manufacturing, in part driven by recent supply chain disruptions from the COVID-19 pandemic as well as the potential for geopolitical and intellectual property infringement risk. We believe the reshoring of manufacturing operations will further necessitate the need for efficient automated MQC testing.

Market opportunity

Our core market of MQC testing encompasses a ubiquitous and high-volume testing process deployed across all pharmaceutical manufacturing operations. We address a total systems, consumables, and services market that we estimate to be approximately $10 billion in 2022 and is forecasted to grow at an approximate 9% CAGR to over $16 billion by 2027. We based our estimated TAM on total potential demand for our products derived from research conducted by Health Advances LLC and our current pricing. Our TAM includes both a system sales opportunity and a recurring opportunity from sales of consumables and service contracts, the latter of which is estimated to be approximately $5 billion in 2022. We estimate that our global addressable MQC testing market represents approximately 360 million MQC tests annually in 2022 and is expected to grow at a CAGR of 9% to a total of approximately 507 million tests by 2027. This aggregate test volume is composed of MQC testing across several addressable end markets, including biologic therapeutics such as cell and gene therapies, vaccines, and protein therapies (approximately 130

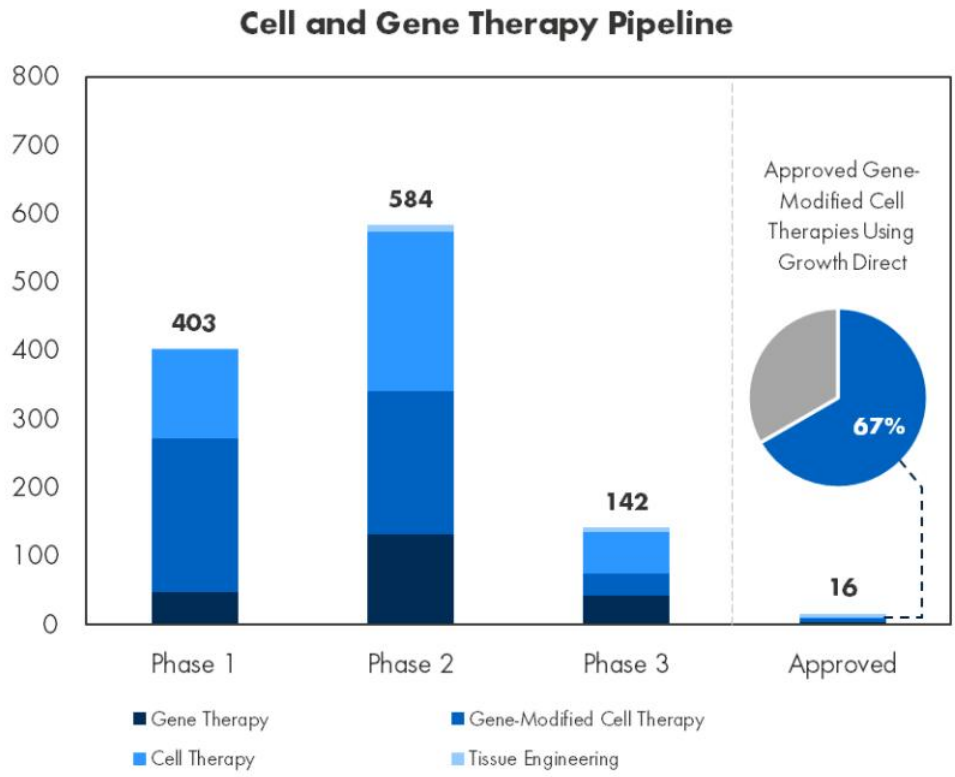
million annual MQC tests); small molecule orals (approximately 95 million annual MQC tests); small molecule injectables (approximately 100 million annual MQC tests); and medtech products (approximately 36 million annual MQC tests). We serve this market across three geographic territories: North America, which accounts for approximately 35% of the global MQC testing market, Europe (approximately 32%), and the rest of the world (approximately 33%).

Our core total addressable market



We are especially focused on serving the high-growth biologics, cell, and gene therapy markets, which have the highest MQC testing intensity per batch of manufactured product. We seek to drive substantial growth by establishing Growth Direct as the standard for MQC automation in advanced bioprocessing for biologics, cell, and gene therapies. MQC testing for these complex therapeutics modalities is forecasted to grow at a 10-30% compounded annual growth rate through 2027. Because these advanced modalities require complex multi-step manufacturing processes with individualized batches and increased product handling, we believe traditional MQC will not scale efficiently to serve this end market, and that the Growth Direct is well positioned to address this opportunity. The need is further highlighted given we have observed an increased scrutiny by regulators and concerns over data integrity, particularly for complex therapeutic manufacturing where MQC is still dominated by legacy, manual processes. We estimate MQC testing for biologic therapeutics will grow at an approximate 13% CAGR from 2022 through 2027. As the sector continues to witness significant advancement, we estimate that nearly 50% of our total TAM growth through 2027 will be driven by the biologics, cell, and gene therapy end markets. Within the cell and gene therapy category, the need for faster, more efficient manufacturing presents an attractive targeted growth opportunity for Growth Direct. A quarter of globally approved cell and gene therapy products use Growth Direct to automate MQC, including two-thirds of approved gene-modified autologous CAR-T cell therapies, and the remaining 1,100+ cell and gene therapies in Phase 1 to 3 clinical trials represent a significant opportunity for our business.

Cell and gene therapy market and pipeline



Our business is further well-positioned to execute on several TAM expansion opportunities. We believe there is an opportunity to expand our existing automated MQC testing solution in adjacent markets such as personal care product manufacturing, where our Growth Direct platform is currently in use and which we estimate presents an approximately $8 billion opportunity with an estimated 270 million MQC tests annually. We based this estimated TAM on total potential demand for our products derived from research we commissioned conducted by Health Advances LLC and our current pricing. We also intend to develop services and products to allow us to deliver integrated QC workflows not currently addressed by our Growth Direct platform, which we estimate represents an approximately $10 billion opportunity. We based this estimated TAM on potential demand derived from our own market research and current pricing of comparable integrated products in other markets. Combined with our core TAM, we believe these expansion opportunities could increase our potential TAM to $32 billion.

The Growth Direct platform

Our proprietary Growth Direct platform fully automates and digitizes the trusted growth-based method of MQC and enables customers to perform this critical testing process more efficiently, accurately, and securely. Our platform comprises the Growth Direct system, proprietary consumables, LIMS connection software, and comprehensive customer support and validation services. The platform's suite of products reflects our expertise at innovating and integrating

across multiple technology disciplines, including systems design, robotic handling, microbiology, optical imaging, image analysis, data management and security, and process automation, and is supported by our unwavering commitment to the highest level of customer support.

Our technology

To date, prior technology products have not succeeded in automating MQC workflow at scale, due to a combination of insufficient platform throughput, lack of full automation, and non-viable technology approaches. Most testing solutions on the market that seek to replace the traditional method diverge from directly measuring microbial growth, using alternative analytical technologies that often require additional reagent preparation and that do not deliver the same results as the existing traditional method. These methods are difficult to validate relative to the traditional method and have therefore seen low adoption across the industry.

Growth Direct method

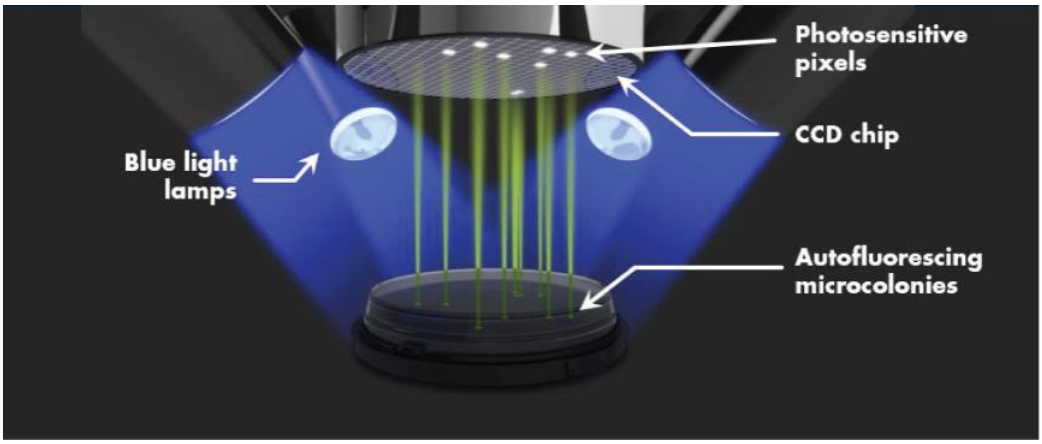
The Growth Direct method relies on a fundamental property of all microorganisms—they contain cellular components required for growth, called flavins and flavoproteins, that autofluoresce, or glow, without the addition of reagents under certain frequencies of light. Our proprietary system detects microcolonies of microorganisms by illuminating them with blue-spectrum light and directing the resulting green-spectrum signal onto a Charged-Coupled Device, or CCD, chip—an array of independent photosensitive pixel elements. Our image analysis software interprets these light signals and counts the clusters of illuminated pixels representing each microcolony. The end result is an automated method that is faster and produces more reliable and accessible data than the traditional method. Our Growth Direct platform accelerates time to results by several days, a 50% improvement over the traditional method, and reduces MQC testing to a simple two-step workflow, eliminating up to 85% of the manual steps of traditional MQC, generating significant time, operational, and cost savings for our customers.

Traditional microbial method compared to Growth Direct method

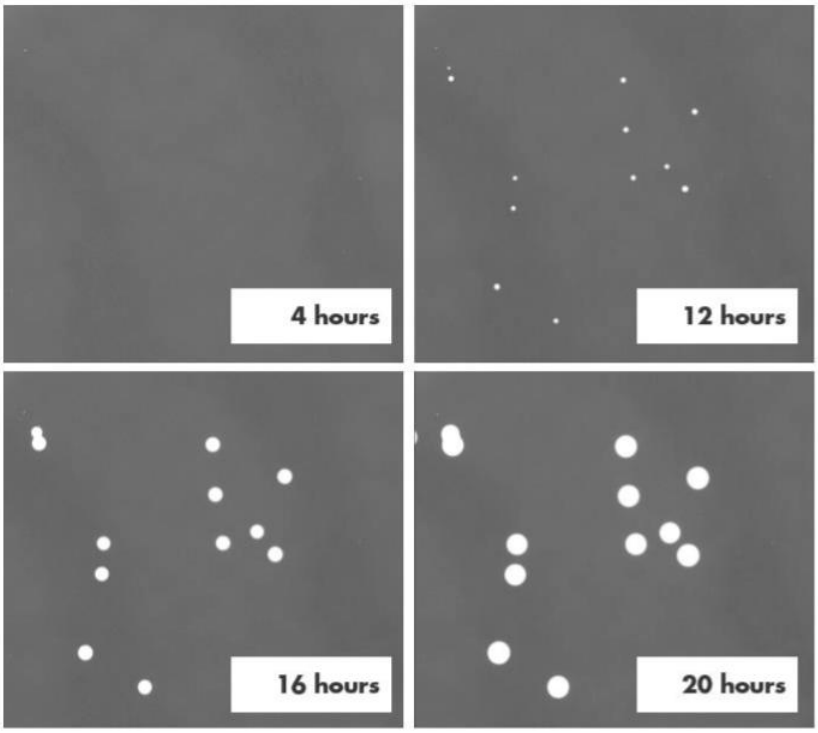
Core detection technology

Our system illuminates samples using an array of high-intensity blue LED lights, which causes microcolonies to autofluoresce without destroying them. All microbial cells autofluoresce in the green-spectrum when illuminated with blue LED light. A CCD chip captures images with illuminated pixels wherever autofluorescence from microbial cells is detected. Our software detects and registers the clusters of illuminated pixels that represent underlying microcolonies. The system generates a time series of images as the sample incubates and is imaged every four hours. Finally, vision analysis software continuously evaluates the time series for evidence of growing colonies, represented by increasing signal intensity and size of illuminated groups of pixels.

Illumination of a sample via a blue LED light causes microcolonies to fluoresce



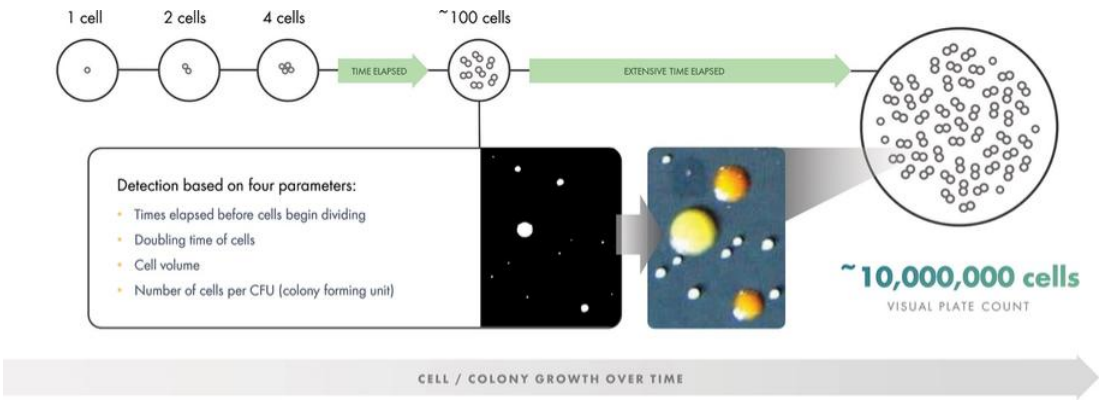
Growing autofluorescent S. aureus microcolonies in Growth Direct imaging time series



A key feature of detection via imaging of autofluorescence is that this approach does not harm cells, and as such is a non-destructive method. This provides several benefits, including ensuring that detected colonies represent actual viable microbial contaminations, and permitting detected microcolonies to grow into visible colonies for use in subsequent microbial identification for root cause investigation follow-up.

Our platform can detect microorganism growth at the microcolony stage at approximately 100 cells, which typically occurs in half the time required for visual plate counting to detect visible colonies by eye at approximately 10 million cells.

Growth Direct finds colonies earlier than operators using visual plate inspection.



System components and workflow

The Growth Direct system comprises two automated and temperature-controlled incubators, robotic sample transport systems, an advanced imaging system, two servers (one for system control, the other for image analysis) and associated hardware and staging required for the handling of up to 700 of our consumables.

The overall workflow of the automated Growth Direct method mirrors the traditional visual plate counting assays, allowing for operator familiarity of use, ease of integration into existing MQC protocols, and a streamlined regulatory validation process.

Growth Direct system components

The Growth Direct workflow begins when microbial organisms are collected on proprietary growth media plates using the same collection methods as the traditional method—via direct contact, air settling or air filtration for environmental monitoring testing, or via funnel filtration of liquid samples onto the membrane of the consumable for water or bioburden testing. For ease of use, our consumables are compatible with existing hardware, such as active air samplers or liquid filtration systems, and are supplied by us with identical nutrient agar media as traditional media plates.

A Growth Direct operator loads the system in bulk using two carriers designed to hold up to 60 of our consumables each. A key benefit of the Growth Direct is that the system can be placed directly in a production area, compared to the traditional method which often requires transporting samples to a centralized lab for testing. Our consumables are pre-labeled with unique bar codes for forensic trail identification, management and to enable data integrity compliance. Every consumable bar code contains a unique serial number that allows traceable information to be captured by two bar code scanners on the Growth Direct system. That allows metadata such as sample location, time, type, test protocol, and operator to be captured and associated with each consumable result. Intake sensors within the system automatically read, identify, and catalog the bar-coded samples, after which the samples are transferred from the loading queue to one of two independently controlled incubators, which together have a capacity of 700 of our consumables, and which support the operation of multiple custom incubation protocols. Once loaded into the system, consumables cannot be removed or tampered without generating an auditable record of actions by an operator.

During the incubation phase, the Growth Direct captures images of each consumable at intervals of four hours. To perform the imaging, the system transfers consumables from the incubator to the imaging chamber, illuminates them using a blue-spectrum light and captures autofluorescence signals in a high-resolution image using the CCD camera. Samples are returned to the incubators to continue their incubation protocols. Automated sample handling means no sample is ever missed for testing or replaced into the wrong incubator or accidentally discarded.

Over the course of the incubation protocol, the system's image analysis software uses proprietary algorithms to analyze the behavior of autofluorescent objects over an accumulating time series of images, enabling the Growth Direct to identify and count growing microcolonies and distinguish them from non-living debris.

After the image analysis is complete, the system reports the number of growing colonies found on the surface of the consumable. The result data can be printed or transmitted to LIMS via our LIMS connection software for storage and user review. When a sample demonstrates growth that exceeds the threshold for contamination set by the organization, automatic email alerts notify quality personnel of a possible contamination before the end of the incubation period. A powerful yet intuitive user interface allows the operator to track the consumables in the system throughout the testing process and monitor the results in real time, which offers a significant advantage to the manual and traditional method that has to wait to the end of the incubation before counting. After results are reviewed, the consumable can either be unloaded to a carrier for further microbiological identification or automatically discarded as waste at the operator's discretion.

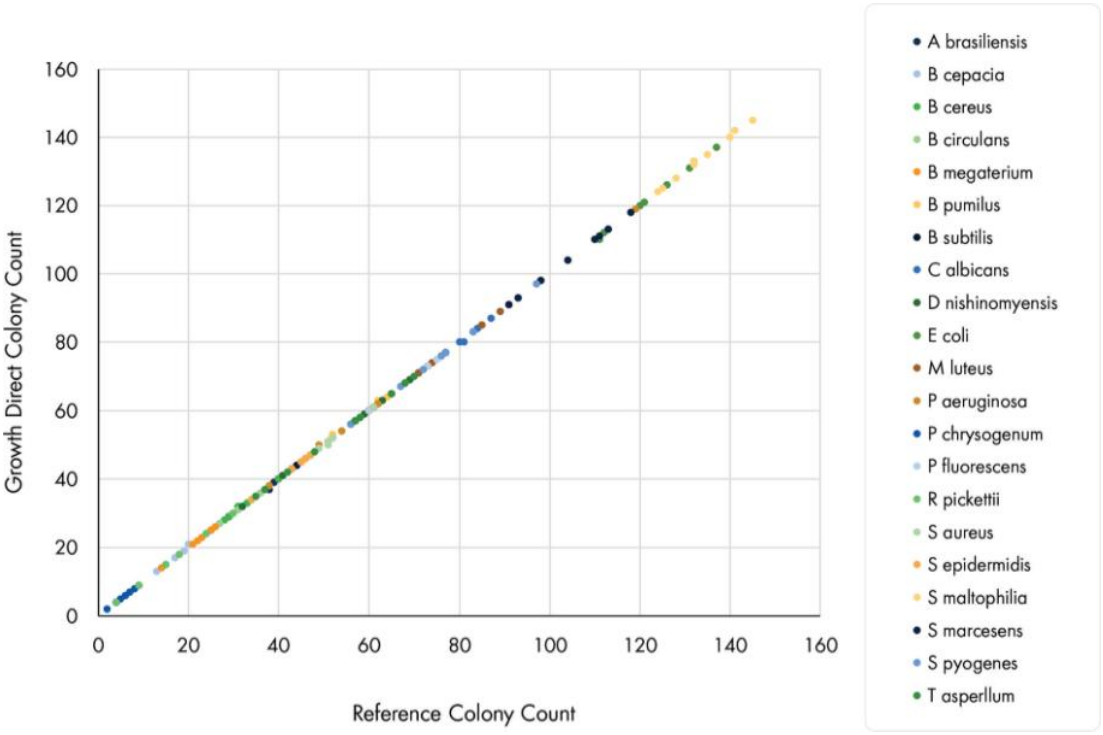
Validation framework

We have demonstrated the accuracy, speed, and reliability of detecting microcolonies using the Growth Direct's automated image analysis compared to conventional methods through numerous scientific studies.

Accuracy. The Growth Direct is highly accurate when compared to traditional methods. Studies of the Growth Direct comparing its vision-based detection and enumeration of colonies against the MQC gold-standard USP <61> benchmark reference set of micro-organisms demonstrate that the Growth Direct delivers the same results or better as traditional, manual verification of colonies.

The figure below demonstrates the accuracy of the Growth Direct imaging and analysis technology compared to a reference count produced by an analyst interpreting the image data created by the software. A wide range of organism types—both mandated by the United States Pharmacopeia, or USP, and those commonly found in pharmaceutical facilities—were evaluated.

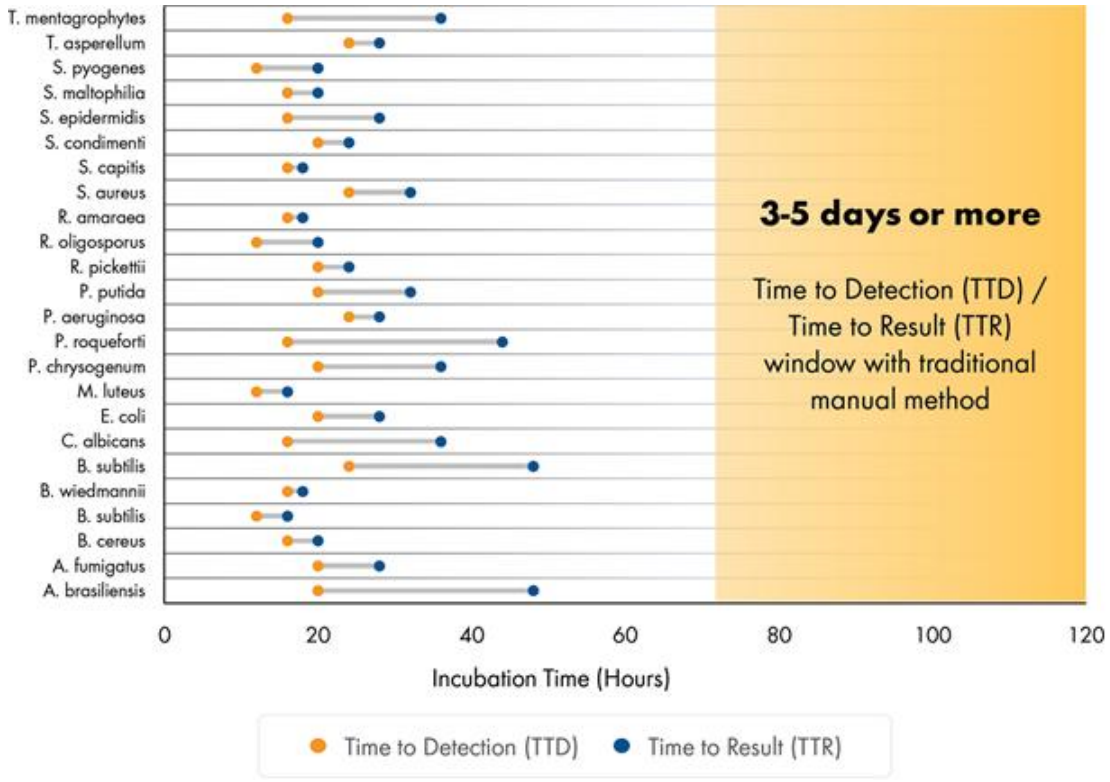
Growth Direct colony count accuracy vs. standard reference



Speed. The Growth Direct is faster than the traditional method. Across a range of organisms of interest, the Growth Direct detects colonies in half the time or faster.

The figure below shows the time to detection, or TTD, and time to result, or TTR, in hours for a wide range of pharma lab-relevant microorganisms using the EM application on the Growth Direct system compared to the TTD/TTR window using traditional manual tests (72+ hours).

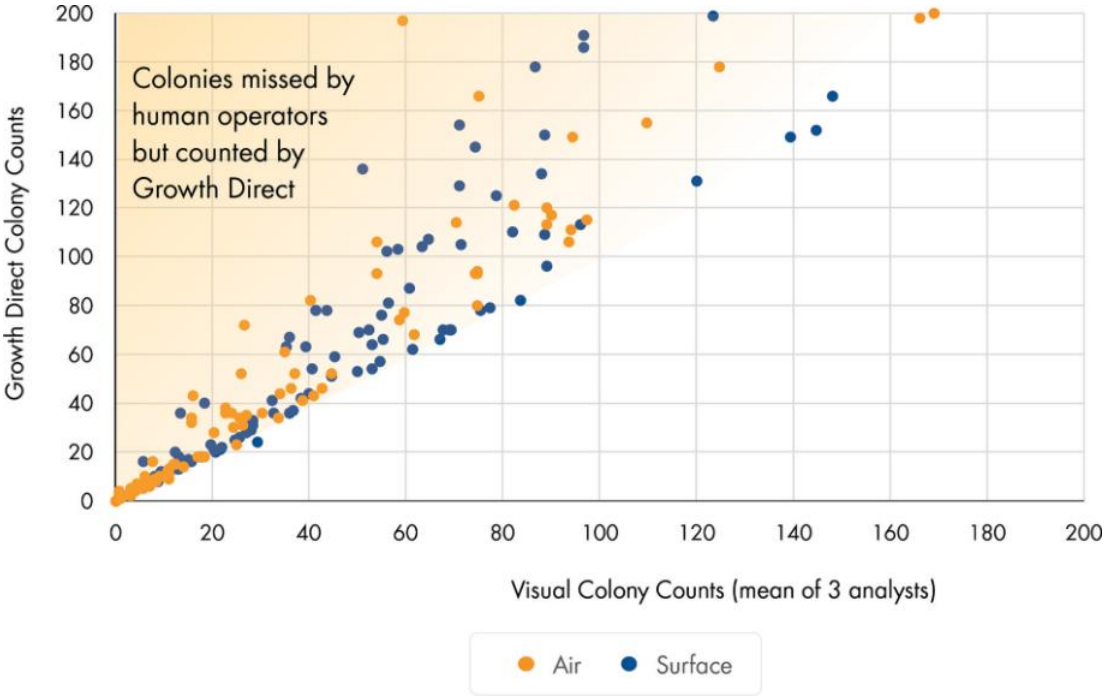
Growth Direct time to result vs. traditional method



Our value proposition by stakeholder is described below:

Reliability. The Growth Direct is more reliable than the traditional method for accuracy of organism enumeration. In studies of environmental monitoring plates incubated for five days, which compared Growth Direct's vision-based detection and enumeration to visual counting conducted by technicians, the Growth Direct regularly identified and counted colonies that technicians missed, as shown by the counts in the shaded area in the figure below.

Growth Direct colony detection reliability vs. traditional method



Our Growth Direct platform

We pioneered the Growth Direct platform—a combination of our novel Growth Direct system, proprietary consumables, LIMS connection software, and comprehensive customer support and validation services—to fully automate and digitize the process of MQC in the sterile manufacturing of important health care products.

The Growth Direct system

Our latest version of the second-generation Growth Direct, launched in 2017, reflects our deep experience with delivering automation to the MQC market. The Growth Direct system is a fully automated, high throughput system for processing MQC samples—a microbiology quality control lab in a box. The Growth Direct contains two high-capacity incubators, an advanced imaging system and internal robotics for sample handling. The system enables walk-away bulk sample loading, holding 700 of our consumables per system. Its dual, independently controlled incubators automatically manage multi-temperature incubation protocols. Onboard imaging and vision software detects and counts microbial growth, delivering test results in half the time of the manual method. The system's compact 57" x 39" x 95" size delivers these benefits in a footprint that allows customers to place the Growth Direct directly in manufacturing suites of various sizes compared to the traditional method, where samples are often required to be transferred to a centralized lab. Co-location in manufacturing minimizes delays to incubation and errors introduced by sample transfer to the quality control lab. Growth Direct brings the lab to the manufacturing floor, for in-line / at-the-line automated MQC testing, anywhere in the facility or manufacturing campus.

The Growth Direct system

Proprietary consumables

We offer two proprietary consumables plates to capture test samples for analysis on the Growth Direct: (1) an Environmental Monitoring, or EM, consumable and (2) a Water / Bioburden, or W/BB, consumable. Both types are custom-designed proprietary consumables with specific mechanical and optical features to facilitate automated handling and image processing within our Growth Direct system and have bar codes for tracking and data integrity. Two bar codes are used—one applied during our manufacturing process to define the media type and expiration dates, and a second that is generated by the Growth Direct system at time of testing that defines the sample ID and LIMS number. The consumables incorporate multiple standard media for each application as both products are based on the traditional growth method.

Growth Direct Environmental Monitoring and Water / Bioburden consumables

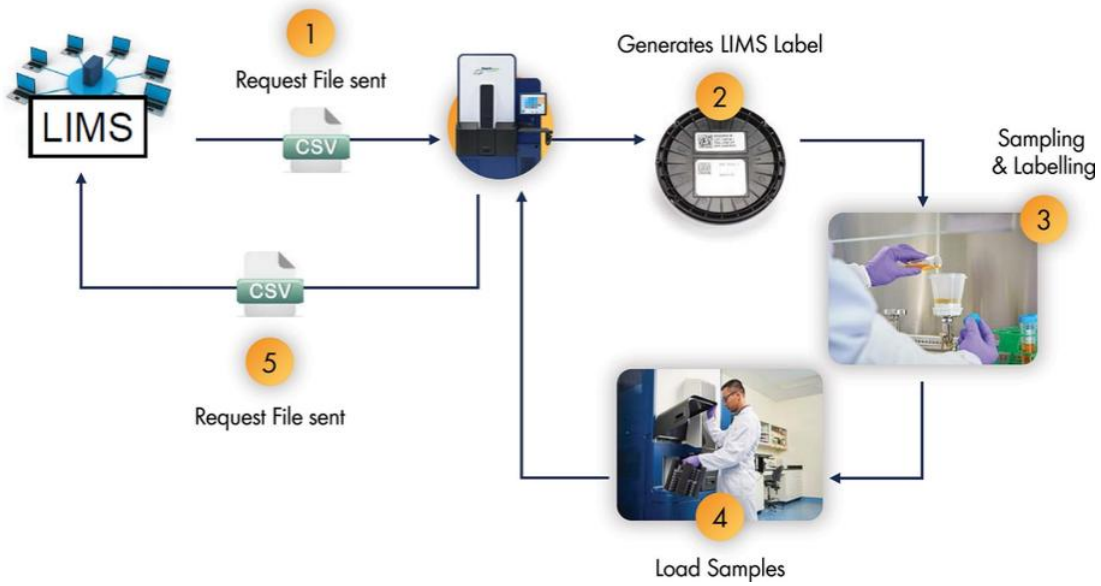
In addition, we are developing a growth-based rapid automated sterility test for use on the Growth Direct system. Rapid sterility tests are utilized for final release testing in any facility that manufactures sterile products such as biologics and sterile injectables, as a final quality check before shipment. The traditional sterility test utilizes a growth method that requires at least 14 days to deliver final results, during which time dependent manufacturing steps are paused or proceed at risk, or final products are held in inventory. This causes delays to patient access and manufacturer revenue recognition as well as excess inventory costs. Sterility tests are especially valuable in vaccine manufacturing to enable faster release and greater capacity, and in cell and gene therapy manufacturing environments given the challenging balance of purity, contamination control, and speed required in the manufacturing of those products. For example, vaccine production requires two or more sterility tests during manufacturing, each of which imposes a 14-day delay on the production process. In total, release of critical vaccines can be delayed by months. Similarly, autologous cell therapies require collection of patient tissue, ex vivo manipulation of these cells, and delivery via reinjection into patients — all steps which must be conducted within approximately two weeks, which the traditional method of sterility testing exceeds, causing delays or requiring release of the product at risk.

We expect to start beta testing of our rapid sterility test with select customers in the second quarter of 2022. When commercialized, we expect our rapid sterility test will reduce the traditional method's 14-day time to results by at least 50%, permitting faster final release, with the goal of speeding critical drugs and vaccines to market. When released, we expect our rapid sterility test will also deliver the other benefits of the Growth Direct platform, including increased efficiency, reduced risk of errors, and enabling data integrity compliance. Our development program was supported by contract funding from U.S. Department of Health and Human Services Biomedical Advanced Research & Development Authority, or BARDA, which is supporting the development of improvements in vaccine production methods that accelerate the availability of vaccines against viruses with pandemic potential.

Growth Direct LIMS connection software

Our Growth Direct allows for two-way integration to LIMS enabling a fully paperless workflow. The bi-directional LIMS connection uses the widely supported comma-separated values, or CSV, file format to communicate, delivering compatibility with all existing LIMS. The connection supports the use of LIMS for Growth Direct created barcodes that are applied to our consumables. After sampling, the consumables are loaded into the Growth Direct system, which performs the incubation, detection and enumeration of colonies. Final results are automatically uploaded to the LIMS. This eliminates the risk of human error that could arise from manually entering the results, while improving efficiency. Moreover, the LIMS connection eliminates the need to use paper in the lab and delivers information to stakeholders in a secure manner, designed to enable compliance with data integrity regulations.

Growth Direct LIMS connection



Our service team works directly with customers' IT teams to help integrate Growth Direct software into their LIMS for seamless connectivity.

Validation services

As part of our customer support experience, we offer full validation support to ensure customer success with the Growth Direct. This offering helps our customers validate their Growth Direct for full routine use faster, typically in just three to nine months, and develops confidence in the operation of our platform.

Support begins prior to system purchase when our sales representative brings in a validation expert for consultation about specific application requirements. The validation teams offer a complete array of documents and services to support validation efforts, including:

- Installation Qualification
- Operational Qualification
- Performance Qualification
- Time-To-Results Qualification, or TTR
- 21 CFR Part 11 Assessment
- Method Qualification/Method Suitability

Once initial systems are validated, our customized validation approach allows customers to quickly validate follow-on systems through a Technical Transfer Method, facilitating faster adoption throughout their site network.

Customer support

We offer full 24/7 maintenance support via our annual service contract. Purchase of the Growth Direct comes with one-year warranty, after which customers may purchase annual maintenance packages. Our maintenance support package offers access to a staffed online and phone help desk with knowledge base, remote management and troubleshooting, and a 24-hour response time from our on-site field service engineer team.

Key advantages of our Growth Direct platform

Several factors differentiate our technology and will continue to be significant drivers of customer adoption of Growth Direct:

- **Faster Results at Higher Testing Throughputs and Capacity** — The Growth Direct uniquely combines superior detection and enumeration capabilities—translating to a 50% reduction in detection time compared to the traditional method—with a high-throughput, 700-sample total capacity form factor. This allows Growth Direct to offer a large volume automated testing solution that allows for fewer investigations, more targeted interventions, and more uptime for manufacturers, therefore saving time and money.
- **Increased Accuracy through Automation** — The automation of both sample handling and enumeration virtually eliminates human errors from the MQC process. Samples are transferred automatically at the right time, reducing the risk of sample loss, misplacement or mislabeling. The Growth Direct also more reliably distinguishes distinct colonies, hence avoiding the subjectivity that human operators introduce through visual inspection of plates.
- **Increased Process Efficiency** — Faster time to results means faster decision-making and intervention in the event of contamination, preventing production of contaminated batches, and reducing waste and overproduction. Meanwhile, elimination of unnecessary manual labor allows skilled MQC specialists to spend time on test design, interventions, standard operating procedure, or SOP, updates and other critical tasks.
- **Robust Security and Connectivity** — Growth Direct can integrate with existing LIMS, allowing for seamless data transfer from the system to the LIMS. This connection not only makes it easier for quality control personnel to handle and process their testing data, but it also allows other stakeholders to instantly access information critical to continued production.
- **Superior Data Integrity** — By maintaining accurate, complete, and intact records within their original context, Growth Direct ensures the trustworthiness of data. Moreover, data reside in permanent form for the lifetime of the record, easily accessible to authorized users, which allows operators to analyze trends over time for timely, cost-saving decision-making. The system is designed to enable compliance with industry data integrity standards such as 21 CFR Part 11, which set forth the FDA's standards for electronic records and electronic signatures.
- **High Reliability with Clear Path to Validation** — The Growth Direct delivers the reliability that customers need for their mission-critical manufacturing processes, with a consistent record of over 99% uptime in live production use. Our platform's reliability is further supported by our 24/7 support infrastructure and extensive regulatory validation services to ensure quick and seamless integration with customer's facilities and IT systems.

Competitive strengths

We believe our continued growth will be driven by the following competitive strengths.

- **Our proprietary technology platform offering best-in-class automated and secure MQC testing** — Our platform was purpose built to meet the growing demands posed by the increasing scale, complexity, and regulatory scrutiny of global pharmaceutical manufacturing. We believe that our Growth Direct leads

the industry in throughput, accuracy, reliability, security, and data integrity. Compared to the traditional method, our Growth Direct platform accelerates time to results by several days, a 50% improvement over the traditional method, and reduces MQC testing to a simple two-step workflow, eliminating 85% of the manual steps of traditional MQC, generating significant time, operational, and cost savings for our customers. Growth Direct is backed by our comprehensive validation and value-added service offerings, which create a continuous, positive touch point with our customers. Altogether, we believe our technology and service platform best address the growing needs of our customers.

- **Our investment and patent-protected innovation across multiple technology disciplines** — Our platform reflects our expertise at innovating and integrating across multiple technology disciplines, including systems design, robotic handling, microbiology, optical imaging, software image analysis, data management and security, and process automation. Through multiple years of development and investments from both investors and institutional partners, such as BARDA, we have amassed a set of technologies that form the foundation of our growing suite of products and solutions. We also believe that our first mover advantage in automated MQC testing reinforces our growing position in this market, with over 15 years of customer development and feedback, technical development, advocacy, and customer success. We continue to focus on investing in our business and have a well-defined product roadmap which includes development of new, innovative products, as well as advancements to our existing suite of technologies. Moreover, we have a strong intellectual property portfolio, including at least eighty-five granted patents globally with seven U.S. granted patents and five U.S. pending patent applications as of December 31, 2021.

- **Top-tier customer partners establishing Growth Direct as an industry standard globally** — We have cultivated long-standing and collaborative relationships with our significant and growing customer base. We originally developed our platform in close collaboration with our customers, and our customers' success in validating our technology constitutes a major driver for platform deployment. Moreover, our comprehensive validation, value-added service, and customer support offerings create a continuous touch point with our customers, cementing the value and integration of our products. Through these efforts, we deliver high quality experiences at every step of the customer journey which creates and strengthens our customer loyalty.

- **Deep integration into heavily regulated pharmaceutical manufacturing processes** — Our products are entrenched within our customers' workflow and the majority of our customers have purchased multiple systems and at multiple locations. For every drug product manufactured or in development, our customers are required to establish a validated QC process that they can execute consistently and reliably. Customers typically dismantle manual testing infrastructure after switching to our platform, creating enormous switching costs that get amplified by the network effect of linked systems and data aggregation across customer sites. Since initial installation, our relentless focus on providing robust validation support ensures assimilation of our platform into our customers' SOPs, further contributing to customer captivity. We believe that our first mover advantage has further enabled us to become deeply rooted within our customer's facilities and provide for ongoing opportunity with our existing customer base.

- **Our highly attractive business model that leverages our growing installed base of systems to generate persistent recurring revenues through consumables and service contracts** — Once embedded and validated in our customers' facilities, our Growth Direct provides for recurring revenues through ongoing consumables and service contracts. When our customers invest in our technology, they commit to a long-term use of our products. Our customers regularly purchase our proprietary consumables to perform MQC testing and maintain their systems via annual service contracts. Our products are used daily in our customer's facilities and their key workflows, reinforced by regulatory requirements that are driving the industry towards further automation. Once validated, additional systems can be deployed to absorb the majority of test volume in a facility. Moreover, once a Growth Direct system is installed within a customer's facility, it provides for an opportunity to place additional systems in existing and new facilities, which can be installed and validated in a faster, more efficient manner given the comprehensive validation process for the initial system.

- **Ability to leverage our extensive regulatory expertise to better serve our customers' needs** — We believe we are a thought-leader with respect to regulatory requirements. We have a long history engaging with the major regulatory bodies in our industry, such as the FDA and European Medicines Agency, or EMA, some of whom are also our customers. Our regulatory strategy has benefited our business in several ways, including: 1) by achieving the definition of the Growth Direct Technology as an "automated compendial validation" in key trade group and regulatory issuances, such as the Parenteral Drug Association, or PDA, Technical Report 33, and USP chapter <1223>; 2) by working with industry and regulatory forums to define a fast validation strategy that allows a short timeline routine testing implementation; 3) and by helping our customers obtain regulatory acceptance from the EMA and the FDA for the use of our technology and validation strategy for new drug applications with the Bioburden application (EM and water do not need regulatory license change). Our technology has also been audited regularly by regulatory inspectors as part of routine audits of customer sites, with no citations received to date. We have also succeeded in securing a substantial long-term government contract from BARDA to support development of new products as part of an ongoing partnership concerning areas of shared strategic interest regarding accelerated pandemic vaccine release.

- **Our experienced management team and workforce with deep domain knowledge** — Our management team combines strong subject matter expertise with a demonstrated history of commercial and operational execution. Moreover, our workforce has deep domain knowledge across a range of healthcare, technology and business disciplines, which we believe drives our continued commercial success. We have supplemented our diverse technical experience by assembling an operational team with expertise in manufacturing, legal, sales, marketing, customer service and finance. We believe this confluence of talent from multiple disciplines allows us to stay ahead of our competitors by identifying highly impactful opportunities and building products and solutions that address these opportunities.

Our growth strategy

We aim to position the Growth Direct as the industry standard for automated MQC testing. We believe we can achieve this through the following key growth strategies.

Leverage our first-mover advantage and our industry leadership to cement Growth Direct as the new standard of MQC automation in the rapidly growing bioprocessing market, including biologics, cell, and gene therapy manufacturing — Our MQC process automation platform is particularly well-suited to the manufacturing of biologics, cell, and gene therapies. These products are manufactured in a highly modularized fashion where each manufacturing batch often represents an individual dose to a specific patient. These therapies are therefore exceedingly valuable, and the manufacturing methods to produce them are time-sensitive and exposed to outsized risk of contamination given the amount of material handling and process change-over. We have demonstrated the value of our platform in cell and gene therapy manufacturing with our early success in converting customers in this segment. Furthermore, companies in this space are developing new approaches to manufacture these complex products, including novel facility layouts, new processes and workflows, and new quality and risk management frameworks. We intend to capitalize on our first-mover advantage to define the standard of MQC automation in this growing market by moving upstream in the cell and gene therapy manufacturing design practice, creating thought leadership on MQC automation in cell and gene therapy manufacturing, partnering with facility design firms who specialize in manufacturing infrastructure for these modalities, and targeting CDMOs, contract manufacturing organizations, or CMOs, and contract research organizations, or CROs, with significant exposure to this segment.

Drive new customer adoption of the Growth Direct platform by converting the leading manufacturers in our core markets, including but not limited to top 50 pharmaceutical companies and leading CDMOs — With the launch of our latest generation Growth Direct in 2017, over 30 global customers have adopted the Growth Direct platform to automate MQC testing in approximately 70 manufacturing facilities. We intend to drive global adoption by broadly seeking new customers in our core pharmaceutical manufacturing end markets. Our initial focus is on influential high-volume top 50 pharmaceutical companies as measured by revenue and global contract manufacturing organizations, which provide manufacturing services directly to pharmaceutical companies. Our existing customer base includes over 50% of the top twenty global pharmaceutical companies by revenue. Our target geographies include North America and

Europe and we are expanding our direct and indirect sales teams to access new customers in other geographic territories, such as Asia.

Expand implementation of the Growth Direct platform within our existing customer base by deploying additional systems across their global manufacturing site network and driving increased application utilization and consumable pull through on a system-by-system basis — We pursue a land-and-expand strategy to drive broad global adoption of our systems. Our approach begins by placing initial systems within our customers' global manufacturing network. The majority of our customers, which comprise over 50% of the top twenty global pharmaceutical companies as measured by revenue, have global operations with multiple manufacturing facilities. We guide these initial sites as they gain experience with the Growth Direct, assisting their validation of initial applications, proving the value of our systems, and establishing a relationship as a trusted and reliable vendor. Our system is specifically designed to absorb the daily MQC testing volume at our customer's facilities. We then successfully sell additional systems to support additional suites at existing sites as well as leverage our high customer satisfaction at existing facilities to drive adoption at new sites within our customers' global manufacturing network. The majority of our customers have multiple Growth Direct systems per site and across different facility locations. We accomplish this expansion via direct peer-to-peer selling facilitated by our commercial team, and by partnering with executive decision makers to execute global customer rollout agreements. We simultaneously drive increased utilization on a system-by-system basis by providing our customers our full suite of applications that can be validated and used on the Growth Direct. Moreover, our customers' strong desire to globally standardize and harmonize their MQC operations provides us a direct opportunity to grow with them, and after validating their first system we are able to install and validate more systems globally for them in a much faster time period given the initial validation process.

Increase the value of our platform by innovating and launching new applications, hardware, and software products that deliver the power of integrated automation across our customers' QC workflows — We believe the depth, scalability and robust capabilities of our Growth Direct platform allow us to address key challenges facing MQC testing in the pharmaceutical industry. As an innovative leader in automatic MQC testing, we intend to invest in further enhancements in our existing platform as well as end-to-end workflow solutions in our core market. We have a well-defined roadmap for our existing products, which includes new consumables to expand our platform's MQC testing applications, such as in sterility testing; improvements to on-board algorithms that enable greater insight from our image analysis; additional imaging modalities to unlock new testing functionality; additional system formats to accommodate new customer use cases; and new software to enable fleet management and analytics. Our product roadmap also includes new products to automate upstream and downstream workflow elements, such as microbial identification and automated sample collection, and data-rich products including data management, fleet integration, and predictive analytics. By expanding and continuously enhancing the Growth Direct platform, we believe we can drive incremental revenue from existing clients as well as broaden the appeal of our solutions to potential new customers.

Expand the Growth Direct platform into adjacent end markets with high volumes of manual MQC testing — We have identified markets that conduct high volumes of MQC testing under regulatory control and derive value from improving operational efficiency via MQC automation and we may opportunistically enter these markets. We could expand into these markets through our existing technologies, through adapting our existing technologies, or through developing new products specific to the unmet needs of adjacent markets. We have identified several market expansion opportunities which we expect to pursue in the near term, including deploying our existing Growth Direct platform into the personal care products market, in which an estimated 270 million MQC tests are performed annually, equating to an overall market of approximately $8 billion. We continuously seek to identify other market opportunities where our Growth Direct platform could enhance MQC testing.

Pursue opportunistic strategic investments, partnerships, and acquisitions — Our strong growth to date has been entirely organic as we continue to add customers to our growing install base of Growth Direct users, while also expanding our consumables and product offering to those customers. At the appropriate stage we may consider opportunistic investments, partnerships, and acquisitions which may strengthen our product platform, allow us to enter new markets, and enhance our growth profile.

Commercial

We launched the latest generation of the Growth Direct system in 2017, which includes the Growth Direct platform and consumables for three applications: environmental monitoring, water, and bioburden testing. Our principal commercial strategy since launch has been to focus on converting customers among the top fifty global pharmaceutical companies. Our land-and-expand approach concentrates on placing initial systems at leading pharmaceutical manufacturers, validating our products, driving high customer satisfaction, and then expanding throughout our customer's network of sites with more systems and applications. We have simultaneously and opportunistically pursued other important customer types outside of top fifty global pharmaceutical companies, such as CDMOs, CMOs, CROs, vaccine manufacturers, pharmacy compounders (503Bs), among others.

With this approach, we have substantially grown our customer base to over 30 global customers and have placed 116 systems and sold over 1 million consumables globally. We have customers across approximately 70 sites in 14 countries and the majority of our customers have multiple Growth Direct systems per site and across different facility locations. Our customer base includes manufacturers of biologics, including cell and gene therapies, sterile injectables, small molecule pharmaceutical manufacturers, and CDMOs, among others. We have sold to over half of the top twenty global pharmaceutical companies as measured by revenue. Moreover, we serve customers who operate some of the most complex manufacturing modalities in the world; for example, we support the manufacturers of 25% of globally approved cell and gene therapies, including 67% of approved gene-modified autologous CAR-T cell therapies. Many of our customers purchase multiple Growth Direct systems at the same time and we expect them to use these systems for many years before needing to purchase new systems. As a result, a significant portion of our annual sales currently comes from the purchase of our Growth Direct system by a small number of different customers each year. We are working to expand our new customer base and sales within existing customers' organizations to provide a steady stream of sales of our systems and to grow our recurring sales stream from consumables and service contracts.

We have a global commercial team that includes direct sales, commercial operations, validation, field services, strategic marketing, marketing communications and product management. This staff is primarily located in North America and Europe, and we also maintain direct customer support teams providing both validation and field service capabilities in the same territories. We intend to significantly expand our sales, support, and marketing efforts in the future by expanding our direct footprint in North America and Europe as well as developing a comprehensive distribution and support network in Asia where significant new market opportunities exist.

We increase awareness of our products among our target customers through direct sales calls, trade shows, seminars, academic conferences, web presence, social media and other forms of internet marketing. We supplement these traditional marketing efforts by fostering an active community of users of our products through user groups, customer advisory board meetings, forums and blogs with internally generated and user-generated content.

We employ a high-touch, customer-centric commercial approach focused on maximizing customer success. After a system sale is closed, our team works closely with customers to install systems and provide on-site validation and training support. We focus on supporting our customer's transition to an automated MQC protocol and aim to ensure customer success in routine use. We maintain high customer satisfaction through a robust service and maintenance offering, including an online phone and help desk, remote support and on-site field service.

Manufacturing and supply

Our primary manufacturing facility is located in our headquarters in Lowell, Massachusetts. The facility has over 52,000 square feet, with 20,000 square feet of manufacturing floor space that houses multiple manufacturing spaces and functions, including assembly of Growth Direct systems, an ISO-8 cleanroom with ISO-5 laminar flow hoods for consumable manufacturing, dedicated areas for media preparation. The facility has robust quality control from materials receiving to product distribution. We are working to complete a back-up manufacturing facility for consumables in Lexington, Massachusetts.

We believe that our manufacturing capacity is sufficient to meet our near-term growth targets for both systems and consumables. Our consumables manufacturing operation, in particular, is designed to meet the demands of high-volume

media supply necessary to serve our market. It is centered around a state-of-the-art automated production line that we believe has enough capacity to support near and medium-term growth. To support continuous supply for our customers, we have manufacturing redundancies and maintain inventory in multiple locations, including our Lowell headquarters, a second redundant storage location in the metropolitan Boston area, and at our third-party logistics, or 3PL, warehouses in Schiphol, Netherlands and Frankfurt, Germany.

Our manufacturing strategy includes direct manufacturing of certain products, and third-party outsourcing for certain components and subassemblies. We obtain components and subassemblies for our Growth Direct systems from multiple third-party suppliers and contract manufacturers. While some of these components are sourced from a single supplier, we have qualified second sources for several of our critical parts. We believe that having dual sources for our critical components helps reduce the risk of a production delay caused by a disruption in the supply of a critical component. We perform final assembly, commissioning, and inspection of the systems in our Lowell facility before shipping to customers. Our consumable plate assemblies and lids are manufactured to our specifications by manufacturing partners. We procure media from third-party suppliers and fill and assemble the final consumables in our Lowell facility. We contract with third party vendors to sterilize our consumables before shipping to customers.

We continue to invest in our manufacturing capabilities to increase capacity ahead of future growth, to ensure continuity of supply, and to make order fulfillment consistent and convenient for our customers. Our future manufacturing plans may include expansion of our existing facilities, additional global sites, additional automation lines, and further manufacturing redundancy plans. We are continually evaluating our supply chain and may proactively optimize certain aspects of our manufacturing and supply chain footprint to meet our business objectives.

License agreement

License agreement with Thermo Fisher

In May 2013, we entered into a patent license agreement, or the Thermo Fisher license agreement, with Thermo CRS, Ltd., or Thermo Fisher, pursuant to which we obtained a non-exclusive, worldwide, royalty-bearing, non-sublicensable license under Thermo Fisher's patent rights relating to robotic devices. Pursuant to the Thermo Fisher license agreement, we paid Thermo Fisher one-time fees in the aggregate of $125,000 and are also obligated to pay royalties at a fixed dollar amount ranging from the low to mid four figures for our sale of each system containing the licensed products, subject to increase or decrease upon certain events. The Thermo Fisher license agreement will remain in effect until the last to expire of the licensed patent rights.

Intellectual property

Our success depends in part on our ability to obtain and maintain intellectual property protection for our products and technology, including by seeking and maintaining patent protection, protecting our trade secrets and other proprietary information, obtaining and maintaining our licenses to use intellectual property owned by third parties, and continually evaluating third-party technologies for further licensing opportunities. We also seek trademark protection where appropriate to protect the names that identify us as the source of our products and services.

We own certain patents, patent applications and intellectual property and license certain patents and other intellectual property from third parties. We have also entered into certain supply and commercial agreements with various vendors and suppliers under which we receive rights to their intellectual property for use in our products. Our material licenses with Thermo Fisher are described in more detail above.

As of December 31, 2021, we own 7 granted patents in the United States, 77 issued patents in foreign jurisdictions, including Australia, Canada, China, countries in Europe, and Japan and Mexico, and 5 pending patent applications in the United States. Our issued patents and pending patent applications cover our technologies and products, including machines, manufactures, compositions of matter, and methods of use with respect thereto, related to the Growth Direct platform. Additionally, as of December 31, 2021, we license three issued patents in the United States, Canada and Europe from Thermo Fisher relating to a robotic carousel workstation. The issued patents that we own or that we in-license from Thermo Fisher and any patents that may issue from pending applications that we own have expiration dates

or, in the case of patent applications, projected statutory expiration dates, between 2022 and 2033, excluding, with respect to patents that may be issued from our patent applications, any additional term for patent term adjustments or patent term extensions, if applicable.

The term of our patents depends upon the laws of the countries in which they are obtained and commonly ends 20 years from the earliest date of filing of a non-provisional patent application. A provisional patent application is not eligible to become an issued patent until, among other things, we file a non-provisional patent application within 12 months of the filing date of the provisional patent application. If we do not timely file non-provisional patent applications, we may lose our priority date with respect to our provisional patent applications and any patent protection on the inventions disclosed in our provisional patent applications. In the United States, patent term adjustments may be available depending upon the time the United States Patent and Trademark Office takes to examine and eventually issue a patent. The protection of patents may vary on a country-by-country and claim-by-claim basis, which can vary the scope of protection afforded by such patents. In addition, we must generally pay fees to maintain our patents annually or at other specified intervals or risk the patent lapsing. We cannot provide any assurance that any of our current or future owned or licensed patent applications will result in the issuance of patents, or that any of our current or future owned or licensed issued patents will effectively protect any of our products or technology or prevent others from commercializing competitive products or technology.

Competition

As a life sciences technology company, we face competition from a wide array of companies in the pharmaceutical manufacturing industry. This competition includes both small companies and large companies with greater financial and technical resources and longer operating histories than our own.

Our competitors may have significantly greater financial resources, established presence in the market, and expertise in research and development, manufacturing, and sales and marketing than we do. These competitors also compete with us in recruiting and retaining qualified engineering, sales, marketing and management personnel, as well as in acquiring technologies complementary to, or necessary for, our programs. Smaller or early-stage companies may also prove to be significant competitors, particularly if they establish collaborative arrangements with large companies.

The key competitive factors affecting the success of the products that we develop are likely to be the continued growth of our market position, our ability to expand our integration with existing customers, our ability to develop new products and improve our existing products, and our ability to grow our sales and marketing capabilities. Our commercial opportunity for any of our products could be reduced or eliminated if our competitors develop and commercialize products that are more effective, are more convenient, or are less expensive than our products, or if they are able to more effectively integrate their systems with customers before we do.

We primarily compete with established manufacturers of traditional MQC testing products, such as petri dishes, incubators, and other manual testing equipment, which our products aim to displace. These companies include bioMerieux, Becton Dickinson, Charles River Labs, Merck Millipore and Thermo Fisher. We also compete with a limited number of companies that have or are attempting to enter the MQC testing market with alternative automated solutions, such as Interscience, which has developed a partially-automated system for MQC testing. There are also several established companies in the bioprocessing technology market with whom we do not currently compete, but that could develop products that will compete with us in the future. Many of the established companies have substantially greater financial and other resources than us, including larger research and development teams or more established marketing and sales and commercial teams.

Seasonality

Our revenues typically increase progressively over the course of each calendar year, with the first quarter being the lowest and the fourth quarter being the highest revenue quarter in the year. However, our revenues can vary from quarter to quarter as a result of seasonality, including factors such as our customers' budgetary cycles and our customers' budgetary cycles and extended summer vacation periods that could impact our ability to deliver products and provide

onsite services to our customers during those periods. Our revenues in fiscal year 2021 were not indicative of our typical seasonality due to the Omicron variant which intensified during the latter part of the fourth quarter of 2021 and contributed to our revised guidance for the fourth quarter and fiscal year ending December 31, 2021. We expect this seasonality to continue for the foreseeable future, which may cause fluctuations in our operating results and financial metrics. However, our seasonality trends may vary in the future as our revenue mix shifts from non-recurring to recurring revenues.

Government regulation

We provide products and services used for quality-control testing in pharmaceutical product and medical device manufacturing. Although our Growth Direct platform is not directly subject to regulation by the FDA, our customers' products and product candidates are subject to extensive regulation by the FDA and other federal and state authorities in the United States, as well as comparable authorities in foreign jurisdictions. In the United States, many of our customers' products are regulated as either medical devices or drugs under the Federal Food, Drug, and Cosmetic Act, or FDCA, and its implementing regulations, or as biological products under the FDCA and the Public Health Service Act, or PHSA, and their implementing regulations, each as amended and enforced by the FDA. The FDA regulates the development, design, non-clinical and clinical research, manufacturing, safety, efficacy, labeling, packaging, storage, installation, servicing, recordkeeping, premarket clearance or approval, adverse event reporting, advertising, promotion, marketing and distribution, and import and export of medical devices, drugs and biological products to ensure that such products distributed domestically are safe and effective for their intended uses and otherwise meet the applicable requirements of the FDCA and PHSA. Failure to comply with the applicable U.S. requirements at any time during the product development process, approval process or after approval, may subject an applicant or manufacturer to administrative or judicial civil or criminal sanctions and adverse publicity.

The manufacture of our Growth Direct system and our consumables is subject to compliance with regulatory systems, standards, guidance and other requirements, as appropriate, including, but not limited to, laws and regulations for safe working conditions and certifications from the International Organization for Standardization. Our products are also subject to various federal, state, local, and foreign laws, regulations and recommendations, relating to the safe and proper use, transportation and disposal of hazardous or potentially hazardous substances. In addition, U.S. and international import and export laws and regulations, including those enforced by the U.S. Departments of Commerce, State and Treasury and OFAC, require us to abide by certain standards relating to the cross-border transit of finished goods, raw materials and supplies and the handling of related information. Our logistics activities must comply with the rules and regulations of the Department of Transportation, the Department of Homeland Security, Department of Commerce, Department of Defense, and the Federal Aviation Administration and similar foreign agencies. We are also subject to various other laws and regulations concerning the conduct of our foreign operations, including the Foreign Corrupt Practices Act and other anti-bribery laws as well as laws pertaining to the accuracy of our internal books and records. We also contract and may in the future contract with the U.S. government. As such, we are subject to certain laws and regulations applicable to companies doing business with the government, as well as with those concerning government contracts, including being subject to potential investigation for compliance with government contract regulations.

Human capital resources

As of December 31, 2021, we had 202 full-time employees across the globe, of which 60 were engaged in sales and marketing, 29 in research and development, and 61 in manufacturing and services. None of our employees are covered by a collective bargaining agreement. We consider our relationships with our employees to be good.

We believe we are attracting and developing a diverse, equitable and inclusive work environment for our employees. We value diversity at all levels and continue to focus on expanding our diversity and inclusion initiatives from candidate attraction, employee onboarding and employee experience. We saw diversity levels increase across all levels within our Company year-over-year, including our professional and leadership positions. In 2022, we are focused on continuing to build our Company culture, to continue to enrich our employee experience.

Our key human capital objectives in managing our business include attracting, developing and retaining top talent while integrating diversity, equity and inclusion principles and practices into our core values.

We strive to attract a pool of diverse and exceptional candidates and support their career growth once they become employees. We also emphasize in our evaluation and career development efforts internal mobility opportunities for employees to drive profession development for every employee, which we believe also drives our retention efforts.

Our principles of accountability, honesty, integrity and customer-focused, serve as our cultural pillars. We focus our efforts on creating a collaborative environment where our colleagues feel respected and valued. We provide our employees with competitive compensation, opportunities for equity ownership and a robust employment package, including health care, disability and long-term planning insurance, retirement planning and paid time off. In addition, we regularly interact with our employees to gauge employee satisfaction and identify areas of focus.

Additional information

Rapid Micro Biosystems, Inc., a Delaware corporation, was incorporated in December 2006. We completed our initial public offering of our Class A common stock in July 2021.

Our Internet address is *www.rapidmicrobio.com*. At our Investor Relations website, *investors.rapidmicrobio.com*, we make available free of charge a variety of information for investors, including our annual report on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K and any amendments to those reports, as soon as reasonably practicable after we electronically file that material with or furnish it to the Securities and Exchange Commission, or SEC. The information found on our website is not part of this or any other report we file with, or furnish to, the SEC. In addition, our filings with the SEC may be accessed through the SEC's Interactive Data Electronic Applications system at *www.sec.gov*. All statements made in any of our securities filings, including all forward-looking statements or information, are made as of the date of the document in which the statement is included, and we do not assume or undertake any obligation to update any of those statements or documents unless we are required to do so by law.

Item 1A. Risk Factors.

Our business involves significant risks. Stockholders should carefully consider the risks and uncertainties described below and the other information in this Annual Report on Form 10-K. Our business, financial condition, results of operations, or prospects could be materially and adversely affected if any of these risks occurs, and as a result, the market price of our Class A common stock could decline and stockholders could lose all or part of their investment. This Annual Report on Form 10-K also contains forward-looking statements that involve risks and uncertainties. See "Forward-Looking Statements." Our actual results could differ materially and adversely from those anticipated in these forward-looking statements as a result of certain important factors, including those set forth below.

Risks Related to Our Financial Position and Need for Capital

We have incurred significant losses since inception, we expect to incur losses in the future and we may not be able to generate sufficient revenue to achieve and maintain profitability.

We have incurred significant losses since our inception. For the years ended December 31, 2021 and 2020, we incurred net losses of $73.5 million and $37.1 million, respectively. As of December 31, 2021, we had an accumulated deficit of $315.1 million. We expect that our operating expenses will continue to increase as we grow our business and will also increase as a result of our becoming a public company. Since our inception, we have financed our operations primarily from private placements of our convertible preferred stock, the incurrence of indebtedness, our initial public offering, and to a lesser extent, revenue derived from our Growth Direct platform and non-commercial contracts. We have devoted substantially all of our resources to the development and commercialization of our Growth Direct platform and to development activities related to advancing and expanding our technological capabilities. We will need to generate significant additional revenue to achieve and sustain profitability, and even if we achieve profitability, we cannot be sure that we will remain profitable for any substantial period of time. We may never be able to generate sufficient revenue to achieve or sustain profitability and our recent and historical growth should not be considered indicative of our future performance.

Our limited operating history makes it difficult to evaluate our future prospects and the risks and challenges we may encounter.

We were established in 2006 and launched our current second-generation Growth Direct platform in 2017 for which we are continuing to grow our manufacturing and sales and marketing capabilities. Consequently, predictions about our future success or viability may not be as accurate as they could be if we had a longer operating history. While our product and services revenue has increased, if our growth strategy is not successful, we may not be able to continue to grow our revenue or operations. Our limited operating history, evolving business and rapid growth make it difficult to evaluate our future prospects and the risks and challenges we may encounter, and we may not continue to grow at or near historical rates.

In addition, as a business with a limited operating history, we may encounter unforeseen expenses, difficulties, complications, delays and other known and unknown challenges. We are transitioning to a company capable of supporting commercial manufacturing, sales and marketing at scale. We may not be successful in such a transition and, as a result, our business may be adversely affected.

Our success depends on the success of our Growth Direct platform, which may not be achieved or maintained.

Our ability to achieve and maintain commercial market acceptance of our Growth Direct platform will depend on a number of factors, including:

- significant acceptance by drug manufacturers of automated microbial quality control, or MQC, testing;
- our ability to increase awareness of the capabilities of automated MQC testing and our technology and solutions;

- our customers' willingness to adopt new technologies and workflows;
- our ability to integrate our platform with our customers' existing workflows, including related to regulatory validation processes;
- whether our platform reliably provides advantages over the conventional, manual method of MQC testing and other automated technologies and is perceived by customers to be cost effective;
- the continued growth of the pharmaceutical and biopharmaceutical industry, in particular biologics, cell and gene therapies;
- our ability to execute on our business strategy, including continuing to expand in the market for cell and gene therapies;
- the rate of adoption of our platform and solutions by drug manufacturers;
- prices we charge for our systems and consumables;
- the relative reliability and robustness of our platform as a whole and the components of our platform;
- our ability to develop new products for existing customers and to expand our capabilities within the MQC testing workflow;
- our ability to expand the use of our platform with existing customers;
- other competitive automated MQC testing platforms; and
- the impact of our investments in product innovation and commercial growth.

We cannot assure our stockholders that we will be successful in addressing each of these criteria or other criteria that might affect the market acceptance of our products. If we are unsuccessful in achieving and maintaining commercial market acceptance of our Growth Direct platform, our business, financial condition, results of operations and prospects could be adversely affected.

Our operating results have fluctuated significantly in the past and will fluctuate significantly in the future, which makes our future operating results difficult to predict and could cause our operating results to fall below expectations.

Our quarterly and annual operating results have fluctuated significantly in the past and may fluctuate significantly in the future, which makes it difficult for us to predict our future operating results. These fluctuations may occur due to a variety of factors, many of which are outside of our control, including, but not limited to:

- our customers' tendency to purchase our Growth Direct system, including multiple systems, in a single transaction, resulting in significant variations in sales of our systems over time;
- the level of demand for our platform and solutions, which may vary significantly;
- the length of time of the sales cycle for purchases of our systems;
- seasonality in our business due to our customers' budgetary cycles and time off during the summer vacation;

- lead time needed for validation prior to our customers' using and purchasing our consumables;
- changes in demand for our consumables;
- the timing and cost of, and level of investment in, technology development and commercialization activities, which may change from time to time;
- the start and completion of manufacturing runs;
- the relative reliability and robustness of our platform;
- the introduction of new products or product enhancements by us or others in our industry;
- expenditures that we may incur to acquire, develop or commercialize additional products and technologies;
- expenditures involved in preparing, filing, prosecuting, maintaining, defending and enforcing patent claims;
- future accounting pronouncements or changes in our accounting policies; and
- general market conditions and other factors, including factors, such as inflation, unrelated to our operating performance or the operating performance of our competitors.

For example, we experienced a decrease in our installation of Growth Direct systems in 2020 due to the shutdown of a number of our customers due to the COVID-19 pandemic and the rapid onset of the Omicron variant impacted system placements in the second half of the fourth quarter of 2021. The effect of one of the factors discussed above, or the cumulative effects of a combination of factors discussed above, could result in large fluctuations and unpredictability in our quarterly and annual operating results. As a result, comparing our operating results on a period-to-period basis may not be meaningful. Investors should not rely on our past results as an indication of our future performance.

Our revenue has been primarily generated from sales of our Growth Direct system, proprietary consumables and laboratory information management system, or LIMS, connection software, which require a substantial period of time to generate recurring revenue.

Product revenue, comprised of sales of our Growth Direct system, proprietary consumables and LIMS connection software, accounted for 66.8% and 68.4% of total revenue for the years ended December 31, 2021 and 2020, respectively. We expect that sales of these products will continue to account for a substantial portion of our revenue and will increase as we grow our customer base and expand our business with existing customers. The Growth Direct system is fully functional for use by the customer upon delivery, as such we recognize revenue for sales of our Growth Direct system upon transfer of control of the system to the customer. After a system is placed with a customer and installed, validation services start to be provided, which typically can take anywhere from three to nine months. Once a system is validated, we generally expect our customers to transition from the traditional manual method of MQC testing to our automated method and begin regular utilization of consumables over a period of up to three months. Therefore, there can be a period of up to 12 months or more between installation of a system and revenue being generated from the regular sale of consumables for that system. As a result, it can be difficult for us to forecast our product revenue and there may be an extended period of time before we receive recurring revenue from sales of consumables. We may also experience fluctuations in our product revenue, which could have an adverse effect on our financial position.

If we cannot maintain the level of sales of our Growth Direct systems or the sales of our consumables and service contracts to existing customers declines, our future operating results would be adversely affected.

In the years ended December 31, 2021 and December 31, 2020, 16.7% of our revenue was generated from one customer, and 46.1% of our revenue was generated from three customers, respectively. The revenue generated from

these customers was primarily derived from sales of our Growth Direct system. Many of our customers purchase multiple Growth Direct systems at the same time and we expect them to use these systems for many years before needing to purchase new systems. Our ability to generate revenue depends on our ability to sell our Growth Direct system to new customers or expand the use of our system by existing customers. As a result, in the near term, we expect a significant portion of our revenue to primarily be generated from a small number of different customers each year. We also rely on consumables and service contracts as a source of recurring revenue from our existing customers. These consumables and service contracts are purchased on an as-needed basis and, as a result, revenue from these sources may be subject to change, as customers' purchasing practices and policies change or their demand for our consumables and service contracts change. If we are unable to sell our Growth Direct system to new customers, if our existing customers don't expand their use of our system, or if our existing customers decide to purchase fewer of our consumables and service contracts or terminate their relationships with us, our revenue could significantly decrease, which would have an adverse effect on our financial condition and results of operations and could adversely impact our ability to execute on our growth strategy.

We may need to raise additional capital to fund our existing operations, improve our platform or develop and commercialize new products or expand our operations.

We expect to spend significant amounts to expand our existing operations, to continue to improve our Growth Direct platform and to develop new products and consumables. Based upon our current operating plan, we believe that the net proceeds from our initial public offering, or IPO, and our existing cash, cash equivalents, and investments of $203.5 million, and anticipated cash flow from operations, will enable us to fund our operating expenses and capital expenditure requirements for at least twelve months following the date these consolidated financial statements were issued. This estimate and our expectation regarding the sufficiency of the net proceeds from the IPO are based on assumptions that may prove to be wrong, and we could use our available capital resources sooner than we currently expect. Until such time, if ever, as we can generate sufficient revenues, we may finance our cash needs through a combination of equity offerings and debt financings or other sources. We do not currently have any committed external source of funds. In addition, we may seek additional capital due to favorable market conditions or strategic considerations, even if we believe that we have sufficient funds for our current or future operating plans.

Our present and future funding requirements will depend on many factors, including:

- our ability to achieve revenue growth;
- the cost of expanding our operations, including our manufacturing facilities, and our offerings, including our sales and marketing efforts;
- our rate of progress in launching and commercializing new products, and the cost of the sales and marketing activities associated with, establishing adoption of our Growth Direct system;
- our rate of progress in, and cost of research and development activities associated with, products in research and development;
- the effect of competing technological and market developments;
- the costs involved in preparing, filing, prosecuting, maintaining, defending and enforcing patent claims; and
- costs related to domestic and international expansion.

To the extent that we raise additional capital through the sale of equity or convertible debt securities, the ownership interests of our common stockholders will be diluted, and the terms of these securities may include liquidation or other preferences that adversely affect the rights of our common stockholders. In addition, debt financing and preferred equity financing, if available, may involve agreements that include covenants limiting or restricting our ability to take specific actions, such as incurring additional debt, making capital expenditures or declaring dividends. If we raise additional

funds through collaborations, strategic alliances or marketing, distribution or licensing arrangements with third parties, we may be required to relinquish valuable rights to our technologies, intellectual property, future revenue streams or products or grant licenses on terms that may not be favorable to us. Furthermore, any capital raising efforts may divert our management from their day-to-day activities, which may adversely affect our ability to advance product development activities. If we are unable to raise additional funds when needed, we may be required to delay, limit, reduce or terminate product development or commercialization efforts.

Repair or replacement costs due to warranties we provide on our Growth Direct system could have a material adverse effect on our business, financial condition and results of operations.

We provide a one-year limited assurance warranty on Growth Direct systems, which is included in the sales price. Existing and future warranties place us at the risk of incurring future repair or replacement costs. We establish our accrual for estimated warranty expenses based on historical information, current cost data and future forecasts. We exercise judgment in determining the expected product warranty costs, using estimated material, labor and other costs. While we believe that historical experience provides a reliable basis for estimating such warranty cost, unforeseen quality issues or component failure rates could result in future costs in excess of such estimates. As of December 31, 2021, we had an amount reserved for warranty costs of $0.6 million. Substantial amounts of warranty claims could have a material adverse effect on our business, financial condition and results of operations.

Risks Related to Our Business and Strategy

The ongoing COVID-19 pandemic has impacted, and may continue to impact, our operations and may materially and adversely affect our business and financial results.

Since late 2019, the COVID-19 pandemic has spread globally, including to the Boston, Massachusetts area, where our primary office and manufacturing facility is located. The COVID-19 pandemic continues to evolve, and has led to the implementation of various responses, including government-imposed, shelter-in-place orders, quarantines, travel restrictions and other public health safety measures. In response to the spread of COVID-19, and its variants, and in accordance with direction from state and local government authorities, we have restricted access to our facilities mostly to personnel and third parties who must perform critical activities that must be completed on-site, limited the number of such personnel that can be present at our facilities at any one time, and requested that most of our personnel work remotely. In the event that government authorities modify current restrictions, our employees conducting development or manufacturing activities may not be able to access our manufacturing space, and our core activities may be significantly limited or curtailed, possibly for an extended period of time.

As a result of the ongoing COVID-19 pandemic, we have and may in the future experience severe disruptions, including:

- interruption of or delays in receiving products and supplies from the third parties we rely on to, among other things, manufacture components for our Growth Direct system and consumables, due to staffing shortages, production slowdowns or stoppages and disruptions in delivery systems, which may impair our ability to sell our products;
- limitations on our business operations by local, state, or the federal government that could impact our ability to sell our products;
- on-site visit limitations and prohibitions imposed by customers that could impact our ability to engage in pre-sales activities, such as in-person meetings and site visits, and to provide post-sale activities, such as installation and verification, training and service and support;
- delays in customers' purchasing decisions and negotiations with customers and potential customers;

- business disruptions caused by workplace, laboratory and office closures and an increased reliance on employees working from home, travel limitations, cyber security and data accessibility, or communication or mass transit disruptions; and

- limitations on employee resources that would otherwise be focused on the conduct of our activities, including because of sickness of employees or their families or the desire of employees to avoid contact with large groups of people.

Any of these factors could severely impact our development activities, business operations and sales, or delay necessary interactions with manufacturing sites and other important contractors and customers. For example, we experienced a disruption in receiving supplies from third parties and a decrease in installations as a result of the shutdown of our customers' businesses. These and other factors arising from the COVID-19 pandemic could worsen in countries that are already afflicted with COVID-19, and its variants, could continue to spread, or could return to countries where the pandemic has been partially contained, and could further adversely impact our ability to conduct our business generally and have a material adverse impact on our operations and financial condition and results.

The extent to which the outbreak may negatively impact our operations and results of operations or those of our third party manufacturers, suppliers, collaborators or customers will depend on future developments, which are highly uncertain and cannot be predicted with confidence, such as the ultimate duration of the pandemic, subsequent waves of infection or variant strains, including the impact of the Delta and Omicron variants, the timing, availability, and effectiveness of vaccines as well as vaccination rates among the population, travel restrictions, and additional or modified government actions and private sector actions to contain the spread of COVID-19 or treat its impact, such as social distancing, quarantines, lock-downs or business closures.

The continued success of our business relies heavily on establishing and maintaining our position in the market as a leading provider of automated MQC testing.

Our future profitability will depend on our ability to successfully execute and maintain a sustainable business model and generate continuous streams of revenue. Our business model is premised on the fact that we are and will continue to be a leader in automated MQC testing and the competitive advantages our position creates. Our Growth Direct platform, among other things, is designed to reduce the amount of time for MQC testing and the opportunity for human error in what we believe is a more cost-effective manner than traditional MQC testing. However, if competitors develop and commercialize an automated MQC testing platform that is comparable to ours and are able to obtain traction with customers, we may not be able to maintain our lead position and execute our business strategy, which could adversely affect our financial position and prospects. If we are unable to expand or continue to expand our customers in new areas of drug manufacturing, such as cell and gene therapies, continue to grow market adoption of our Growth Direct platform, and maintain our position as the industry leader in automated MQC testing, our business, prospects, financial condition and results of operation could be adversely affected.

It may be difficult for us to implement our strategies for improving growth.

Our success will depend on our ability to expand our business with existing customers and to target new drug manufacturing customers to capture a greater share of the MQC testing value chain. Our ability to grow our business with existing customers will depend on our ability to broaden the application of our automated MQC testing to a larger portion of the MQC testing workflow and to increase the number of Growth Direct systems in their manufacturing facilities. Our ability to expand our business will also depend on our ability to attract new customers and to integrate our platform with new methods of manufacturing, such as cell and gene therapies. Future revenue growth will also depend on our ability to develop and market new products, technologies and solutions to meet our customers' evolving needs, as well as our ability to identify new applications and customers for our technology in additional industries beyond the drug manufacturing industry.

As we continue to scale our business, we may find that certain of our products, certain customers or certain industries may require a dedicated sales force or sales personnel with different experience than those we currently employ. Identifying, recruiting and training additional qualified personnel would require significant time, expense and

attention. If we are unable to drive new customer conversion to automated MQC and our Growth Direct platform, expand adoption of our Growth Direct platform into new industries and markets, or increase the usage and value of our platform to our customers, then our business, financial condition, results of operations and prospects could be adversely affected.

We may not successfully implement our strategy to expand our Growth Direct platform to customers who manufacture cell and gene therapies.

Our ability to execute our growth strategy to expand our Growth Direct platform to customers who manufacture cell and gene therapies depends upon our ability to integrate our platform with the novel manufacturing processes being developed for these therapies. Companies that manufacture cell and gene therapies are developing new approaches to handle this manufacturing method, including novel facility layouts, new processes and workflows, and new quality and risk management frameworks. Unlike traditional "small molecule" drug manufacturing, the manufacture of biologics, such as cell and gene therapies, is more time sensitive and subject to increased risk of contamination due to material handling and process change-over. There are also currently a small number of cell and gene therapies approved by the FDA. While we have experience providing automated MQC testing for customers that manufacture a number of these approved therapies, we may encounter challenges or unexpected issues as we apply our Growth Direct platform to testing a greater number of therapies as they are approved in future. We cannot be certain that we will be able to successfully or consistently integrate our platform with this novel manufacturing process. If we are unable to successfully expand our Growth Direct platform into this growing segment of therapeutic manufacturing, our business and financial position may be adversely affected.

The size of the markets and forecasts of market growth for automated MQC testing and other of our key performance indicators are based on a number of complex assumptions and estimates, and may be inaccurate.

We estimate annual total addressable markets and forecasts of market growth for our Growth Direct platform. We have also developed a standard set of key performance indicators in order to enable us to assess the performance of our business in and across multiple markets, and to forecast future revenue. These estimates, forecasts and key performance indicators are based on a number of complex assumptions, internal and third-party estimates and market studies, and other business data, including assumptions and estimates relating to our ability to generate revenue from the expansion of our platform into new drug manufacturing areas and new industries. While we believe our assumptions and the data underlying our estimates and key performance indicators are reasonable, there are inherent challenges in measuring or forecasting such information. As a result, these assumptions and estimates may not be correct and the conditions supporting our assumptions or estimates may change at any time, thereby reducing the predictive accuracy of these underlying factors and indicators. As a result, our estimates of the total addressable market and our forecasts of market growth for our current or future products may prove to be incorrect, and our key performance indicators may not reflect our actual performance. If the total addressable market or the potential market growth for our platform is smaller than we have estimated or if the key performance indicators we utilize to forecast revenue are inaccurate, it may impair our sales growth and have an adverse impact on our business, financial condition, results of operations and prospects.

New product development involves a lengthy and complex process and we may be unable to develop or commercialize products on a timely basis, or at all.

Products from our development programs will take time and considerable resources to develop, and may include improvements or changes to our systems, software and consumables. We may not be able to complete development and commercialize them on a timely basis, or at all. There can be no assurance that our development programs will produce commercial products and solutions and before we can commercialize any new products, we will need to expend significant funds in order to:

- conduct substantial research and development, which may include validation studies;
- further develop and scale our engineering and manufacturing processes to accommodate different products;
- further develop and scale our infrastructure to be able to analyze increasingly large amounts of data; and

- utilize data and analytical insights generated from existing Growth Direct platform in our research and development programs in order to advance these programs.

Our product development processes involve a high degree of risk, and these efforts may be delayed or fail for many reasons, including:

- failure of the product to perform as expected;
- higher costs than anticipated; and
- failure to reliably demonstrate the advantages of our products.

In addition, if we are unable to generate additional data and insights from our existing Growth Direct platforms, then we may not be able to advance these programs as quickly, or at all, or without significant additional investment, all of which could have a material adverse effect on our product development efforts.

Even if we are successful in developing new products, it will require us to make significant additional investments in marketing and selling resources in order to commercialize any such products. As a result, we may be unsuccessful in commercializing new products that we develop, which could adversely affect our business, financial condition, results of operations and prospects.

Our customers use our Growth Direct platform as part of their quality-control workflow, which is subject to regulation by the U.S. Food and Drug Administration, or FDA, and other comparable regulatory authorities.

We provide products and services used for quality-control testing in pharmaceutical product manufacturing. Our customers are subject to extensive regulations by the FDA and similar regulatory authorities in other countries, including, for example, cGMP regulations and associated requirements to validate the methods used to manufacture their products. To meet their regulatory compliance requirements, our customers have implemented quality-control workflows to monitor for microbial growth and contamination. While our Growth Direct platform is not regulated directly by the FDA or other comparable authorities and we have not verified our Growth Direct platform for compliance with such regulations, we have designed our platform to be integrated as part of a compliant quality-control workflow. If our Growth Direct platform is unable to meet regulatory standards for compliance or we are unable to update our platform to meet new regulatory requirements, we will lose customers and our business will be adversely affected. While under our agreements with our customers we are not liable for non-compliance of our Growth Direct platform, if a customer experienced a compliance failure due to our Growth Direct platform, our reputation could be harmed and our business prospects adversely affected.

If we are unable to support demand for the Growth Direct platform, and for our future product offerings, including ensuring that we have adequate capacity to meet increased demand, our business could suffer.

As the number of customers using the Growth Direct platform grows and our volume of installed systems increases, we will need to continue to increase our capacity for customer service and support, including maintenance services of our systems, and expand our manufacturing capabilities. As a result, we will also need to purchase additional equipment, some of which can take several months or more to procure, setup and validate, and increase our personnel levels to meet increased demand. There is no assurance that any of these increases in scale, expansion of personnel, equipment, manufacturing or services will be successfully implemented, or that we will have adequate space, including in our manufacturing facility, to accommodate such required expansion.

As we commercialize additional products, we will need to incorporate new equipment, implement new technology systems and processes, and hire new personnel, possibly with supplemental or different qualifications as compared to our current personnel. Failure to manage this growth or transition could result in product delays, higher cost of product revenue, declining product quality, deteriorating customer service and slower responses to competitive challenges. A failure in any one of these areas could make it difficult for us to meet market expectations for our products and could damage our reputation and the prospects for our business.

We have limited experience in marketing and sales, and if we are unable to expand our marketing and sales organization to adequately address our customers' needs or to expand our customer base, our business may be adversely affected.

We have limited experience in marketing and selling our products and we currently rely on a small team to make direct sales in countries around the world. In order to support our planned growth, we will need to rapidly increase our sales and marketing team. Competition for employees capable of selling expensive instruments within the drug manufacturing industry is intense. There are significant expenses and risks involved with having our own sales and marketing team, including our ability to hire, train, retain, and appropriately incentivize a sufficient number of qualified individuals, generate sufficient sales leads and provide our sales and marketing team with adequate access to customers who may want to purchase our products, effectively manage a geographically dispersed sales and marketing team, and other unforeseen costs and expenses. We may not be able to attract and retain personnel or be able to build an efficient and effective sales organization, which could negatively impact sales and market acceptance of our products and limit our revenue growth and potential profitability. In addition, the time and cost of establishing a specialized sales, marketing and service force for a particular product or service may be difficult to justify in light of the revenue generated or projected.

We may also choose to engage distributors for the sale of our products. We would exert limited control over these distributors, and if their sales and marketing efforts for our products are not successful, our business would be materially and adversely affected. We may not be successful in locating, qualifying and engaging distributors with local industry experience and knowledge, or we may not be able to enter into arrangements with them on favorable terms. Even if we are successful in identifying distributors, such distributors may engage in sales practices that violate local laws or our internal policies. Furthermore, sales practices utilized by any such distributors that are locally acceptable may not comply with sales practices standards required under U.S. laws that apply to us, which could create additional compliance risk.

We may be unable to manage our future growth effectively, which could make it difficult to execute our business strategy.

We have experienced rapid growth in our product and service revenue and anticipate further growth in our business operations. Our growth has required significant time and attention from our management, and placed strains on our operational and manufacturing systems and processes, financial systems and internal controls and other aspects of our business. We expect to continue to increase headcount and to hire more specialized personnel in the future as we grow our business. We will need to continue to hire, train and manage additional qualified engineers, client and account services personnel and sales and marketing staff and improve and maintain our technology to properly manage our growth. We may also need to hire, train and manage individuals with expertise that is separate, supplemental or different from expertise that we currently have, and accordingly we may not be successful in hiring, training and managing such individuals. If our new hires perform poorly, if we are unsuccessful in hiring, training, managing and integrating these new employees, or if we are not successful in retaining our existing employees, our business may be harmed.

Developing and launching new products and innovating and improving our existing products have required us to hire and retain additional engineering, sales and marketing, software, manufacturing, distribution and quality assurance personnel. As a result, we have experienced rapid headcount growth. As we have grown, our employees have become more geographically dispersed. We serve customers located in multiple countries and plan to continue to expand to new countries as part of our growth strategy, which will lead to increased dispersion of our employees, including sales employees and employees who are in our service and support groups. Moreover, we expect that we will need to hire additional accounting, finance, legal and other personnel in connection with our becoming, and our efforts to comply with the requirements of being, a public company. As a public company, our management and other personnel will need to devote a substantial amount of time towards maintaining compliance with these requirements. We may face challenges integrating, developing and motivating our rapidly growing and increasingly dispersed employee base.

We may not be able to maintain the quality, reliability or robustness of our platform, or the expected turnaround times of our services and support, or to satisfy customer demand as it grows. Our ability to manage our growth properly will require us to continue to improve our operational, financial and management controls, as well as our reporting

systems and procedures. To effectively manage our growth, we must continue to improve our operational and manufacturing systems and processes, our financial systems and internal controls and other aspects of our business and continue to effectively expand, train and manage our personnel. The time and resources required to improve our existing systems and procedures, implement new systems and procedures and to adequately staff such existing and new systems and procedures is uncertain, and failure to complete such activities in a timely and efficient manner could adversely affect our operations and negatively impact our business and financial results.

If we cannot compete successfully, we may be unable to increase or sustain our revenue, or achieve and sustain profitability.

We currently primarily compete with established companies that provide consumables for MQC testing and with a limited number of established and early-stage companies that have automated MQC testing systems. In addition, our customers may also elect to continue to use the traditional MQC testing method rather than our platform and may decide to stop using our platform.

Our competitors and potential competitors may enjoy a number of competitive advantages over us, including:

- longer operating histories;
- larger customer bases;
- greater brand recognition and market penetration;
- greater financial resources;
- greater technological and research and development resources;
- better system reliability and robustness;
- greater selling and marketing capabilities; and
- better established, larger scale and lower cost manufacturing capabilities.

As a result, our competitors and potential competitors may be able to respond more quickly to changes in customer requirements, devote greater resources to the development, promotion and sale of their platforms or instruments than we can or sell their platforms or instruments, or offer services competitive with our platform and services at prices designed to win significant levels of market share. We may not be able to compete effectively against these organizations.

In addition, competitors may be acquired by, receive investments from or enter into other commercial relationships with larger, well-established and well-financed companies. Certain of our competitors may be able to secure key inputs from vendors on more favorable terms, devote greater resources to marketing and promotional campaigns, adopt more aggressive pricing policies and devote substantially more resources to product development than we can. Further, competition in the automated MQC testing market, while currently limited, may increase in future, and we may not be able to maintain our leading position in the industry as a result. If we are unable to compete successfully, we may be unable to increase market adoption and sales of our platform, which could prevent us from increasing our revenue or achieving profitability.

We must develop new products, adapt to rapid and significant technological change and respond to introductions of new products by competitors to remain competitive.

We sell our products in industries that are characterized by significant enhancements and evolving industry standards. As a result, our customers' needs are rapidly evolving. If we do not appropriately innovate and invest in new technologies, our products and services may become less desirable in the markets we serve, and our customers could move to new technologies offered by our competitors or decide to revert to the traditional MQC testing method. Though we believe customers in our markets display a significant amount of loyalty to their supplier of a particular product, we also believe that because of the initial time investment required by many of our customers to reach a purchasing decision for a new product, it may be difficult to regain that customer once the customer purchases a product from a competitor. Without the timely introduction of new products, services and enhancements, our offerings will likely become less competitive over time, in which case our competitive position and operating results could suffer. Accordingly, we focus significant efforts and resources on the development and identification of new technologies, products and markets to further broaden our offerings. To the extent we fail to timely introduce new and innovative products or services, adequately predict our customers' needs or fail to obtain desired levels of market acceptance, our business may suffer and our operating results could be adversely affected.

Due to the significant resources required to enable access in new markets, we must make strategic and operational decisions to prioritize certain markets, products and services. We may expend our resources to access markets and develop products and services that do not yield meaningful revenue or we may fail to capitalize on markets, products or services that may be more profitable or with a greater potential for success.

We believe our platform has potential applications across a wide range of markets and we have targeted certain markets in which we believe our technology has significant advantages or a higher probability of success or greater revenue opportunity, such as the manufacture of cell and gene therapies. We seek to maintain a process of prioritization and resource allocation among our programs to maintain a balance between advancing near-term opportunities and exploring additional markets for our platform. However, due to the significant resources required for the development of products and services for new markets, we must make decisions on which markets to pursue and the amount of resources to allocate to each. Our decisions concerning the allocation of research, development, collaboration, management and financial resources toward particular markets, products or services may not lead to the development of any viable product or service and may divert resources away from better opportunities. Similarly, we may choose to pursue certain markets, which may not be as profitable as other markets that we did not pursue due to our limited resources. As a result, our business, financial condition, results of operations and prospects could be adversely impacted.

The Growth Direct platform may contain undetected errors or defects and may not meet the expectations of our customers, which means our business, financial condition, results of operations and prospects could suffer.

Our Growth Direct platform includes the Growth Direct system, proprietary consumables and our LIMS connection software. While we rigorously test our platform and its components, there could be undetected errors or defects. Disruptions or other performance problems with our platform or with the components that comprise our platform may adversely impact our customers' manufacturing process, compliance work flow or business, harm our reputation and result in reduced revenue or increased costs associated with repairs or replacements. If that occurs, we may also incur significant costs, the attention of our key personnel could be diverted or other significant customer relations problems may arise. We may also be subject to warranty claims or breach of contract for damages related to errors or defects in our products. Additionally, we may be subject to legal claims arising from any defects or errors in our platform, and in the systems, consumables and software that comprise our platform.

Our success depends on, among other things, the market's confidence that the Growth Direct platform is capable of substantially enhancing quality control in the conduct of manufacturing activities as compared to the traditional method of MQC testing, and will enable more efficient or improved drug manufacturing. Pharmaceutical companies and contract manufacturing organizations, or CMOs, are likely to be particularly sensitive to defects and errors in the use of our platform, including if our platform fails to deliver meaningful improvements in MQC testing with results at least as good as the results generated using the traditional method of MQC testing. There can be no guarantee that our platform will meet the expectations of these companies or CMOs.

The complexity of our products and the amount of lead time required to deliver products to our customers have caused in the past, and may cause in the future, delays in releasing new products and workflows. In addition, we have experienced in the past, and may experience in the future, challenges with respect to the reliability of our systems. If there are delays in delivering our products to our customers, or if our products fail to perform as well as or better than traditional MQC testing or fail to generate reliable results for our customers, our revenue could be reduced or delayed, which could adversely affect our business, financial condition, results of operations and prospects.

These complexities also require that we train our customers to operate our Growth Direct platform, which is expensive and time consuming. Any misuse of our products, including as a result of inadequate training, could cause our products not to perform as expected or to fail to demonstrate the process advantages of our products. The training requirement may also deter some customers from utilizing our products. Any of these results could adversely affect our business, financial condition, results of operations and prospects.

Potential product liability lawsuits against us could cause us to incur substantial liabilities and limit commercialization of any products that we may develop.

The use of any product we may develop and the sale of any products exposes us to the risk of product liability claims. Product liability claims might be brought against us by pharmaceutical companies, CMOs or others selling or otherwise coming into contact with our products. If we cannot successfully defend against product liability claims, we could incur substantial liability and costs. In addition, regardless of merit or eventual outcome, product liability claims may result in:

- impairment of our business reputation and significant negative media attention;
- withdrawal of customers;
- significant costs to defend the litigation;
- distraction of management's attention from our primary business;
- substantial monetary awards to claimants;
- inability to commercialize a product;
- product recalls or withdrawals;
- decreased market demand for any product; and
- loss of revenue.

The product liability insurance we currently carry, and any additional product liability insurance coverage we acquire in the future, may not be sufficient to reimburse us for any expenses or losses we may suffer. Moreover, insurance coverage is becoming increasingly expensive and, in the future, we may not be able to maintain insurance coverage at a reasonable cost or in sufficient amounts to protect us against losses due to liability. A successful product liability claim, or series of claims, brought against us could cause our share price to decline and, if judgments exceed our insurance coverage, could adversely affect our results of operation and business, including preventing or limiting the commercialization of any products we develop.

If we lose key management, cannot recruit qualified employees, directors, officers or other significant personnel or experience increases in our compensation costs, our business may be materially harmed.

We are highly dependent on our management and directors, including our Chief Executive Officer, Robert Spignesi, among others. Due to the specialized knowledge each of our officers and key employees possesses with respect to our

products and services and our operations, the loss of service of any of our officers or directors could delay or prevent the successful sales and expansion of our platform. We do not carry key person life insurance on our Chief Executive Officer or our other officers or directors. In general, the employment arrangements that we have with our executive officers do not prevent them from terminating their employment with us at any time.

In addition, our future success and growth will depend in part on the continued service of our directors, employees and management personnel and our ability to identify, hire and retain additional personnel. If we lose one or more of our executive officers or key employees, our ability to implement our business strategy successfully could be seriously harmed. Furthermore, replacing executive officers and key employees may be difficult or costly and may take an extended period of time because of the limited number of individuals in our industry with the breadth of skills and experience required to develop, market and sell our products successfully. Competition to hire from this limited pool is intense, and we may be unable to hire, train, retain or effectively incentivize these additional key personnel on acceptable terms given the competition among numerous technology companies for similar personnel. In addition, we rely on consultants and advisors to assist us in formulating our development and commercialization strategy. Our consultants and advisors may be engaged by entities other than us and may have commitments under consulting or advisory contracts with other entities that may limit their availability to us. If we are unable to continue to attract and retain qualified personnel, our ability to develop and commercialize products will be limited.

We depend on our information technology systems, and any failure of these systems could harm our business.

We depend on information technology and telecommunications systems for significant elements of our operations, including our knowledge management system, our customer reporting, our platform, advanced automation systems, and advanced application and LIMS connection software. We have installed, and expect to expand, a number of enterprise software systems that affect a broad range of business processes and functional areas, including for example, systems handling human resources, financial controls and reporting, contract management, compliance and other infrastructure operations. These implementations can be expensive and require significant time and effort. These information technology and telecommunications systems support a variety of functions, including manufacturing operations, data analysis, quality control, customer service and support, billing, research and development activities, and general administrative activities.

Information technology and telecommunications systems are vulnerable to damage from a variety of sources, including telecommunications or network failures, malicious software, bugs or viruses, human acts and natural disasters. Moreover, despite network security and back-up measures, some of our servers are potentially vulnerable to physical or electronic break-ins, computer viruses and similar disruptive problems. Any disruption or loss of information technology or telecommunications systems on which critical aspects of our operations depend could have an adverse effect on our business and our reputation.

Security breaches, loss of data and other disruptions could compromise sensitive information related to our business or prevent us from accessing critical information and expose us to liability, which could adversely affect our business and our reputation.

In the ordinary course of our business, we collect and store sensitive data, including personal information, intellectual property and proprietary business information owned or controlled by ourselves or our employees, customers and other parties. We manage and maintain our applications and data utilizing a combination of on-site systems and cloud-based data centers. We utilize external security and infrastructure vendors to manage parts of our data centers. These applications and data encompass a wide variety of business-critical information, including research and development information, customer information, commercial information and business and financial information. We, like all companies storing business-critical information, face a number of risks relative to protecting this critical information, including loss of access risk, inappropriate use or disclosure, unauthorized access or exfiltration, inappropriate modification, inappropriate destruction, and the risk of our being unable to adequately monitor and audit and modify our controls over our critical information. This risk extends to the third-party vendors and subcontractors we use to manage this sensitive data or otherwise process it on our behalf. The secure processing, storage, maintenance and transmission of this critical information are vital to our operations and business strategy, and we devote significant resources to protecting such information. Although we take measures to protect sensitive data from unauthorized access,

use or disclosure, our information technology and infrastructure may still be vulnerable to, and we have in the past experienced, attacks by hackers or viruses or breaches due to employee error, malfeasance or other malicious or inadvertent disruptions. Further, attacks upon information technology systems are increasing in their frequency, levels of persistence, sophistication and intensity, and are being conducted by sophisticated and organized groups and individuals with a wide range of motives and expertise. As a result of the COVID-19 pandemic, we may also face increased cybersecurity risks due to our reliance on internet technology and the number of our employees who are working remotely, which may create additional opportunities for cybercriminals to exploit vulnerabilities. Furthermore, because the techniques used to obtain unauthorized access to, or to sabotage, systems change frequently and often are not recognized until launched against a target, we may be unable to anticipate these techniques or implement adequate preventative measures. While we have measures in place to detect and mitigate security breaches, they are not failproof, so we may also experience security breaches that may remain undetected for an extended period. Any such breach or interruption could compromise our networks and the information stored there could be accessed or frozen by unauthorized parties, publicly disclosed, lost or stolen. Any such access, breach, or other loss of information could result in legal claims or proceedings, including for breaches of confidential information obligations with contractual counterparties, and liability under federal or state laws that protect the privacy of personal information, and regulatory penalties. Notice of breaches may be required to affected individuals, customers, or other state, federal or foreign regulators, and for extensive breaches, notice may need to be made to the media or State Attorneys General. Such a notice could harm our reputation and our ability to compete. Although we have implemented security measures to prevent unauthorized access, such data is currently accessible through multiple channels, and there is no guarantee we can protect our data from breach. Unauthorized access, loss or dissemination could also disrupt or halt our operations and damage our reputation, any of which could adversely affect our business.

We are currently subject to, and may in the future become subject to additional, U.S., state, federal, and foreign laws and regulations imposing obligations on how we collect, store and process personal information. Our actual or perceived failure to comply with such obligations could harm our business. Ensuring compliance with such laws could also impair our efforts to maintain and expand our customer base, and thereby decrease our revenue.

We are, and may increasingly become, subject to various laws and regulations, as well as contractual obligations, relating to data privacy and security in the jurisdictions in which we operate. The regulatory environment related to data privacy and security is increasingly rigorous, with new and constantly changing requirements applicable to our business, and enforcement practices are likely to remain uncertain for the foreseeable future. These laws and regulations may be interpreted and applied differently over time and from jurisdiction to jurisdiction, and it is possible that they will be interpreted and applied in ways that may have a material adverse effect on our business, financial condition, results of operations and prospects.

In the United States, various federal and state regulators, including governmental agencies like the Federal Trade Commission, have adopted, or are considering adopting, laws and regulations concerning personal information and data security. Certain state laws may be more stringent or broader in scope, or offer greater individual rights, with respect to personal information than federal, international or other state laws, and such laws may differ from each other, all of which may complicate compliance efforts. For example, the California Consumer Privacy Act, or CCPA, which increases privacy rights for California residents and imposes obligations on companies that process their personal information, came into effect on January 1, 2020. Among other things, the CCPA requires covered companies to provide new disclosures to California consumers and provide such consumers new data protection and privacy rights, including the ability to opt-out of sales of personal information. The CCPA provides for civil penalties for violations, as well as a private right of action for certain data breaches that result in the loss of personal information. This private right of action may increase the likelihood of, and risks associated with, data breach litigation. In 2020, the California residents voted the California Privacy Rights Act (the “CPRA”) into law. The CPRA will impose additional data protection obligations on covered businesses, including additional consumer rights processes, limitations on data uses, new audit requirements for higher risk data, and opt outs for certain uses of sensitive data. The CPRA also created a new California data protection agency authorized to issue substantive regulations and could result in increased privacy and information security enforcement. The majority of the CPRA provisions will go into effect on January 1, 2023, and additional compliance investment and potential business process changes may be required. Similar laws have been proposed, and likely will be proposed, in other states and at the federal level, and if passed, such laws may have potentially conflicting requirements that would make compliance challenging.

A number of other states have proposed new privacy laws, some of which are similar to the above discussed recently passed laws. Such proposed legislation, if enacted, may add additional complexity, variation in requirements, restrictions and potential legal risk, require additional investment of resources in compliance programs, impact strategies and the availability of previously useful data and could result in increased compliance costs and/or changes in business practices and policies. The existence of comprehensive privacy laws in different states in the country would make our compliance obligations more complex and costly and may increase the likelihood that we may be subject to enforcement actions or otherwise incur liability for noncompliance.

In addition, laws in all 50 U.S. states require businesses to provide notice to consumers whose personally identifiable information has been disclosed as a result of a data breach. Internationally, laws, regulations and standards in many jurisdictions apply broadly to the collection, use, retention, security, disclosure, transfer and other processing of personal information. For example, the EU General Data Protection Regulation, or GDPR, which became effective in May 2018, greatly increased the European Commission's jurisdictional reach of its laws and adds a broad array of requirements for handling personal data. EU and the European Economic Area, or EEA, member states are tasked under the GDPR to enact, and have enacted, certain implementing legislation that adds to and/or further interprets the GDPR requirements and potentially extends our obligations and potential liability for failing to meet such obligations. The GDPR, together with national legislation, regulations and guidelines of the EU and EEA member states governing the processing of personal data, impose strict obligations and restrictions on the ability to collect, use, retain, protect, disclose, transfer and otherwise process personal data. In particular, the GDPR includes obligations and restrictions concerning the consent and rights of individuals to whom the personal data relates, the transfer of personal data out of the European Economic Area, security breach notifications and the security and confidentiality of personal data. The GDPR authorizes fines for certain violations of up to 4% of global annual revenue or €20 million, whichever is greater.

In addition, the GDPR prohibits the transfer of personal data from countries within the EU to the U.S. and other countries in respect of which the European Commission or other relevant regulatory body has not issued a so-called "adequacy decision" (known as "third countries"), unless the parties to the transfer have implemented specific safeguards to protect the transferred personal data. One of the primary safeguards used for transfers of personal data to the U.S. was the EU-U.S. Privacy Shield framework administered by the U.S. Department of Commerce. However, certain recent EU court decisions cast doubt on the ability to use one of the primary alternatives to the EU-U.S. Privacy Shield and Swiss-U.S. Privacy Shield, namely the European Commission's Standard Contractual Clauses, to lawfully transfer personal data to the U.S. and other third countries. In addition, the European Commission has recently published new versions of the Standard Contractual Clauses, which must be used for all new transfers of personal data from the EEA to third countries (including the United States) starting in September 2021, and all existing transfers of personal data from the EEA to third countries relying on the existing versions of the Standard Contractual Clauses must be replaced by December 2022. The implementation of the new Standard Contractual Clauses will necessitate significant contractual overhaul of our data transfer arrangements with customers, sub-processors and vendors. Use of both the existing and the new Standard Contractual Clauses must now be assessed on a case-by-case basis taking into account the legal regime applicable in the destination country, in particular applicable surveillance laws and rights of individuals, and additional supplementary technical, organizational and/or contractual measures and/or contractual provisions may need to be put in place.

Further, from January 1, 2021, following Brexit, companies handling personal data of individuals in the UK have to comply with the United Kingdom GDPR, or the UK GDPR, which, together with the amended UK Data Protection Act 2018, retains the GDPR in UK national law. The UK GDPR mirrors the fines under the GDPR, i.e., fines up to the greater of €20 million (£17.5 million) or 4% of global turnover. The relationship between the United Kingdom and the European Union in relation to certain aspects of data protection law remains unclear, and it is unclear how United Kingdom data protection laws and regulations will develop in the medium to longer term, and how data transfers to and from the United Kingdom will be regulated in the long term. These changes will lead to additional costs and increase our overall risk exposure. On June 28, 2021, the European Commission adopted an adequacy decision in favor of the United Kingdom, enabling data transfers from member states in the European Union to the United Kingdom without additional

safeguards. However, the United Kingdom adequacy decision will automatically expire in June 2025 unless the European Commission renews or extends that decision and remains under review by the Commission during this period.

All of these evolving compliance and operational requirements impose significant costs, such as costs related to organizational changes, implementing additional protection technologies, training employees and engaging consultants, which are likely to increase over time. In addition, such requirements may require us to modify our data processing practices and policies, distract management or divert resources from other initiatives and projects, all of which could have a material adverse effect on our business, financial condition, results of operations and prospects. Any failure or perceived failure by us to comply with any applicable federal, state or similar foreign laws and regulations relating to data privacy and security could result in damage to our reputation, as well as proceedings or litigation by governmental agencies or other third parties, including class action privacy litigation in certain jurisdictions, which would subject us to significant fines, sanctions, awards, penalties or judgments, all of which could have a material adverse effect on our business, financial condition, results of operations and prospects.

We may acquire businesses or form joint ventures or make investments in other companies or technologies that could negatively affect our operating results, dilute our stockholders' ownership, increase our debt or cause us to incur significant expense.

We may pursue acquisitions of businesses and assets. We also may pursue strategic alliances and joint ventures that leverage our technology and industry experience to expand our offerings or distribution. We have no experience with acquiring other companies and limited experience with forming strategic partnerships. We may not be able to find suitable collaborators or acquisition candidates, and we may not be able to complete such transactions on favorable terms, if at all. The competition for collaborators or acquisition candidates may be intense, and the negotiation process will be time consuming and complex. If we make any acquisitions, we may not be able to integrate these acquisitions successfully into our existing business, these acquisitions may not strengthen our competitive position, the transactions may be viewed negatively by customers or investors, we may be unable to retain key employees of any acquired business, relationships with key suppliers, manufacturers or customers of any acquired business may be impaired due to changes in management and ownership, and we could assume unknown or contingent liabilities. Any future acquisitions also could result in the incurrence of debt, contingent liabilities or future write-offs of intangible assets or goodwill, any of which could have a material adverse effect on our business, financial condition, results of operations and prospects. We cannot guarantee that we will be able to fully recover the costs of any acquisition. Integration of an acquired company also may disrupt ongoing operations and require management resources that we would otherwise focus on developing our existing business. We may not realize the anticipated benefits of any acquisition, technology license, strategic alliance or joint venture. We also may experience losses related to investments in other companies, which could have a material adverse effect on our business, financial condition, results of operations and prospects.

To finance any acquisitions or joint ventures, we may choose to issue shares of our common stock as consideration, which would dilute the ownership of our stockholders. Additional funds may not be available on terms that are favorable to us, or at all. If the price of our Class A common stock is low or volatile, we may not be able to acquire companies or fund a joint venture project using our stock as consideration.

Our insurance policies are expensive and protect us only from some business risks, which leaves us exposed to significant uninsured liabilities.

We do not carry insurance for all categories of risk that our business may encounter and our policies have limits and significant deductibles. Some of the policies we currently maintain include general liability, property, umbrella and directors' and officers' insurance.

Any additional product liability insurance coverage we acquire in the future, may not be sufficient to reimburse us for any expenses or losses we may suffer. Moreover, insurance coverage is becoming increasingly expensive and in the future we may not be able to maintain insurance coverage at a reasonable cost or in sufficient amounts to protect us against losses. A successful product liability claim or series of claims in which judgments exceed our insurance coverage

could adversely affect our business, financial condition, results of operations and prospects, including preventing or limiting the commercialization of any products we develop.

We also expect that operating as a public company will make it more difficult and more expensive for us to obtain director and officer liability insurance, and we may be required to accept reduced policy limits and coverage or incur substantially higher costs to obtain the same or similar coverage. As a result, it may be more difficult for us to attract and retain qualified people to serve on our board of directors, our board committees or as executive officers. We do not know, however, if we will be able to maintain existing insurance with adequate levels of coverage. Any significant uninsured liability may require us to pay substantial amounts, which would adversely affect our business, financial condition, results of operations and prospects.

International expansion of our business exposes us to business, regulatory, political, operational, financial and economic risks associated with doing business outside of the United States.

We currently have limited international operations, but our business strategy incorporates potentially significant international expansion. We currently maintain a small sales force internationally and engage one distributor. We also have relationships with customers outside of the United States and may in the future expand our international customer base. Doing business internationally involves a number of risks, including:

- multiple, conflicting and changing laws and regulations such as privacy regulations, tax laws, export and import restrictions, tariffs, economic sanctions and embargoes, employment laws, regulatory requirements and other governmental approvals, permits and licenses;
- failure by us or our distributors to obtain approvals to conduct our business in various countries;
- differing intellectual property rights;
- complexities and difficulties in obtaining intellectual property protection, enforcing our intellectual property and defending against third-party intellectual property claims;
- difficulties in staffing and managing foreign operations;
- logistics and regulations associated with shipping systems and parts and components for systems and consumables, as well as transportation delays;
- travel restrictions that limit the ability of marketing, presales, sales, services and support teams to service customers;
- financial risks, such as longer payment cycles, difficulty collecting accounts receivable, the impact of local and regional financial crises on demand and payment for our products and exposure to foreign currency exchange rate fluctuations;
- international trade disputes that could result in tariffs and other protective measures;
- natural disasters, the severity and frequency of which may be amplified by global climate change, political and economic instability, including wars, terrorism and political unrest, outbreak of disease, boycotts, curtailment of trade and other business restrictions; and
- regulatory and compliance risks, including severe penalties such as criminal and civil penalties, disgorgement and other remedial measures, that relate to the U.S. Foreign Corrupt Practices Act, the U.K. Bribery Act 2010 and similar anti-bribery and anticorruption laws in other jurisdictions.

Any of these factors could significantly harm our future international expansion and operations and, consequently, our business, financial condition, results of operations and prospects. In addition, certain international markets are

subject to significant political and economic uncertainty, including for example the effect of the withdrawal of the United Kingdom from the European Union. Significant political and economic developments in international markets for which we intend to operate, or the perception that any of them could occur, creates further challenges for operating in these markets in addition to creating instability in global economic conditions.

Certain legal and political risks are also inherent in foreign operations. There is a risk that foreign governments may nationalize private enterprises in certain countries where we may operate. In certain countries or regions, terrorist activities and the response to such activities may threaten our operations more than in the United States. Social and cultural norms in certain countries may not support compliance with our corporate policies, including those that require compliance with substantive laws and regulations. Also, changes in general economic and political conditions in countries where we may operate are a risk to our financial performance and future growth. Additionally, the need to identify financially and commercially strong collaborators and customers for operations outside the United States who will comply with the high legal and regulatory standards we require is a risk to our financial performance. As we operate our business globally, our success will depend, in part, on our ability to anticipate and effectively manage these and other related risks. There can be no assurance that the consequences of these and other factors relating to our international operations will not have an adverse effect on our business, financial condition or results of operations.

Changing expectations for inflation and deflation and corresponding fluctuations in interest rates could impact our ability to place our Growth Direct systems with customers, as well as increase certain operating costs, such as employee compensation.

There is particular uncertainty about the prospects for growth in the global economy. A number of factors influence the potential uncertainty, including, but not limited to, rising government debt levels, prospective executive branch or Federal Reserve policy shifts, the withdrawal of government interventions into the financial markets, and changing expectations for inflation and deflation which may impact interest rates. For example, at its March 2022 Federal Open Market Committee Meeting, the Federal Reserve raised benchmark interest rates and expressed its expectation that additional increases will be made in 2022, partially in response to increasing inflation and a strong labor market. Increased interest rates may decrease demand for our Growth Direct systems, as our customers may face economic uncertainty as a result. A change in demand for our products and any steps we may take to mitigate such change could impact our overall growth. Furthermore, inflation and other economic pressures could negatively affect our financial condition, results of operations, cash flows and future prospects.

In operating our business, we may experience inflationary pressures on significant cost categories including labor, materials and freight. An inflationary environment, including factors such as tight labor markets and increasing freight and materials prices, could make it more costly for us to do business. In order to meet the compensation expectations of our prospective and current employees due to inflationary factors, we may be required to increase our labor costs, including wages and employee benefits, or risk losing skilled workers to competitors. In addition, changes in global shipping capacity and demand as well as the cost of raw materials and commodities such as oil (including derivative products including fuel and plastics) could negatively impact our freight and materials costs. If we see additional pressure on our labor, materials and freight costs, we could see negative effects on our results of operations (including product costs), cash flows and overall financial condition.

Global economic and political instability and conflicts, such as the conflict between Russia and Ukraine, could adversely affect our business, financial condition or results of operations.

Our business could be adversely affected by unstable economic and political conditions within the United States and foreign jurisdictions and geopolitical conflicts, such as the conflict between Russia and Ukraine. While we do not have any customer or direct supplier relationships in either country at this time, the current military conflict, and related sanctions, as well as export controls or actions that may be initiated by nations including the United States, the European Union or Russia (e.g., potential cyberattacks, disruption of energy flows, etc.) and other potential uncertainties could adversely affect our business and/or our supply chain, business partners or customers, and could cause demand for our products to be volatile, cause abrupt changes in our customers buying patterns, interrupt our ability to supply products, limit customers' access to financial resources and ability to satisfy obligations to us, or otherwise adversely impact our

ability to place our Growth Direct systems. In the event geopolitical tensions fail to abate or deteriorate further, additional governmental sanctions may be enacted adversely impacting the global economy, its banking and monetary systems, markets or customers for our products.

Our employees, consultants and collaborators may engage in misconduct or other improper activities.

We are exposed to the risk of fraud or other misconduct by our employees, consultants and collaborators. Misconduct by these parties could include intentional failures to comply with the applicable laws and regulations in the United States and abroad, report financial information or data accurately or disclose unauthorized activities to us. These laws and regulations may restrict or prohibit a wide range of pricing, discounting and other business arrangements. Such misconduct could result in legal or regulatory sanctions and cause serious harm to our reputation. It is not always possible to identify and deter misconduct, and any precautions we take to detect and prevent this activity may not be effective in controlling unknown or unmanaged risks or losses, or in protecting us from governmental investigations or other actions or lawsuits stemming from a failure to comply with these laws or regulations. If any such actions are instituted against us, and we are not successful in defending ourselves or asserting our rights, we could be subject to significant civil, criminal and administrative penalties, which could have a material adverse impact on our business. Whether or not we are successful in defending against such actions or investigations, we could incur substantial costs, including legal fees and divert the attention of management in defending ourselves against any of these claims or investigations, which could have a material adverse impact on our business.

We and our employees are increasingly utilizing social media tools as a means of communication both internally and externally.

Despite our efforts to monitor evolving social media communication guidelines and comply with applicable rules, there is risk that the use of social media by us or our employees to communicate about our products or business may cause us to be found in violation of applicable requirements. In addition, our employees may knowingly or inadvertently make use of social media in ways that may not comply with applicable laws and regulations, our policies and other legal or contractual requirements, which may give rise to regulatory enforcement action, liability, lead to the loss of trade secrets or other intellectual property or result in public exposure of personal information of our employees, customers and others. Furthermore, negative posts or comments about us or our products in social media could seriously damage our reputation, brand image and goodwill. Any of these events could have a material adverse effect on our business, prospects, operating results and financial condition and could adversely affect the price of our Class A common stock.

Risks Related to Manufacturing and Supply

If our sole manufacturing and development facility becomes damaged or inoperable or we are required to vacate our existing facility, our ability to conduct and pursue our manufacturing and development efforts will be jeopardized.

We currently conduct our development and manufacturing at a single facility located in Lowell, Massachusetts. Our facility and equipment could be harmed or rendered inoperable or inaccessible by natural or man-made disasters, the severity and frequency of which may be amplified by global climate change, or other circumstances beyond our control, including fire, power loss, communications failure, war or terrorism, or another catastrophic event, such as a pandemic or similar outbreak or public health crisis, which may render it difficult or impossible for us to support our customers and develop products. The inability to manufacture our systems and consumables could develop if our facility is inoperable or suffers a loss of utilization for even a short period of time and may result in the loss of customers or harm to our reputation. Furthermore, our facility and the equipment we use to perform our manufacturing and development could be unavailable or costly and time consuming to repair or replace. It would be difficult, time consuming and expensive to rebuild our facility, to locate and qualify a new facility or license or transfer our proprietary technology to a third party. Even in the event we are able to find a third party to assist in manufacturing and development efforts, we may be unable to negotiate commercially reasonable terms to engage with the third party. Although we are working to complete a back-up manufacturing facility in Lexington, Massachusetts, it is not complete and these risks are not yet mitigated.

We also store a certain amount of inventory of components of our products at our Lowell, Massachusetts facility.

We carry insurance for damage to our property and the disruption of our business, but this insurance may not cover all of the risks associated with damage or disruption to our business, may not provide coverage in amounts sufficient to cover our potential losses and may not continue to be available to us on acceptable terms, if at all.

Our manufacturing operations are dependent upon third-party suppliers, including single-source suppliers, making us vulnerable to supply shortages and price fluctuations, which could harm our business.

We source the components of our Growth Direct system and consumables from third-party suppliers. We do not have supply agreements with most of our suppliers beyond purchase orders and, although we maintain an inventory of components, forecasted amounts may be inaccurate and we may experience shortages as a result of serious supply problems with these suppliers. There can be no assurance that our supply of components will not be limited, interrupted, or of satisfactory quality or continue to be available at acceptable prices. For example, we have experienced disruptions to our supply chain as a result of the COVID-19 pandemic and may experience additional disruptions in the future.

Certain critical components of our Growth Direct system and consumables we obtain from single suppliers and the loss of supply from any of these suppliers could materially adversely affect our business. To protect against such loss, we maintain, or are working to obtain, sufficient inventory of these components to allow us to continue to manufacture our systems and consumables during the period required to qualify a new supplier. For example, the manufacturer of the camera used in our Growth Direct system intends to discontinue production of the camera, and we have obtained a supply we believe is sufficient to allow us to qualify a new camera supplier. While we believe we have, or will have, sufficient inventory to provide protection against changes in our sole suppliers, our estimates of the length of time required to qualify a new supplier or inventory level required to manufacture our systems and consumables during that time may be incorrect, and we may run out of inventory sooner than we anticipate. In addition, we have not obtained sufficient inventory for all of our single-source components and we may not be able to do so in the amounts we predict will be required. In addition, any change to a new supplier will require us to devote substantial time and resources, result in additional costs, and could involve a period in which our products might not be produced in a timely or consistent manner. We may also be unable to enter into agreements with new suppliers on commercially reasonable terms or at all. The occurrence of any of these events could adversely affect our business and customer relationships. In addition, loss of any critical component provided by a single-source supplier could require us to change the design of our manufacturing process based on the functions, limitations, features and specifications of the replacement components.

Several other non-critical components and materials that comprise our Growth Direct platform are currently manufactured by a single supplier or a limited number of suppliers. In many of these cases, we have not yet qualified alternate suppliers and rely upon purchase orders, rather than long-term supply agreements. A supply interruption or an increase in demand beyond our current suppliers' capabilities could harm our ability to manufacture our products unless and until new sources of supply are identified and qualified. Our reliance on these suppliers subjects us to a number of risks that could harm our business, including:

- interruption of supply resulting from modifications to or discontinuation of a supplier's operations;
- delays in product shipments resulting from uncorrected defects, reliability issues, or a supplier's variation in a component;
- a lack of long-term supply arrangements for key components with our suppliers;
- inability to obtain adequate supply in a timely manner, or to obtain adequate supply on commercially reasonable terms;
- difficulty and cost associated with locating and qualifying alternative suppliers for our components in a timely manner;

- a modification or change in a manufacturing process or part that unknowingly or unintentionally negatively impacts the operation of our products;
- production delays related to the evaluation and testing of products from alternative suppliers, and corresponding regulatory qualifications;
- delay in delivery due to our suppliers prioritizing other customer orders over ours;
- damage to our brand reputation caused by defective components produced by our suppliers;
- increased cost of our warranty program due to product repair or replacement based upon defects in components produced by our suppliers; and
- fluctuation in delivery by our suppliers due to changes in demand from us or their other customers.

Any interruption in the supply of components or materials, or our inability to obtain substitute components or materials from alternate sources at acceptable prices in a timely manner, could impair our ability to meet the demand of our customers, which would have an adverse effect on our business.

We forecast sales to determine requirements for components and materials used in our products, and if our forecasts are incorrect, we may experience delays in shipments or increased inventory costs.

To manage our operations with our third-party suppliers, we forecast anticipated product orders and material requirements to predict our inventory needs and enter into purchase orders on the basis of these requirements. Our limited historical commercial experience and recent growth may not provide us with enough data to consistently and accurately predict future demand. If our business expands and our demand for components and materials increases beyond our estimates, we or our suppliers may be unable to meet our demand. In addition, if we underestimate our component and material requirements, we may have inadequate inventory, which could interrupt, delay, or prevent delivery of our products to our customers. By contrast, if we overestimate our component and material requirements, we may have excess inventory, which would increase our expenses. Any of these occurrences would negatively affect our financial performance and business results.

Shipping is a critical part of our business and any changes in our shipping arrangements or damages or losses sustained during shipping could adversely affect our business, financial condition, results of operations and prospects.

Shipments of our products are subject to various regulations in the various countries in which we provide our products. For example, shipments of our growth media consumables may be required to comply with the shipping requirements promulgated by the U.S. Department of Transportation, or DOT, and the U.S. Federal Aviation Administration, as well as shipment rules established by the International Air Transport Association. If we are unable to comply with any of these rules or regulations, our ability to deliver our products in a timely manner may be adversely affected. In addition, even if we are able to comply with these rules and regulations, compliance can result in increased costs. In either event, our financial results and condition may be adversely affected.

We also currently rely on third-party vendors for our shipping. If we are not able to negotiate acceptable pricing and other terms with these entities or they experience performance problems or other difficulties, it could negatively impact our operating results and our customers' experience. Our products could sustain serious damage or be lost in transit. If a product is damaged in transit, including damage due to consumable temperature excursion, it may result in a substantial delay in the fulfillment of the customer's order, and depending on the type and extent of the damage and whether the incident is covered by insurance, it may result in a substantial financial loss. If our products are not delivered in a timely fashion or are damaged or lost during the delivery process, our customers could become dissatisfied and cease using our products or services, which would adversely affect our business, financial condition, results of operations and prospects.

We use biological and hazardous materials that require considerable expertise and expense for handling, storage and disposal and may result in claims against us.

We work with materials, including chemicals, biological agents and compounds that could be hazardous to human health and safety or the environment. Our operations also produce hazardous and biological waste products. Federal, state and local laws and regulations govern the use, generation, manufacture, storage, handling and disposal of these materials and wastes. We are subject to periodic inspections by federal, state and local authorities to ensure compliance with applicable laws. Compliance with applicable environmental laws and regulations is expensive, and current or future environmental laws and regulations may restrict our operations. If we do not comply with applicable regulations, we may be subject to fines and penalties. In addition, we cannot eliminate the risk of accidental injury or contamination from these materials or wastes, which could cause an interruption of our commercialization efforts, research and development programs and business operations, as well as environmental damage resulting in costly clean-up and liabilities under applicable laws and regulations. In the event of contamination or injury, we could be liable for damages or penalized with fines in an amount exceeding our resources and our operations could be suspended or otherwise adversely affected. Furthermore, environmental laws and regulations are complex, change frequently and have tended to become more stringent. We cannot predict the impact of such changes and cannot be certain of our future compliance.

Risks Related to Our Intellectual Property

If we are unable to obtain and maintain sufficient intellectual property protection for our technology, including the Growth Direct platform, or if the scope of the intellectual property protection obtained is not sufficiently broad, our competitors could develop and commercialize products similar or identical to ours, and our ability to successfully commercialize our products may be impaired.

We rely on patent protection as well as trademark, copyright, trade secret and other intellectual property rights protection and contractual restrictions to protect our proprietary technologies, all of which provide limited protection and may not adequately protect our rights or permit us to gain or keep any competitive advantage. If we fail to maintain, protect or enforce our intellectual property, third parties may be able to compete more effectively against us. In addition, we may incur substantial litigation costs in our attempts to recover or restrict use of our intellectual property.

To the extent our intellectual property offers inadequate protection, or is found to be invalid or unenforceable, we would be exposed to a greater risk of direct competition. If our intellectual property does not provide adequate coverage of our competitors' products, our competitive position could be adversely affected, as could our business. Both the patent application process and the process of managing patent disputes can be time consuming and expensive.

As is the case with other technology companies, our success depends in large part on our ability to obtain and maintain protection of the intellectual property we may own solely and jointly with others, particularly patents, in the United States and other countries with respect to our products and technologies. We apply for patents covering our products and technologies and their uses, as we deem appropriate. However, obtaining and enforcing patents in our industry is costly, time consuming and complex, and we may fail to apply for patents on important products, services and technologies in a timely fashion or at all, or we may fail to apply for patents in potentially relevant jurisdictions. We may not be able to file and prosecute all necessary or desirable patent applications, or maintain, enforce and license any patents that may issue from such patent applications, at a reasonable cost or in a timely manner. If we delay in filing a patent application, and a competitor files a patent application on the same or a similar technology before we do, we may face a limited ability to secure patent rights. We may not be able to patent the technology at all. Even if we can patent the technology, we may be able to patent only a limited scope of the technology, and the limited scope may be inadequate to protect our products, or to block competitor products that are similar or adjacent to ours. Our earliest patent filings have been published. A competitor may review our published patents and arrive at the same or similar technology advances for our products as we developed. If the competitor files a patent application on such an advance before we do, then we may no longer be able to protect the technology, we may require a license from the competitor, and if the license is not available on commercially-viable terms, then we may not be able to launch our product. It is also possible that we will fail to identify patentable aspects of our research and development output before it is too late to obtain patent protection. We may not have the right to control the preparation, filing and prosecution of patent

applications, or to maintain the rights to patents licensed to third parties. Therefore, these patents and applications may not be prosecuted and enforced in a manner consistent with the best interests of our business.

It is possible that none of our pending patent applications will result in issued patents in a timely fashion or at all, and even if patents are granted, they may not provide a basis for intellectual property protection of commercially viable products or services, may not provide us with any competitive advantages, or may be challenged and invalidated by third parties. It is possible that others will design around our current or future patented technologies. It is possible that in the future some of our patents, licensed patents and patent applications may be challenged at the United States Patent and Trademark Office, or USPTO, or in proceedings before the patent offices of other jurisdictions. We may not be successful in defending any such challenges made against our patents or patent applications. Any successful third-party challenge to our patents could result in our patents being narrowed, invalidated or held unenforceable which could result in increased competition to our business. We may have to challenge the patents or patent applications of third parties. The outcome of patent litigation or other proceeding can be uncertain, and any attempt by us to enforce our patent rights against others or to challenge the patent rights of others may not be successful, or, if successful, may take substantial time and result in substantial cost, and may divert our efforts and attention from other aspects of our business.

The patent positions of technology companies can be highly uncertain and involve complex legal and factual questions for which important legal principles remain unresolved. No consistent policy regarding the breadth of claims allowed in such companies' patents has emerged to date in the United States or elsewhere. Courts frequently render opinions that may affect the patentability of certain inventions or discoveries. If the breadth or strength of protection provided by the patents and patent applications we hold with respect to our products is threatened, it could dissuade companies from collaborating with us to develop, and threaten our ability to commercialize, our products.

Our current and future licensors may retain certain rights under their agreements with us, including the right to use the underlying technology for noncommercial academic and research use, to publish general scientific findings from research related to the technology and to make customary scientific and scholarly disclosures of information relating to the technology. It is difficult to monitor whether our licensors limit their use of the technology to these uses, and we could incur substantial expenses to enforce our rights in the event of misuse.

Patent terms may be inadequate to protect our competitive position on our products for an adequate amount of time.

Patents have a limited lifespan. In the United States, if all maintenance fees are timely paid, the natural expiration of a patent is generally 20 years from its earliest U.S. non-provisional filing date. Various extensions may be available, but the life of a patent, and the protection it affords, is limited. Even if patents covering our products are obtained, once the patent life has expired, we may be open to competition from competitive products. If one of our products requires extended development or testing, patents protecting such products might expire before or shortly after such products are commercialized. For example, while our patents and, if issued, our patent applications have terms that will expire through 2041, certain of our U.S. patents covering the Growth Direct system and its use are scheduled to expire in 2024, and the corresponding foreign patents are scheduled to expire in 2022. Although we own other patents with later expiration dates that cover various improvements and consumables for the Growth Direct platform, these other patents may not provide the same protection as the earliest-filed patents. As a result, our patent portfolio may not provide us with sufficient rights to exclude others from commercializing products similar or identical to ours, which would have a material adverse effect on our business.

The United States government may exercise certain rights with regard to certain of our inventions developed using government funding.

The United States federal government retains certain rights in inventions produced with its financial assistance under the Patent and Trademark Law Amendments Act, or the Bayh-Dole Act. Certain of our inventions for which we have pursued, and in some cases obtained, patent protection were developed using federal funding from the U.S. Department of Health and Human Services Biomedical Advanced Research & Development Authority, or BARDA. As a result, the U.S. government may have certain rights, including so-called march-in rights, to any patent rights that were funded in party by the U.S. government and any products or technology developed from such patent rights. When new technologies are developed with U.S. government funding, the U.S. government generally obtains certain rights in any

resulting patents, including a nonexclusive license authorizing the U.S. government to use the invention for non-commercial purposes. These rights may permit the U.S. government to disclose our confidential information to third parties and to exercise march-in rights to use or to allow third parties to use our licensed technology. The U.S. government can exercise its march-in rights if it determines that action is necessary because we fail to achieve the practical application of government-funded technology, because action is necessary to alleviate health or safety needs, to meet requirements of federal regulations, or to give preference to U.S. industry. In addition, our rights in such inventions may be subject to certain requirements to manufacture products embodying such inventions in the United States. Any exercise by the U.S. government of such rights could harm our business, financial condition, results of operations and prospects.

In addition to our current inventions developed using BARDA funds, we also sometimes collaborate with academic institutions to accelerate our research or development. While it is our policy to avoid engaging our university partners in projects in which there is a risk that federal funds may be commingled, we cannot be sure that any co-developed intellectual property will be free from government rights pursuant to the Bayh-Dole Act. If, in the future, we co-own or in-license in technology which is critical to our business that is developed in whole or in part with federal funds subject to the Bayh-Dole Act, our ability to enforce or otherwise exploit patents covering such technology may be adversely affected.

If we are unable to protect the confidentiality of our trade secrets, the value of our technology could be materially adversely affected and our business could be harmed.

We rely heavily on trade secrets and confidentiality agreements to protect our unpatented know-how, technology and other proprietary information, including parts of our technology platform, and to maintain our competitive position and we expect our reliance to increase in the near term as the terms for certain of our patents expire. For example, while our patents and, if issued, our patent applications have terms that will expire through 2041, some of our U.S. patents covering the Growth Direct system and its use are expected to expire in 2024, and the corresponding foreign patents are scheduled to expire in 2022. Once these patents expire, we may have to rely more heavily on trade secrets to maintain our competitive advantage. Any disclosure, either intentional or unintentional, by our employees, consultants and vendors that we engage to perform research or manufacturing activities, or misappropriation by third parties (such as through a cybersecurity breach) of our trade secrets or proprietary information could enable competitors to duplicate or surpass our technological achievements, thus eroding our competitive position in our market. Because we expect to rely on third parties in the development and manufacture of our products, we must, at times, share trade secrets with them. Our reliance on third parties requires us to share our trade secrets, which increases the possibility that a competitor will discover them or that our trade secrets will be misappropriated or disclosed.

Trade secrets and know-how can be difficult to protect. In addition to pursuing patents on our technology, we take steps to protect our intellectual property and proprietary technology by entering into agreements, including confidentiality agreements, non-disclosure agreements and intellectual property assignment agreements, with our employees, consultants, advisors, collaborators and customers. However, we cannot be certain that such agreements have been entered into with all relevant parties, and we cannot be certain that our trade secrets and other confidential proprietary information will not be disclosed or that competitors will not otherwise gain access to our trade secrets or independently develop substantially equivalent information and techniques. For example, any of these parties may breach the agreements and disclose our proprietary information, including our trade secrets, and we may not be able to obtain adequate remedies for such breaches. Such agreements may not be enforceable or may not provide meaningful protection for our trade secrets or other proprietary information in the event of unauthorized use or disclosure or other breaches of the agreements, and we may not be able to prevent such unauthorized disclosure, which could materially adversely impact our business and financial position. If we are required to assert our rights against such a party, it could result in significant cost and distraction.

Monitoring unauthorized disclosure is difficult, and we do not know whether the steps we have taken to prevent such disclosure are, or will be, adequate. If we were to enforce a claim that a third party had illegally obtained and was using our trade secrets, it would be expensive and time consuming, and the outcome would be unpredictable. In addition, if we choose to go to court to stop a third party from using any of our trade secrets, it may result in a public disclosure of our trade secrets and corresponding loss of rights, which could have a material adverse effect on our business. In

addition, courts outside the United States may be less willing to protect trade secrets. We may need to share our proprietary information, including trade secrets, with future business partners, collaborators, contractors and others located in countries at heightened risk of theft of trade secrets, including through direct intrusion by private parties or foreign actors, and those affiliated with or controlled by state actors.

We also seek to preserve the integrity and confidentiality of our confidential proprietary information by maintaining physical security of our premises and physical and electronic security of our information technology systems, but it is possible that these security measures could be breached. If any of our confidential proprietary information were to be lawfully obtained or independently developed by a competitor or other third party, absent patent protection, we would have no right to prevent such competitor from using that technology or information to compete with us, which could harm our competitive position. If any of our trade secrets were to be disclosed to, or independently discovered by, a competitor or other third party, it could harm our business, financial condition, results of operations and prospects.

We rely on in-licenses from third parties. If we lose these rights, our business may be materially adversely affected, our ability to develop improvements to our Growth Direct platform and to develop new technologies may be negatively and substantially impacted, and if disputes arise, we may be subjected to future litigation as well as the potential loss of or limitations on our ability to develop and commercialize products and technology covered by these license agreements.

We are party to a royalty-bearing license agreement with Thermo CRS, Ltd., or Thermo Fisher, that grants us rights to exploit certain patent rights that are related to our Growth Direct platform. We may need to obtain additional licenses from others to advance our research, development and commercialization activities. These and other intellectual property license agreements that we enter into with third parties may impose various development, regulatory and/or commercial diligence obligations, payment of milestones and/or royalties and other obligations on us. Our rights to use the technology we license are subject to the continuation of and compliance with the terms of these agreements. If we fail to comply with our obligations under these agreements (including as a result of COVID-19, and its variants, impacting our operations), we use the licensed intellectual property in an unauthorized manner or we are subject to bankruptcy-related proceedings, the terms of the licenses may be materially modified, such as by rendering currently exclusive licenses non-exclusive, or it may give our licensors the right to terminate their respective agreement with us, which could limit our ability to implement our current business plan and materially adversely affect our business, financial condition, results of operations and prospects.

In some cases, we may not control the prosecution, maintenance or filing of the patents to which we hold licenses, or the enforcement of those patents against third parties. Our licensors may not successfully prosecute the patent applications to which we are licensed. Even if patents are issued in respect of these patent applications, our licensors may fail to maintain these patents, may determine not to pursue litigation against other companies that are infringing these patents, or may pursue such litigation less aggressively than we would. Without protection for the intellectual property we license, other companies might be able to offer substantially identical products for sale, which could adversely affect our competitive business position and harm our business prospects. Further, we may have limited control over these activities or any other intellectual property that may be in-licensed. For example, we cannot be certain that such activities by licensors have been or will be conducted in compliance with applicable laws and regulations or will result in valid and enforceable patents and other intellectual property rights. We may have limited control over the manner in which our licensors initiate an infringement proceeding against a third-party infringer of the intellectual property rights, or defend certain of the intellectual property that is licensed to us. It is possible that the licensors' infringement proceeding or defense activities may be less vigorous than had we conducted them ourselves. In the event our licensors fail to adequately pursue and maintain patent protection for patents and applications they control, and to timely cede control of such prosecution to us, our competitors might be able to enter the market, which would have a material adverse effect on our business.

Moreover, disputes may arise with respect to our licensing or other agreements, including:

- the scope of rights granted under the agreements and other interpretation-related issues;

- the extent to which our systems and consumables, technology and processes infringe on the intellectual property of the licensor that is not subject to the licensing agreement;
- our diligence obligations under the license agreements and what activities satisfy those diligence obligations;
- the inventorship and ownership of inventions and know-how resulting from the joint creation or use of intellectual property by our licensors and us; and
- the priority of invention of patented technology.

In spite of our efforts to comply with our obligations under our in-license agreements, our licensors might conclude that we have materially breached our obligations under our license agreements and might therefore, terminate the relevant license agreement, thereby removing or limiting our ability to develop and commercialize products and technology covered by these license agreements. If any such in-license agreement is terminated, or if the licensed patents fail to provide the intended exclusivity, competitors or other third parties might have the freedom to market or develop products similar to ours. In addition, absent the rights granted to us under such license agreements, we may infringe the intellectual property rights that are the subject of those agreements, we may be subject to litigation by the licensor, and if such litigation by the licensor is successful we may be required to pay damages to the licensor, or we may be required to cease our development and commercialization activities that are deemed infringing, and in such event we may ultimately need to modify our activities or products to design around such infringement, which will consume time and resources and may not be ultimately successful. Any of the foregoing could have a material adverse effect on our business, financial condition, results of operations and prospects. In particular, if our license with Thermo Fisher is terminated, we may suffer the foregoing consequences with respect to our business.

In addition, our rights to certain technologies are licensed to us on a non-exclusive basis. The owners of these non-exclusively licensed technologies are therefore free to license them to third parties, including our competitors, on terms that may be superior to those offered to us, which could place us at a competitive disadvantage. Moreover, our licensors may own or control intellectual property that has not been licensed to us and, as a result, we may be subject to claims, regardless of their merit, that we are infringing or otherwise violating the licensor's rights. In addition, certain of our agreements with third parties may provide that intellectual property arising under these agreements, such as data that could be valuable to our business, will be owned by the counterparty, in which case, we may not have adequate rights to use such data or have exclusivity with respect to the use of such data, which could result in third parties, including our competitors, being able to use such data to compete with us.

Changes in patent law in the United States and other jurisdictions could diminish the value of patents in general, thereby impairing our ability to protect our products.

Changes in either the patent laws or in interpretations of patent laws in the United States or other countries or regions may diminish the value of our intellectual property. We cannot predict the breadth of claims that may be allowed or enforced in our patents or in third party patents. We may not develop additional proprietary products, methods and technologies that are patentable.

Generally, jurisdictions outside the United States have a "first to file" patent system. In the United States, prior to March 2013, the "first to invent" a claimed invention was entitled to the patent (assuming that all other requirements were met). After March 2013, following the passage of the Leahy-Smith America Invents Act, or the America Invents Act, the United States transitioned to a "first inventor to file" system, under which the first inventor to file a patent application on an invention is entitled to the patent (assuming that all other requirements are met) even if another party was the first to invent the claimed invention. The America Invents Act also included a number of significant changes that affect the way patent applications are prosecuted and that also may affect patent litigation. These include the introduction of derivation proceedings; expansion of the permitted content of third-party submissions to the USPTO during patent prosecution; and additional procedures to challenge the validity of a patent after issuance, including post-grant review and *inter partes* review. Because of a lower evidentiary standard in USPTO proceedings compared to the

evidentiary standard in United States federal courts necessary to invalidate a patent claim, a third party could potentially provide evidence in a USPTO proceeding sufficient for the USPTO to hold a claim invalid even though the same evidence would be insufficient to invalidate the claim if first presented in a district court action. Accordingly, a third party may attempt to use the USPTO procedures to invalidate our patent claims that would not have been invalidated if first challenged by the third party as a defendant in a district court action. The America Invents Act and its continued implementation could increase the uncertainties and costs surrounding the prosecution of our patent applications and the enforcement or defense of our issued patents, all of which could have a material adverse effect on our business, financial condition, results of operations, and prospects.

Depending on future actions by the U.S. Congress, the U.S. courts, the USPTO and the relevant law-making bodies in other countries, the laws and regulations governing patents could change in unpredictable ways that would weaken our ability to obtain new patents or to enforce our existing patents and patents that we might obtain in the future. For example, various courts, including the United States Supreme Court have rendered decisions that affect the scope of patentability of certain inventions or discoveries. These decisions state, among other things, that a patent claim that recites an abstract idea, natural phenomenon or law of nature are not themselves patentable. Precisely what constitutes a law of nature or abstract idea is uncertain, and it is possible that certain aspects of our technology could be considered to be or apply laws of nature. Accordingly, the evolving case law in the United States may adversely affect our ability to obtain patents and may facilitate third party challenges to any owned or licensed patents.

Issued patents covering our products could be found invalid or unenforceable if challenged in court or before administrative bodies in the United States or abroad, including the USPTO.

The issuance of a patent is not conclusive as to its inventorship, scope, validity or enforceability. Some of our patents or patent applications (including licensed patents) may be challenged in opposition, derivation, reexamination, *inter partes* review, post-grant review or interference. Any successful third-party challenge to our patents in this or any other proceeding could result in the unenforceability or invalidity of such patents, which could harm our business. In addition, in patent litigation in the United States, defendant counterclaims alleging invalidity or unenforceability are commonplace. Grounds for a validity challenge could be an alleged failure to meet any of several statutory requirements, for example, lack of novelty, obviousness or non-enablement. Grounds for an unenforceability assertion could be an allegation that someone connected with prosecution of the patent withheld material information from the USPTO or the applicable foreign counterpart, or made a misleading statement, during prosecution. A litigant or the USPTO itself could challenge our patents on this basis even if we believe that we have conducted our patent prosecution in accordance with the duty of candor and in good faith. Further, with respect to challenges to the validity of our patents, there might be invalidating prior art, of which we and the patent examiner were unaware during prosecution. The outcome following legal assertions of invalidity and unenforceability during patent litigation is unpredictable. If a defendant were to prevail on a legal assertion of invalidity or unenforceability, we would lose at least part, and perhaps all, of the patent protection on certain aspects of our platform technologies. The cost of defending such a challenge, particularly in a foreign jurisdiction, and any resulting loss of patent protection could have a material adverse impact on one or more of our products and our business. In addition, if the breadth or strength of protection provided by our patents and patent applications is threatened, regardless of the outcome, it could dissuade companies from collaborating with us to license, develop or commercialize current or future products. Enforcing our intellectual property rights against third parties may also cause such third parties to file other counterclaims against us, which could be costly to defend, particularly in a foreign jurisdiction, and could require us to pay substantial damages, cease the sale of certain products or enter into a license agreement and pay royalties (which may not be possible on commercially reasonable terms or at all). Any efforts to enforce our intellectual property rights are also likely to be costly and may divert the efforts of our scientific and management personnel.

We may not be aware of all third-party intellectual property rights potentially relating to our products. Publications of discoveries often lag behind the actual discoveries, and patent applications in the United States and other jurisdictions are typically not published until approximately 18 months after filing or, in some cases, not until such patent applications issue as patents. We might not have been the first to make the inventions covered by each of our pending patent applications and we might not have been the first to file patent applications for these inventions. To determine the priority of these inventions, we may have to participate in interference proceedings, derivation proceedings or other post-

grant proceedings declared by the USPTO that could result in substantial cost to us. The outcome of such proceedings is uncertain. No assurance can be given that other patent applications will not have priority over our patent applications.

If we cannot acquire or license rights to use technologies on reasonable terms, we may not be able to commercialize new products in the future.

In the future, we may identify third-party intellectual property and technology we may need to license in order to engage in our business, including to develop or commercialize new products or services, and the growth of our business may depend in part on our ability to acquire, in-license or use this technology. However, such licenses may not be available to us on acceptable terms or at all. The licensing or acquisition of third-party intellectual property rights is a competitive area, and several more established companies may pursue strategies to license or acquire third-party intellectual property rights that we may consider attractive or necessary. These established companies may have a competitive advantage over us due to their size, capital resources and greater development or commercialization capabilities. In addition, companies that perceive us to be a competitor may be unwilling to assign or license rights to us. Even if such licenses are available, we may be required to pay the licensor in return for the use of such licensor's technology, lump-sum payments, payments based on certain milestones such as sales volumes, or royalties based on sales of our platform. In addition, such licenses may be non-exclusive, which could give our competitors access to the same intellectual property licensed to us. Our business, financial condition, results of operations and prospects could be materially and adversely affected if we are unable to enter into necessary agreements on acceptable terms or at all, if any necessary licenses are subsequently terminated, if the licensors fail to abide by the terms of the licenses or fail to prevent infringement by third parties, or if the acquired or licensed patents or other rights are found to be invalid or unenforceable. Moreover, we could encounter delays in the introduction of products or services while we attempt to develop alternatives.

We may not be able to protect our intellectual property rights throughout the world.

Filing, prosecuting and defending patents on our products in all countries throughout the world would be prohibitively expensive, and our intellectual property rights in some countries outside the United States can be less extensive than those in the United States. In addition, the laws of some foreign countries do not protect intellectual property rights to the same extent as the laws of the United States, and we may encounter difficulties in protecting and defending such rights in foreign jurisdictions. Consequently, we may not be able to prevent third parties from practicing our inventions in some or all countries outside the United States, or from selling or importing products made using our inventions in and into the United States or other jurisdictions. Competitors may use our technologies in jurisdictions where we have not obtained patent protection to develop their own products and may also export infringing products to territories where we have patent protection, but enforcement is not as strong as that in the United States. These products may compete with our products. Our patents or other intellectual property rights may not be effective or sufficient to prevent them from competing. In addition, certain countries have compulsory licensing laws under which a patent owner may be compelled to grant licenses to other parties. Furthermore, many countries limit the enforceability of patents against other parties, including government agencies or government contractors. In these countries, the patent owner may have limited remedies, which could materially diminish the value of any patents.

Many companies have encountered significant problems in protecting and defending intellectual property rights in foreign jurisdictions. The legal systems of many other countries do not favor the enforcement of patents and other intellectual property protection, which could make it difficult for us to stop the misappropriation or other violations of our intellectual property rights including infringement of our patents in such countries. Proceedings to enforce our patent rights in foreign jurisdictions could result in substantial cost and divert our efforts and attention from other aspects of our business, could put our patents at risk of being invalidated or interpreted narrowly and our patent applications at risk of not issuing, and could provoke third parties to assert claims against us. We may not prevail in any lawsuits that we initiate, or that are initiated against us, and the damages or other remedies awarded, if any, may not be commercially meaningful. In addition, changes in the law and legal decisions by courts in the United States and foreign countries may affect our ability to obtain adequate protection for our products, services and other technologies and the enforcement of intellectual property. Accordingly, our efforts to enforce our intellectual property rights around the world may be inadequate to obtain a significant commercial advantage from the intellectual property that we develop or license.

We may be subject to claims that our employees, consultants or independent contractors have wrongfully used or disclosed confidential information of third parties or that our employees have wrongfully used or disclosed alleged trade secrets of their former employers.

As is common in an industry like ours, we have employed and expect to employ individuals who were previously employed at other companies, including our competitors or potential competitors. Although we try to ensure that our employees, consultants, advisors and independent contractors do not use the proprietary information or know-how of others in their work for us, we may be subject to claims that our employees, advisors, consultants or independent contractors have inadvertently or otherwise used or disclosed intellectual property, including trade secrets or other proprietary information of their former employers or other third parties, or to claims that we have improperly used or obtained such trade secrets. Litigation may be necessary to defend against these claims. If we fail in defending such claims, in addition to paying monetary damages, we may lose valuable intellectual property rights and face increased competition to our business. A loss of key research personnel work product could hamper or prevent our ability to commercialize potential products, which could harm our business. Even if we are successful in defending against these claims, litigation could result in substantial costs and be a distraction to management.

We may not be able to protect and enforce our trademarks and trade names, or build name recognition in our markets of interest thereby harming our competitive position.

Our trademarks or trade names may be challenged, infringed, diluted, circumvented, declared generic or determined to be infringing on other marks. We may not be able to protect our rights in these trademarks or trade names or may be forced to stop using these names, which we need for name recognition by potential partners or customers in our markets of interest. We have not yet registered certain of our trademarks in all of our potential markets. During the trademark registration process, we may receive Office Actions from the USPTO objecting to the registration of our trademarks. Although we would be given an opportunity to respond to those objections, we may be unable to overcome such objections. In addition, at the USPTO and at comparable agencies in many foreign jurisdictions, third parties are given an opportunity to oppose pending trademark applications and/or to seek the cancellation of registered trademarks. Opposition or cancellation proceedings may be filed against our trademarks, and our trademarks may not survive such proceedings. If we are unable to obtain a registered trademark or establish name recognition based on our trademarks and trade names, we may not be able to compete effectively and our business may be adversely affected.

We may be subject to claims challenging the inventorship of our patents and other intellectual property.

We or our licensors may be subject to claims that former employees, collaborators or other third parties have an interest in our owned or in-licensed patents, trade secrets or other intellectual property as an inventor or co-inventor. The failure to name the proper inventors on a patent application can impact the validity and enforceability of patents issuing thereon. Inventorship disputes may arise from conflicting views regarding the contributions of different individuals named as inventors, the effects of foreign laws where foreign nationals are involved in the development of the subject matter of the patent, conflicting obligations of third parties involved in developing our product candidates or as a result of questions regarding co-ownership of potential joint inventions. Litigation may be necessary to defend against these and other claims challenging inventorship of our or our licensors' ownership of our owned or in-licensed patents, trade secrets or other intellectual property. Alternatively, or additionally, we may enter into agreements to clarify the scope of our rights in such intellectual property. If we or our licensors fail in defending any such claims, in addition to paying monetary damages, we may lose valuable intellectual property rights, such as exclusive ownership of, or right to use, intellectual property that is important to our products. Even if we are successful in defending against such claims, litigation could result in substantial costs and be a distraction to management and other employees, and certain customers or partners may defer engaging with us until the particular dispute is resolved. Any of the foregoing could have a material adverse effect on our business, financial condition, results of operations and prospects.

In addition, while it is our policy to require our employees and contractors who may be involved in the conception or development of intellectual property to execute agreements assigning such intellectual property to us, we may be unsuccessful in executing such an agreement with each party who, in fact, conceives or develops intellectual property that we regard as our own. The assignment of intellectual property rights may not be self-executing, or the assignment agreements may be breached, and we may be forced to bring claims against third parties, or defend claims that they may

bring against us, to determine the ownership of what we regard as our intellectual property. Any of the foregoing could harm our business, financial condition, results of operations and prospects.

We may be involved in litigation claiming that we have infringed on a third party's intellectual property, which could be time consuming and costly and may adversely affect our business, financial condition, results of operations and prospects.

In recent years, there has been significant litigation involving intellectual property rights. We may be involved with litigation or actions at the USPTO or foreign patent offices with various third parties that claim we or our collaborators or customers using our solutions and services have misappropriated or misused other parties' intellectual property rights. We expect that the number of such claims may increase as the number of our products grows, we expand our market share and the level of competition in our markets increases. Any infringement claim, regardless of its validity, could harm our business by, among other things, resulting in time consuming and costly litigation, diverting management's time and attention from the development of the business, requiring the payment of monetary damages (including treble damages, attorneys' fees, costs and expenses) or royalty payments, or result in potential or existing customers delaying purchases of our products or entering into engagements with us pending resolution of the dispute.

As we move into new markets and applications for our platform, incumbent participants in such markets may assert their patents and other proprietary rights against us as a means of slowing our entry into such markets or as a means to extract substantial license and royalty payments from us. Our competitors and others have significantly larger and more mature patent portfolios than we currently have. In addition, future litigation may involve patent holding companies or other adverse patent owners who have no relevant product or service revenue and against whom our own patents may provide little or no deterrence or protection. Therefore, our commercial success may depend in part on our non-infringement of the patents or proprietary rights of third parties, or the invalidity of such patents or proprietary rights.

Our research, development and commercialization activities may in the future be subject to claims that we infringe or otherwise violate patents or other intellectual property rights owned or controlled by third parties. There is a substantial amount of litigation and other patent challenges, both within and outside the United States, involving patent and other intellectual property rights, including patent infringement lawsuits, interferences, oppositions and *inter partes* review proceedings before the USPTO, and corresponding foreign patent offices. Numerous U.S. and foreign issued patents and pending patent applications, which are owned by third parties, exist in the fields in which we are developing products. As the automated MQC testing industry expands and more patents are issued, the risk increases that our products may be subject to claims of infringement of the patent rights of third parties. Numerous significant intellectual property issues have been litigated, are being litigated and will likely continue to be litigated, between existing and new participants in our existing and targeted markets, and one or more third parties may assert that our products or services infringe their intellectual property rights as part of a business strategy to impede our successful entry into or growth in those markets.

Third parties may assert that we are employing their proprietary technology without authorization. Because patent applications can take many years to issue, there may be currently pending patent applications which may later result in issued patents that our current or future products and services may infringe. In addition, similar to what other companies in our industry have experienced, we are aware of a patent, and there may be patents of which we are not aware or that are issued in future, that may cover our platform or its components. Additionally, pending patent applications that have been published can, subject to certain limitations, be later amended in a manner that could cover our platform or its components. Under the applicable law of certain jurisdictions, the scope of a patent claim is determined by an interpretation of the law, the written disclosure in a patent and the patent's prosecution history. Our interpretation of the relevance or the scope of a patent or a pending application may be incorrect, which may negatively impact our ability to market our products. We may incorrectly determine that our products are not covered by a third-party patent or may incorrectly predict whether a third party's pending application will issue with claims of relevant scope. Our determination of the expiration date of any patent in the United States or abroad that we consider relevant may be incorrect, which may negatively impact our ability to develop and market our products.

There can be no assurance that we will prevail in any suit initiated against us by third parties, successfully settle or otherwise resolve patent infringement claims. Third parties making claims against us may be able to obtain injunctive or

other relief, which could block our ability to develop, commercialize and sell products or services, and could result in the award of substantial damages against us, including treble damages, attorneys' fees, costs and expenses, if we are found to have willfully infringed. In the event of a successful claim of infringement against us, we may be required to pay damages and ongoing royalties, and obtain one or more licenses from third parties, or be prohibited from selling certain products or services. We may not be able to obtain these licenses on acceptable or commercially reasonable terms, if at all, or these licenses may be non-exclusive, which could result in our competitors gaining access to the same intellectual property. In addition, we could encounter delays and incur significant costs, in product or service introductions while we attempt to develop alternative products or services, or redesign our products or services, to avoid infringing third party patents or proprietary rights. Defense of any lawsuit or failure to obtain any of these licenses or to develop a workaround could prevent us from commercializing products or services, and the prohibition of sale or the threat of the prohibition of sale of any of our products or services could materially affect our business and our ability to gain market acceptance for our products or services. Some of our competitors may be able to sustain the costs of complex patent litigation more effectively than we can because they have substantially greater resources. Further, even if we were successful in defending against a lawsuit, such a defense would distract our management team from our operations, which could have an adverse effect on our business. In addition, any uncertainties resulting from the initiation and continuation of any litigation could have a material adverse effect on our ability to raise the funds necessary to continue our operations or could otherwise have a material adverse effect on our business, results of operations, financial condition and prospects. Furthermore, because of the substantial amount of discovery required in connection with intellectual property litigation or other legal proceedings relating to our intellectual property rights, there is a risk that some of our confidential information could be compromised by disclosure during this type of litigation or other proceedings.

In addition, our agreements with some of our customers, suppliers or other entities with whom we do business require us to defend or indemnify these parties to the extent they become involved in infringement claims, including the types of claims described above. We could also voluntarily agree to defend or indemnify third parties in instances where we are not obligated to do so if we determine it would be important to our business relationships. If we are required or agree to defend or indemnify third parties in connection with any infringement claims, we could incur significant costs and expenses that could adversely affect our business, financial condition, results of operations and prospects.

We may become involved in lawsuits to protect or enforce our intellectual property, which could be expensive, time consuming and unsuccessful.

Third parties, including our competitors, could be infringing, misappropriating or otherwise violating our intellectual property rights. Monitoring unauthorized use of our intellectual property is difficult and costly. From time to time, we seek to analyze our competitors' products and services, and may in the future seek to enforce our rights against potential infringement, misappropriation or violation of our intellectual property. However, the steps we have taken to protect our proprietary rights may not be adequate to enforce our rights against such infringement, misappropriation or violation of our intellectual property. We may not be able to detect unauthorized use of, or take appropriate steps to enforce, our intellectual property rights. Any inability to meaningfully enforce our intellectual property rights could harm our ability to compete and reduce demand for our products and services.

Litigation may be necessary for us to enforce our patent and proprietary rights or to determine the scope, coverage and validity of the proprietary rights of others. If we do not prevail in such legal proceedings, we may be required to pay damages, we may lose significant intellectual property protection for our products or services, such that competitors could copy our products or services and we could be forced to cease commercialization of certain of our products or services. Even if resolved in our favor, any award of monetary damages or other remedy we receive may not be commercially valuable.

Any litigation that may be necessary in the future could result in substantial costs and diversion of resources and could have a material adverse effect on our business, financial condition, results of operations and prospects. In any lawsuit we bring to enforce our intellectual property rights, a court may refuse to the stop the other party from using the technology at issue on grounds that our intellectual property rights do not cover the technology in question. Further, in such proceedings, the defendant could counterclaim that our intellectual property is invalid or unenforceable and the court may agree, in which case we could lose valuable intellectual property rights. The outcome in any such lawsuits are unpredictable. Even if we do prevail in any future litigation related to intellectual property rights, the cost and time

requirements of the litigation could negatively impact our financial results. Some of our competitors may be able to sustain the costs of such litigation or proceedings more effectively than we can because of their greater financial resources. Uncertainties resulting from the initiation and continuation of patent litigation or other proceedings could compromise our ability to compete in the marketplace.

Intellectual property litigation may lead to unfavorable publicity that harms our reputation and causes the market price of our Class A common stock to decline.

During the course of any intellectual property litigation, there could be public announcements of the initiation of the litigation as well as results of hearings, rulings on motions and other interim proceedings in the litigation. If securities analysts or investors regard these announcements as negative, the perceived value of our existing products, programs or intellectual property could be diminished.

Accordingly, the market price of shares of our Class A common stock may decline. Such announcements could also harm our reputation or the market for our future products, which could have a material adverse effect on our business.

Obtaining and maintaining our patent protection depends on compliance with various required procedures, document submissions, fee payments and other requirements imposed by governmental patent agencies, and our patent protection could be reduced or eliminated for non-compliance with these requirements.

Periodic maintenance fees, renewal fees, annuity fees and various other governmental fees on patents and/or applications will be due to be paid to the USPTO and various governmental patent agencies outside of the United States at several stages over the lifetime of the patents and/or applications. We have systems in place to remind us to pay these fees, and we rely on our outside counsel using an outside service to pay these fees due to non-U.S. patent agencies. The USPTO and various non-U.S. governmental patent agencies require compliance with a number of procedural, documentary, fee payment and other similar provisions during the patent application process. In many cases, an inadvertent lapse, including due to the effect of the COVID-19 pandemic on us or our vendors, can be cured by payment of a late fee or by other means in accordance with the applicable rules. However, there are situations in which non-compliance can result in abandonment or lapse of the patent or patent application, resulting in partial or complete loss of patent rights in the relevant jurisdiction. In such an event, our competitors may be able to enter the market without infringing our patents and this circumstance would have a material adverse effect on our business.

Our use of open-source software could compromise our ability to offer our services and subject us to possible litigation.

We use open-source software licensed to us by third-party authors under “open source” licenses in connection with our products and services. Use and distribution of open-source software may entail greater risks than use of third-party commercial software, as open-source licensors generally do not provide support, warranties, indemnification or other contractual protections regarding infringement claims or the quality of the code.

Further, some open-source software licenses require users who distribute software containing open-source software to publicly disclose all or part of the source code to the licensee’s software that incorporates, links or uses such open-source software, and make available to third parties for no cost, any derivative works of the open source code created by the licensee, which could include the licensee’s own valuable proprietary code. While we monitor our use of open-source software and try to ensure that none is used in a manner that would require us to disclose our proprietary source code or that would otherwise breach the terms of an open source agreement, such use could inadvertently occur, or could be claimed to have occurred, in part because open source license terms are often ambiguous. Despite our efforts to monitor our use of open-source software to avoid subjecting our platform to conditions we do not intend, there is a risk that open source licenses could be construed in a way that could impose unanticipated conditions or restrictions on our ability to provide or distribute our platform. Additionally, we may from time to time face claims from third parties claiming ownership of, or seeking to enforce the terms of, an open source license, including by demanding release of source code for the open-source software, derivative works or our proprietary source code that was developed using, or that is distributed with, such open-source software. These claims could also result in litigation and could require us to make our proprietary software source code freely available, require us to devote additional research and development

resources to change re-engineer our platform, seek costly licenses from third parties or otherwise incur additional costs and expenses, any of which could result in reputational harm and would have a negative effect on our business and operating results. There is little legal precedent in this area and any actual or claimed requirement to disclose our proprietary source code or pay damages for breach of contract could harm our business and could help third parties, including our competitors, develop products and services that are similar to or better than ours.

In addition, if the license terms for the open-source software we utilize change, we may be forced to re-engineer our platform, incur additional costs to comply with the changed license terms or replace the affected open-source software. Although we have implemented policies to regulate the use and incorporation of open-source software into our platform and solutions, we cannot be certain that that such policies will be effective and that we have not incorporated open-source software in our platform and solutions in a manner that is inconsistent with such policies.

Risks Related to Our Common Stock

The market price of our Class A common stock has been and may continue to be volatile and fluctuate substantially, which could result in substantial losses for our stockholders.

The market price of our Class A common stock has been and may continue to be volatile. The stock market in general and the market for smaller technology companies in particular has experienced extreme volatility that has often been unrelated to the operating performance of particular companies. As a result of this volatility, our stockholders may not be able to sell their Class A common stock at or above the price they paid for them. The market price for our Class A common stock may be influenced by many factors, including:

- actual or anticipated fluctuations in our financial condition and operating results, including fluctuations in our quarterly and annual results;
- the introduction of new products or product enhancements by us or others in our industry;
- variances in product and system reliability;
- overall conditions in our industry and the markets in which we operate;
- disputes or other developments with respect to our or others' intellectual property rights;
- actual or anticipated changes in our operating results or growth rate as a result of our competitors' operating results;
- our ability to develop and market new and enhanced products and expand into new markets on a timely basis;
- fluctuations in the valuation of companies perceived by investors to be comparable to us;
- product liability claims or other litigation;
- announcement or expectation of additional financing effort;
- sales of our common stock by us or our stockholders;
- share price and volume fluctuations attributable to inconsistent trading volume levels of our shares;
- media exposure of our products or of those of others in our industry;
- changes in earnings estimates or recommendations by securities analysts;

- general market conditions and other factors, including factors unrelated to our operating performance or the operating performance of our competitors; and
- the other factors described in this "Risk Factors" section and elsewhere in this Annual Report on Form 10-K.

An active trading market for our Class A common stock may not be sustainable.

It is possible that an active or liquid market for our Class A common stock may not be sustainable. In the absence of an active trading market for our Class A common stock, it may be difficult for stockholders to sell our shares without depressing the market price for the shares, or at all. Further, an inactive market may also impair our ability to raise capital by selling shares of our Class A common stock and may impair our ability to enter into strategic collaborations or acquire companies or products by using our shares of Class A common stock as consideration.

Our executive officers, directors and principal stockholders, if they choose to act together, will have the ability to control all matters submitted to stockholders for approval.

Following our IPO, based on the number of shares of Class A common stock outstanding as of December 31, 2021, our executive officers, directors and stockholders who owned more than 5% of our outstanding common stock before the IPO and their respective affiliates hold, in the aggregate, a majority of our outstanding voting stock. The holders of shares of our Class B common stock have the ability to convert any portion of their Class B common stock into Class A common stock. Our Class B common stock cannot be converted if, immediately following such conversion, the holder would beneficially own more than 4.9% of the issued and outstanding Class A common stock. Due to this conversion right, holders of our Class B common stock could, at any time, increase their voting control of us. As a result of their combined voting power, if our executive officers, directors and stockholders who own more than 5% of our outstanding common stock choose to act together, they would be able to control all matters submitted to our stockholders for approval, as well as our management and affairs. For example, these persons, if they choose to act together, would control the election of directors, the composition of our management and approval of any merger, consolidation or sale of all or substantially all of our assets.

The dual class structure of our common stock and the option of the holders of shares of our Class B common stock to convert into shares of our Class A common stock may limit our Class A stockholders' ability to influence corporate matters.

Our Class A common stock has one vote per share, while our Class B common stock is non-voting. Nonetheless, each share of our Class B common stock may be converted at any time into one share of issued and outstanding Class A common stock at the option of its holder, subject to the limitations provided for in our restated certificate of incorporation that prohibit the conversion of our Class B common stock into shares of Class A common stock to the extent that, upon such conversion, such holder would beneficially own in excess of 4.9% of our Class A common stock. Consequently, if holders of Class B common stock exercise their option to make this conversion, such exercise will have the effect of increasing the relative voting power of those prior holders of our Class B common stock (subject to the ownership limitation described in the previous sentence) and increasing the number of outstanding shares of our voting common stock, and correspondingly decreasing the relative voting power of the current holders of our Class A common stock, which may limit our current Class A stockholders' ability to influence corporate matters.

Sales of a substantial number of shares of our Class A common stock in the public market, or the perception in the market that the holders of a large number of shares intend to sell shares, could reduce the market price of our Class A common stock.

As of December 31, 2021, we have 41,467,419 outstanding shares of Class A common stock and Class B common stock, collectively. This includes the shares that we sold in the IPO, which may be resold in the public market immediately without restriction, unless purchased by our affiliates. The remaining shares were previously restricted as a result of applicable securities laws or lock-up agreements and have recently become eligible to be sold, unless held by one of our affiliates, in which case the resale of those securities will be subject to certain restrictions under the Securities

Act of 1933, as amended, and the rules and regulations promulgated thereunder. Moreover, pursuant to an investors' rights agreement entered into with certain of our stockholders, holders of an aggregate of 34,564,040 shares of our Class A common stock (including shares issuable upon conversion of our Class B common stock) will have rights, subject to specified conditions, to require us to file registration statements covering their shares or to include their shares in registration statements that we may file for ourselves or other stockholders, until the rights terminate. We have also registered shares of our Class A common stock issued and available for issuance under our equity compensation plans, which can be freely sold in the public market, subject to vesting requirements, volume limitations applicable to affiliates and lock-up agreements. If these additional shares are sold, or if it is perceived that they will be sold, in the public market, the trading price of our Class A common stock could decline.

We are an "emerging growth company," and the reduced disclosure requirements applicable to emerging growth companies may make our Class A common stock less attractive to investors.

We are an "emerging growth company," as defined in the JOBS Act, and may remain an emerging growth company until the last day of the fiscal year following the fifth anniversary of the closing of the IPO. However, if certain events occur prior to the end of such five-year period, including if we become a "large accelerated filer," our annual gross revenues exceed $1.07 billion or we issue more than $1.0 billion of non-convertible debt in the previous three-year period, we will cease to be an emerging growth company prior to the end of such five-year period. For so long as we remain an emerging growth company, we are permitted and intend to rely on exemptions from certain disclosure requirements that are applicable to other public companies that are not emerging growth companies. These exemptions include:

- not being required to comply with the auditor attestation requirements in the assessment of our internal control over financial reporting;
- reduced disclosure obligations regarding executive compensation;
- exemptions from the requirements of holding a nonbinding advisory vote on executive compensation and stockholder approval of any golden parachute payments not previously approved and from providing the pay ratio between our Chief Executive Officer and employees; and
- an exemption from compliance with the requirements of the Public Company Accounting Oversight Board regarding the communication of critical audit matters in the auditor's report on the financial statements.

We cannot predict whether investors will find our Class A common stock less attractive if we rely on these exemptions. If some investors find our Class A common stock less attractive as a result, there may be a less active trading market for our Class A common stock and our stock price may be reduced or more volatile. In addition, the JOBS Act provides that an emerging growth company can take advantage of an extended transition period for complying with new or revised accounting standards. This allows an emerging growth company to delay the adoption of these accounting standards until they would otherwise apply to private companies. We intend to utilize the extended transition period and, as a result, we will not be required to comply with new or revised accounting standards on the same time line as other public companies.

We are a "smaller reporting company" and the reduced disclosure requirements applicable to smaller reporting companies may make our Class A common stock less attractive to investors.

We are a "smaller reporting company" and are therefore entitled to rely on certain reduced disclosure requirements for as long as we remain a smaller reporting company, such as presenting 2 years of audited financial statements in our annual Form 10-K or reduced disclosure requirements for executive compensation. This reduced disclosure in our SEC filings due to our status as a smaller reporting company may make it harder for investors to analyze our results of operations and financial prospects. We cannot predict if investors will find our Class A common stock less attractive because we may rely on these exemptions. If some investors find our Class A common stock less attractive as a result, there may be a less active trading market for our Class A common stock and our stock prices may be more volatile.

If we fail to maintain effective internal control over financial reporting and effective disclosure controls and procedures, we may not be able to accurately report our financial results in a timely manner or prevent fraud, which may adversely affect investor confidence in our company.

We are not currently required to comply with the rules of the SEC implementing Section 404 of the Sarbanes-Oxley Act, or Section 404, and, therefore, we are not required to make a formal assessment of the effectiveness of our internal control over financial reporting. As a public company, we will be required to comply with the SEC's rules implementing Sections 302 and 404 of the Sarbanes-Oxley Act, which require management to certify financial and other information in our quarterly and annual reports and provide an annual management report on the effectiveness of controls over financial reporting. Although we will be required to disclose changes made in our internal controls and procedures on a quarterly basis, we are not required to make our first annual assessment of our internal control over financial reporting pursuant to Section 404 until the year following our first annual report required to be filed with the SEC. As an emerging growth company, our independent registered public accounting firm will not be required to attest to the effectiveness of our internal control over financial reporting pursuant to Section 404 until the later of the year following our first annual report required to be filed with the SEC or the date we are no longer an emerging growth company and a "non-accelerated filer." At such time, our independent registered public accounting firm may issue a report that is adverse in the event material weaknesses have been identified in our internal control over financial reporting.

To comply with the requirements of being a public company, we will need to undertake actions, such as implementing new internal controls and procedures and hiring additional accounting or internal audit staff. Testing and maintaining internal control can divert our management's attention from other matters that are important to the operation of our business. In addition, when evaluating our internal control over financial reporting, we may identify material weaknesses that we may not be able to remediate in time to meet the applicable deadline imposed upon us for compliance with the requirements of Section 404. If we identify any material weaknesses in our internal control over financial reporting or we are unable to comply with the requirements of Section 404 in a timely manner or assert that our internal control over financial reporting is effective, investors may lose confidence in the accuracy and completeness of our financial reports. As a result, the market price of our Class A common stock could be materially adversely affected.

Our disclosure controls and procedures may not prevent or detect all errors or acts of fraud.

We are subject to the periodic reporting requirements of the Exchange Act. We are continuing to refine our disclosure controls and procedures to provide reasonable assurance that information we must disclose in reports we file or submit under the Exchange Act is accumulated and communicated to management, and recorded, processed, summarized and reported within the time periods specified in the rules and forms of the SEC. We believe that any disclosure controls and procedures, no matter how well conceived and operated, can provide only reasonable, not absolute, assurance that the objectives of the control system are met.

These inherent limitations include the realities that judgments in decision-making can be faulty, and that breakdowns can occur because of simple error or mistake. Additionally, controls can be circumvented by the individual acts of some persons, by collusion of two or more people or by an unauthorized override of the controls. Accordingly, because of the inherent limitations in our control system, misstatements due to error or fraud may occur and not be detected, which could have a material adverse effect on investors' confidence in our reporting and the price of our Class A common stock.

Provisions in our restated certificate of incorporation and amended and restated bylaws and under Delaware law could make an acquisition of our company, which may be beneficial to our stockholders, more difficult and may prevent attempts by our stockholders to replace or remove our current management.

Provisions in our restated certificate of incorporation and our amended and restated bylaws may discourage, delay or prevent a merger, acquisition or other change in control of our company that stockholders may consider favorable, including transactions in which our stockholders might otherwise receive a premium for their shares. These provisions could also limit the price that investors might be willing to pay in the future for shares of our Class A common stock, thereby depressing the market price of our Class A common stock. In addition, because our board of directors is responsible for appointing the members of our management team, these provisions may frustrate or prevent any attempts

by our stockholders to replace or remove our current management by making it more difficult for stockholders to replace members of our board of directors. Among other things, these provisions include those establishing:

- a classified board of directors with three-year staggered terms, which may delay the ability of stockholders to change the membership of a majority of our board of directors;
- no cumulative voting in the election of directors, which limits the ability of minority stockholders to elect director candidates;
- the exclusive right of our board of directors to elect a director to fill a vacancy created by the expansion of the board of directors or the resignation, death or removal of a director, which prevents stockholders from filling vacancies on our board of directors;
- the ability of our board of directors to authorize the issuance of shares of preferred stock and to determine the terms of those shares, including preferences and voting rights, without stockholder approval, which could be used to significantly dilute the ownership of a hostile acquirer;
- the ability of our board of directors to alter our bylaws without obtaining stockholder approval;
- the required approval of the holders of at least two-thirds of the shares entitled to vote at an election of directors to adopt, amend or repeal our bylaws or repeal the provisions of our restated certificate of incorporation regarding the election and removal of directors;
- the required approval of the holders of at least two-thirds of the shares entitled to vote thereon to (i) effect a reorganization, recapitalization, share exchange, share classification, consolidation, conversion or merger, (ii) sell, lease, exchange, transfer or otherwise dispose of all or substantially all of our assets, or (iii) dissolve our company or revoke a dissolution of our company;
- a prohibition on stockholder action by written consent, which forces stockholder action to be taken at an annual or special meeting of our stockholders;
- the requirement that a special meeting of stockholders may be called only by the chairman of the board of directors, the chief executive officer, the president or the board of directors, which may delay the ability of our stockholders to force consideration of a proposal or to take action, including the removal of directors; and
- advance notice procedures that stockholders must comply with in order to nominate candidates to our board of directors or to propose matters to be acted upon at a stockholders' meeting, which may discourage or deter a potential acquirer from conducting a solicitation of proxies to elect the acquirer's own slate of directors or otherwise attempting to obtain control of us.

Moreover, because we are incorporated in Delaware, we are governed by the provisions of Section 203 of the General Corporation Law of the State of Delaware, which prohibits a person who owns in excess of 15% of our outstanding voting stock from merging or combining with us for a period of three years after the date of the transaction in which the person acquired in excess of 15% of our outstanding voting stock, unless the merger or combination is approved in a prescribed manner.

Our restated certificate of incorporation designates specific courts as the exclusive forum for certain litigation that may be initiated by our stockholders, which could limit our stockholders' ability to obtain a favorable judicial forum for disputes with us.

Our restated certificate of incorporation specifies that, unless we consent in writing to the selection of an alternative forum, the Court of Chancery of the State of Delaware will be the sole and exclusive forum for most legal actions

involving claims brought against us by stockholders; provided that, the exclusive forum provision will not apply to suits brought to enforce any liability or duty created by the Securities Act, the Exchange Act, the rules and regulations thereunder or any other claim for which the federal courts have exclusive jurisdiction; and provided further that, if and only if the Court of Chancery of the State of Delaware dismisses any such action for lack of subject matter jurisdiction, such action may be brought in another state or federal court sitting in the State of Delaware. Our restated certificate of incorporation further provides that, unless we consent in writing to the selection of an alternative forum, the federal district courts of the United States of America shall, to the fullest extent permitted by law, be the sole and exclusive forum for the resolution of any complaint asserting a cause of action arising under the Securities Act. Any person or entity purchasing or otherwise acquiring any interest in shares of our capital stock shall be deemed to have notice of and to have consented to the provisions of our restated certificate of incorporation described above; provided, however, that stockholders cannot and will not be deemed to have waived our compliance with the U.S. federal securities laws and the rules and regulations thereunder.

We believe these provisions benefit us by providing increased consistency in the application of Delaware law by chancellors particularly experienced in resolving corporate disputes and in the application of the Securities Act by federal judges, as applicable, efficient administration of cases on a more expedited schedule relative to other forums and protection against the burdens of multi-forum litigation. However, the provision may have the effect of discouraging lawsuits against our directors, officers, employees and agents as it may limit any stockholder's ability to bring a claim in a judicial forum that such stockholder finds favorable for disputes with us or our directors, officers, employees or agents and result in additional litigation costs in pursuing any such claims. In addition, while the Delaware Supreme Court ruled in March 2020 that federal forum selection provisions purporting to require claims under the Securities Act be brought in federal court are "facially valid" under Delaware law, there is uncertainty as to whether other courts will enforce our Federal Forum Provision. If a court were to find the choice of forum provision contained in our restated certificate of incorporation to be inapplicable or unenforceable in an action, we may incur additional costs associated with resolving such action in other jurisdictions, which could adversely affect our business, financial condition or results of operations. The choice of forum provision contained in our restated certificate of incorporation may also impose additional litigation costs on stockholders who assert that the provision is not enforceable or invalid. The Court of Chancery of the State of Delaware and the federal district courts of the United States may also reach different judgments or results than would other courts, including courts where a stockholder considering an action may be located or would otherwise choose to bring the action, and such judgments may be more or less favorable to us than our stockholders.

Because we do not anticipate paying any cash dividends on our common stock in the foreseeable future, capital appreciation, if any, would be stockholders' sole source of gain.

We have never declared or paid any cash dividends on our common stock. We currently anticipate that we will retain all available funds and future earnings for the development, operation and expansion of our business and do not anticipate declaring or paying any cash dividends for the foreseeable future. As a result, capital appreciation, if any, of our common stock will be the sole source of gain on an investment in our common stock for the foreseeable future.

Our ability to use our net operating losses and research and development tax credits to offset future taxable income or income tax liabilities may be subject to certain limitations.

As of December 31, 2021, we had U.S. federal and state net operating loss carryforwards, or NOLs, of $137.5 million and $62.7 million, respectively, which may be available to offset future taxable income, if any, that begin to expire in 2037 and 2032, respectively. Additionally, we had federal NOLs of $124.7 million which do not expire but are (for taxable years beginning after December 31, 2017) generally limited in their usage to an annual deduction equal to 80% of taxable income. In addition, we had federal and state research and development tax credits of $1.1 million and $2.1 million, respectively, which may be available to offset future tax liabilities and begin to expire in 2038 and 2024, respectively. In general, under Sections 382 and 383 of the Internal Revenue Code of 1986, as amended, or the Code, a corporation that undergoes an "ownership change," generally defined as a greater than 50 percentage point change by value in its equity ownership by one or more stockholders or groups of stockholders owning at least 5% of the corporation's stock over a rolling three-year period, is subject to limitations on its ability to utilize its pre-ownership change NOLs and tax credits to offset future taxable income or income tax liabilities for U.S. federal income tax purposes. Similar rules may apply under state tax laws. Our existing NOLs and tax credits are subject to limitations

arising from previous ownership changes based on the preliminary results of the Section 382 study for ownership changes. The Section 382 study is expected to be completed in 2022 and may result in additional limitations. The IPO transaction, could result in ownership changes. For these reasons, we are not able to utilize a material portion of the NOLs and tax credits even if we attain profitability. For additional information on our use of NOLs, see the section entitled "*Management's Discussion and Analysis of Financial Condition and Results of Operations—Components of results of operations—Income tax expense*" and Note 14—*Income taxes* to our consolidated financial statements included elsewhere in this Annual Report on Form 10-K.

General risk factors

Changes in tax laws, including as a result of the upcoming congressional elections, may impact our future financial position and results of operations.

New income, sales, use or other tax laws, statutes, rules, regulations or ordinances could be enacted at any time, or interpreted, changed, modified or applied adversely to us, any of which could adversely affect our business operations and financial performance. In particular, the upcoming congressional elections in the United States could result in significant changes in, and uncertainty with respect to, tax legislation, regulation and government policy directly affecting our business or indirectly affecting us because of impacts on our customers and suppliers. For example, the United States government may enact significant changes to the taxation of business entities including, among others, a permanent increase in the corporate income tax rate, an increase in the tax rate applicable to the global intangible low-taxed income and elimination of certain exemptions, and the imposition of minimum taxes or surtaxes on certain types of income. The likelihood of these changes being enacted or implemented is unclear. We are currently unable to predict whether such changes will occur and, if so, the ultimate impact on our business. To the extent that such changes have a negative impact on us, our suppliers or our customers, including as a result of related uncertainty, these changes may materially and adversely impact our business, financial condition, results of operations and cash flows.

If securities or industry analysts do not publish research or reports about our business, or if they issue an adverse or misleading opinion regarding our stock, our stock price and trading volume could decline, even if our business is doing well.

The trading market for our Class A common stock will be influenced by the research and reports that industry or securities analysts publish about us or our business. We do not currently have, and may never obtain, research coverage by securities and industry analysts. If no or few securities or industry analysts commence coverage of us, the trading price for our stock would be negatively impacted. In the event we obtain securities or industry analyst coverage, if the analysts who cover us issue an adverse or misleading opinion regarding us, our business model, or our stock performance, or if our product development or marketing and sales results fail to meet the expectations of analysts, our stock price would likely decline. If one or more of these analysts ceases coverage of us or fails to publish reports on us regularly, we could lose visibility in the financial markets, which in turn could cause our stock price or trading volume to decline.

If our estimates or judgments relating to our critical accounting policies are based on assumptions that change or prove to be incorrect, our operating results could fall below our publicly announced guidance or the expectations of securities analysts and investors, resulting in a decline in the market price of our Class A common stock.

The preparation of financial statements in conformity with accounting principles generally accepted in the United States of America, or GAAP, requires management to make estimates and assumptions that affect the amounts reported in our consolidated financial statements and accompanying notes. We base our estimates on historical experience and on various other assumptions that we believe to be reasonable under the circumstances, the results of which form the basis for making judgments about the carrying values of assets, liabilities, equity, revenue and expenses that are not readily apparent from other sources. If our assumptions change or if actual circumstances differ from our assumptions, our operating results may be adversely affected and could fall below our publicly announced guidance or the expectations of securities analysts and investors, resulting in a decline in the market price of our Class A common stock.

We could be subject to securities class action litigation.

In the past, securities class action litigation has often been brought against a company following a decline in the market price of its securities. This risk is especially relevant for us because early-stage technology companies have experienced significant stock price volatility in recent years. If we face such litigation, it could result in substantial costs and a diversion of management's attention and resources, which could harm our business.

We will continue to incur increased costs as a result of operating as a public company, and our management will be required to devote substantial time to new compliance initiatives and corporate governance practices.

As a public company, we will continue incur significant legal, accounting and other expenses that we did not incur as a private company, particularly after we are no longer an emerging growth company and a non-accelerated filer. The Sarbanes-Oxley Act of 2002, the Dodd-Frank Wall Street Reform and Consumer Protection Act, the listing requirements of The Nasdaq Global Select Market and other applicable securities rules and regulations impose various requirements on public companies, including establishment and maintenance of effective disclosure and financial controls and corporate governance practices. Our management and other personnel will need to devote a substantial amount of time to these compliance initiatives. Moreover, these rules and regulations will increase our legal and financial compliance costs and will make some activities more time consuming and costly. For example, we expect that these rules and regulations may make it more difficult and more expensive for us to obtain director and officer liability insurance, which in turn could make it more difficult for us to attract and retain qualified members of our board of directors.

We are evaluating these rules and regulations and cannot predict or estimate the amount of additional costs we may incur or the timing of such costs. These rules and regulations are often subject to varying interpretations, in many cases due to their lack of specificity, and, as a result, their application in practice may evolve over time as new guidance is provided by regulatory and governing bodies. This could result in continuing uncertainty regarding compliance matters and higher costs necessitated by ongoing revisions to disclosure and governance practice.

Item 1B. Unresolved Staff Comments.

None.

Item 2. Properties.

Our principal office is located in Lowell, Massachusetts, where we lease 67,663 square feet of office, laboratory, manufacturing and inventory-storage space. We lease this space under a lease agreement, as amended, which expires in July 2029. In June 2021, we entered into a Sublease agreement for 33,339 square feet of office and back-up manufacturing space in Lexington, Massachusetts, which expires in June 2029. Further, we maintain inventory at storage a warehouse in Noord-Brabant, Netherlands as well as various offsite warehouses in the United States and Europe. We believe that our facilities are sufficient to meet our current needs.

Item 3. Legal Proceedings.

From time to time, we may become involved in litigation or other legal proceedings. We are not currently a party to any litigation or legal proceedings that, in the opinion of our management, are probable to have a material adverse effect on our business. Regardless of outcome, litigation can have an adverse impact on our business, financial condition, results of operations and prospects because of defense and settlement costs, diversion of management resources and other factors.

Item 4. Mine Safety Disclosures.

Not Applicable.

PART II

Item 5. Market for Registrant's Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities.

Market Information

On July 15, 2021, our Class A common stock began trading on the Nasdaq Global Select Market under the symbol "RPID." Prior to that time, there was no public market for our common stock. There is no established public trading market for our Class B common stock.

Holders

As of March 21, 2022, there were 53 holders of record of our Class A common stock and 2 holders of record of our Class B common stock.

Dividend Policy

We have never declared or paid any cash dividends on our capital stock. We currently intend to retain all available funds and future earnings, if any, for the operation and expansion of our business and do not anticipate declaring or paying any dividends in the foreseeable future. Any future determination related to our dividend policy will be made at the discretion of our board of directors after considering our financial condition, results of operations, capital requirements, contractual requirements, business prospects and other factors the board of directors deems relevant, and subject to the restrictions contained in any future financing instruments.

Recent Sales of Unregistered Securities; Purchases of Equity Securities by the Issuer or Affiliated Purchaser

Other than as disclosed in our Quarterly Report on Form 10-Q for the quarter ended June 30, 2021, the Company did not sell any equity securities during the year ended December 31, 2021 that were not registered under the Securities Act. On July 16, 2021, we filed a registration statement on Form S-8 under the Securities Act to register all of the shares of our Class A common stock subject to outstanding options and all shares of our Class A common stock otherwise issuable pursuant to our equity compensation plans.

Use of Proceeds

On July 19, 2021, we completed our IPO, in which we issued and sold 7,920,000 shares of our Class A common stock at a price to the public of $20.00 per share. We raised net proceeds to us of approximately $143.8 million, after deducting the underwriting discount of $11.1 million and offering expenses of $3.7 million. On August 4, 2021, the underwriters exercised their option to purchase additional shares in part for 1,086,604 shares at the public offering price of $20.00 per share less underwriting discounts and commissions, for additional net proceeds to us of approximately $20.2 million. All shares sold were registered pursuant to a registration statement on Form S-1 (File No. 333-257431), as amended, or the "Registration Statement", declared effective by the SEC on July 14, 2021. The offering terminated after the sale of all securities registered pursuant to the Registration Statement. No payments for such expenses were made directly or indirectly to (i) any of our officers or directors or their associates, (ii) any persons owning 10% or more of any class of our equity securities or (iii) any of our affiliates.

The net proceeds from our IPO have been invested in cash, a money market fund comprised of U.S. Government and U.S. Treasury securities, and short and long-term investments in U.S. Government Treasury Bills. There has been no material change in the expected use of the net proceeds from our IPO as described in our Registration Statement.

Item 6. Reserved

Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations.

You should read the following discussion and analysis of our financial condition and results of operations together with our consolidated financial statements and the related notes appearing at the end of this Annual Report on Form 10-K. Some of the information contained in this discussion and analysis or set forth elsewhere in this Annual Report on Form 10-K, including information with respect to our plans and strategy for our business, includes forward-looking statements that involve risks and uncertainties. As a result of many factors, including those factors set forth in the "Risk Factors" section of this Annual Report on Form 10-K, our actual results could differ materially from the results described in or implied by the forward-looking statements contained in the following discussion and analysis.

Overview

We are an innovative life sciences technology company that enables the safe and efficient manufacture of pharmaceutical products through our rapid automated microbial quality control, or MQC, detection platform. We develop, manufacture, market and sell the Growth Direct system and related proprietary consumables, and value-added services to enable rapid MQC testing in the manufacture of biologics, cell and gene therapies, vaccines, sterile injectables, and other healthcare products. Our system delivers the power of industrial automation to bioprocessing and pharmaceutical manufacturing firms by modernizing and digitizing their MQC operations. Our Growth Direct platform, developed with over 15 years of active feedback from our customers, was purpose-built to meet the growing demands posed by the increasing scale, complexity, and regulatory scrutiny confronting global pharmaceutical manufacturing. Our Growth Direct platform comprises the Growth Direct system, optional laboratory information management system, or LIMS, connection software (which the majority of our customers purchase), proprietary consumables, and comprehensive field service, validation services and post-warranty service contracts. Once embedded and validated in our customers' facilities, our Growth Direct platform provides for recurring revenues through ongoing sales of consumables and service contracts.

Our technology fully automates and digitizes the process of pharmaceutical MQC and is designed to enable our customers to perform this critical testing process more efficiently, accurately, and securely. Our Growth Direct platform accelerates time to results by several days, a 50% improvement over the traditional method, and reduces MQC testing to a simple two-step workflow, eliminating up to 85% of the manual steps of traditional MQC, generating significant time, operational, and cost savings for our customers. We seek to establish the Growth Direct as the trusted global standard in automated MQC by delivering the speed, accuracy, security, and data integrity compliance that our customers depend on to ensure patient safety and consistent drug supply.

Since inception, we have devoted a majority of our resources to designing, developing, and building our proprietary Growth Direct platform and associated products, launching our Growth Direct platform commercially, expanding our sales and marketing infrastructure to grow our sales, building a global customer support team to deliver our value-added services, investing in robust manufacturing and supply chain operations to serve our customers globally, and providing general and administrative support for these operations. Prior to our IPO, we funded our operations primarily with proceeds from sales of preferred stock, borrowings under loan agreements and product and service sales as well as our cost-reimbursement contract with the U.S. Department of Health and Human Services Biomedical Advanced Research & Development Authority ("BARDA"). All funding under this contract was fully earned by the fourth quarter of 2021 and, as such, we do not currently anticipate recognizing any non-commercial revenue in the year ending December 31, 2022.

On July 19, 2021, we closed an initial public offering of our Class A common stock (the "IPO"), which resulted in the sale of 7,920,000 shares of our Class A common stock at a public offering price of $20.00 per share, before underwriting discounts. The IPO resulted in gross proceeds of $158.4 million and net proceeds of approximately $143.8 million after deducting underwriting discounts, commissions and estimated offering expenses payable by us. Additionally, on August 4, 2021, the underwriters exercised their overallotment option in part and purchased 1,086,604 shares of Class A common stock at the initial public offering price of $20.00 per share less discounts and commissions. The overallotment option exercise resulted in net proceeds of approximately $20.2 million. Immediately prior to the completion of the IPO, all of the outstanding shares of our Series A1, Series B1, Series C1 and Series D1 preferred stock converted into 24,200,920 shares of Class A common stock and all of the outstanding shares of our Series C2 and Series

D2 converted into 6,903,379 shares of Class B common stock. As of December 31, 2021, no shares of our preferred stock remained outstanding.

Since our inception, we have incurred net losses in each year. We generated revenue of $23.2 million and $16.1 million for the years ended December 31, 2021 and 2020, respectively, and incurred net losses of $73.5 million and $37.1 million for those same years. As of December 31, 2021, we had an accumulated deficit of $315.1 million. We expect to continue to incur net losses in connection with our ongoing activities, including:

- growing sales of our products in both the United States and international markets by further expanding our sales and marketing capabilities;
- scaling our manufacturing and supply chain processes and infrastructure to meet growing demand for our products;
- investing in research and development to develop new products and further enhance our existing products;
- protecting and building on our intellectual property portfolio; and
- attracting, hiring and retaining qualified personnel.

Until such time as we can generate revenue sufficient to achieve profitability, we expect to finance our operations through a combination of equity offerings and debt financings. If we are unable to raise capital or enter into such agreements as, and when, needed, we may have to significantly delay, scale back or discontinue our expansion plans including the further development and commercialization efforts of one or more of our products, or may be forced to reduce or terminate our operations.

We believe that the net proceeds from the IPO, together with our cash and cash equivalents and investments as of December 31, 2021, will enable us to fund our operating expenses and capital expenditure requirements for at least twelve months following the date these consolidated financial statements were issued. We have based this estimate on assumptions that may prove to be wrong, and we could exhaust our available capital resources sooner than we expect. See “Liquidity and Capital Resources.”

COVID-19 update

In response to the COVID-19 pandemic and various resulting government directives, we took proactive measures to protect the health and safety of our employees, customers, and partners, while maintaining our ability to supply and service our customers. We continue to monitor the implications of the ongoing COVID-19 pandemic on our business, as well as our customers’ and suppliers’ businesses. Some of the measures we have taken follow:

- During this pandemic, we moved quickly to implement several business continuity initiatives aimed at maintaining uninterrupted manufacturing and supply capabilities while keeping our workforce safe, including instituting a COVID-19 task force, forming multiple manufacturing teams with staggered shifts, increasing inventory safety stock levels, and establishing appropriate protective equipment and distancing policies for essential on-site personnel.
- We have been designated an essential business that can continue operations during the COVID-19 pandemic. In early March 2020, we promptly instituted protocols to have many personnel work remotely. At the same time, because of our continued designation as an essential business, many employees continue to work on-site at our facility in Lowell, MA to undertake manufacturing activities that support essential operations to provide mission-critical MQC testing products to global pharmaceutical customers manufacturing life-saving drugs. We have also restricted business travel and have limited access to our facilities mostly to personnel and third parties who must perform critical activities that must be completed on-site. We continue to limit the number of such personnel that can be present at our facilities at any one

time and request that most of our personnel work remotely. To date, these arrangements have not materially affected our ability to maintain our business operations, including the operation of financial reporting systems, internal control over financial reporting and disclosure controls and procedures.

- Our production, shipping and customer service functions remain operational to maintain a continuous supply of products to our customers. We are communicating regularly with our suppliers and logistics partners so that our supply chain remains intact and we have not experienced any material supply issues to date. Our customer service teams around the world are operating remotely and remain available to assist our customers and partners as needed.

- As a result of travel restrictions and shelter-in-place orders, we experienced an impact on our ability to sell, ship, install and validate systems, as well as train customers in certain geographies, which negatively impacted our product and service revenues during 2021 and 2020. To counter some of the effects of these restrictions, we implemented several measures including remote and customer-assisted support activities to support the continued growth of our business. However, the rapid onset of the Omicron variant limited the effectiveness of these measures during the second half of the fourth quarter of 2021, which contributed to our weaker than expected system placements in that period.

- We continue to actively review and manage costs to navigate the current environment.

While the disruption due to COVID-19, and its variants, is currently expected to be temporary, there is considerable uncertainty around its duration. We expect these disruptions to continue to impact our operating results. However, the related financial impact and duration of these disruptions cannot be reasonably estimated at this time.

Factors affecting our performance

We believe that our financial performance has been, and in the foreseeable future will continue to be, primarily driven by multiple factors as described below, each of which presents growth opportunities for our business. These factors also pose important challenges that we must successfully address in order to sustain our growth and improve our results of operations. Our ability to successfully address these challenges is subject to various risks and uncertainties, including those described under the heading “Risk Factors.”

New customer adoption of the Growth Direct platform

Our financial performance has largely been driven by, and a key factor to our future success will be, our ability to increase the global adoption of our Growth Direct platform in our key markets. We plan to drive global customer adoption through both direct and indirect sales and marketing organizations in North America, Europe, Asia, and Australia.

We are investing substantially in these organizations and expect to continue to do so in the future. As part of this effort, we increased our direct sales and marketing team by 14 employees, representing a 78% increase in headcount in the year ended December 31, 2021 compared to the prior year-end.

Expansion within our existing customer base

There is an opportunity to increase broader adoption and utilization of our Growth Direct platform throughout our existing customers’ organizations by existing customers purchasing more systems. These additional systems will allow our existing customers to convert more of their test volume at existing locations, to support multiple locations, to meet redundancy requirements, or to increase capacity. As of December 31, 2021, a majority of our customers have purchased Growth Direct systems for multiple sites, and approximately 60% of our customers have purchased multiple Growth Direct systems. Increased utilization amongst existing customers can also occur as customers advance through the Growth Direct platform adoption cycle from early validation of initial applications to validation and conversion of multiple applications on the Growth Direct platform.

Innovating and launching new products on the Growth Direct platform

We believe the depth, scalability and robust capabilities of our Growth Direct platform allow us to address key opportunities and challenges facing MQC testing in the pharmaceutical industry. As an innovative leader in automated MQC testing, we intend to invest in further enhancements in our existing Growth Direct platform as well as end-to-end workflow solutions in our core market. We plan to further invest in research and development to support the expansion of our Growth Direct platform through development and launch of new applications to capture greater share of customer testing volume, new product formats to broaden our ability to serve different market segments and launch of new products and technologies to address adjacent segments of the overall MQC workflow. We plan to continue to hire employees with the necessary scientific and technical backgrounds to enhance our existing products and help us introduce new products to market. We expect to incur additional research and development expenses as a result. By expanding and continuously enhancing the Growth Direct platform, we believe we can drive incremental revenue from existing clients as well as broaden the appeal of our solutions to potential new customers.

Expanding Growth Direct into adjacent end markets

We have identified several market expansion opportunities including deploying our existing Growth Direct platform into the personal care products market. We continuously seek to identify other market opportunities where our Growth Direct platform could enhance MQC testing. We could expand into these markets through our existing technologies, through adapting our existing technologies, or through developing new products to specifically address the unmet needs of these adjacent markets. We may drive our expansion into these markets by building commercial infrastructure to specifically target customers in those markets, or by partnering with other participants in those markets.

Revenue mix

Our revenue is derived from sales of our Growth Direct systems, our LIMS connection software, proprietary consumables, services and our cost-reimbursement contract with BARDA. During the years ended December 31, 2021 and 2020, Growth Direct system revenue was the single largest component of our revenue. Because Growth Direct system revenue involves a capital selling process and tends to be somewhat concentrated within a small (but varied) group of customers each year, it is subject to variability from quarter to quarter. While we expect Growth Direct systems revenue to continue to be the largest contributor to our revenue over the near- to mid-term, as our base of validated Growth Direct systems continues to grow, we expect our recurring revenue (consumables and service contracts) to grow at a faster rate than our non-recurring revenues (Growth Direct systems, validation and other services), which we expect to drive variability and longer-term trends in our revenue mix.

Our non-commercial revenue is generated from long-term contracts with governmental agencies and third parties that are typically fixed in terms of scope and value. As a result, the amount of non-commercial revenue recognized in each period is subject to variability depending on factors such as the number of active contracts as well as the work performed and value remaining under each contract. All funding under our contract with BARDA was fully earned by the fourth quarter of 2021 and, as such, we do not currently anticipate recognizing any non-commercial revenue in the year ending December 31, 2022.

Key business metrics

We regularly review the following key business metrics to evaluate our business, measure our performance, identify trends affecting our business, formulate financial projections and make strategic decisions. We believe that the following

metrics are representative of our current business; however, we anticipate these may change or be substituted for additional or different metrics as our business grows and evolves.

	Year Ended December 31,		Change	
	2021	2020	Amount	%
	(dollars in thousands)			
Systems placed:				
Systems placed in period	29	26	3	11.5 %
Cumulative systems placed	116	87	29	33.3 %
Systems validated:				
Systems validated in period	33	24	9	37.5 %
Cumulative systems validated	84	51	33	64.7 %
Product and service revenue — total	$ 21,637	$ 14,083	$ 7,554	53.6 %
Product and service revenue — recurring	$ 7,819	$ 3,908	$ 3,911	100.1 %

Growth Direct system placements

We consider a Growth Direct system to be "placed" upon transfer of control of the system to the customer, at which point the revenue for that system is recognized. We regularly review the number of Growth Direct systems placed and cumulative Growth Direct system placements in each period as a leading indicator of our business performance. Our revenue has historically been driven by, and in the future will continue to be impacted by, the rate of Growth Direct system placements as a reflection of our success selling and delivering our products. We expect our Growth Direct system placements to continue to grow over time as we increase penetration in our existing markets and expand into new markets.

The number of Growth Direct system placements and rate of growth varies from period-to-period due to factors including, but not limited to, Growth Direct system order volume and timing, and access to customer sites (including COVID-19 related restrictions). As a result, we expect to experience continued variability in our period-to-period number of Growth Direct system placements due to the aforementioned factors.

Validated systems

We regularly review the number of Growth Direct systems validated and cumulative Growth Direct systems validated in each period as indicators of our business performance. Management focuses on validated Growth Direct systems as a leading indicator of likely future recurring revenue as well as a reflection of our success supporting our customers' validating placed systems. We expect our validated Growth Direct systems to continue to grow over time as we increase our base of cumulative systems placed and then validate those systems. After a Growth Direct system is placed with a customer and installed, we work with the customer to validate the system, which typically takes anywhere from three to nine months. Once a validation has been completed, we generally expect our customers to transition from their legacy manual method to our automated method and begin regular utilization of consumables over a period of up to three months.

The number of validated Growth Direct systems and rate of growth varies from period-to-period due to factors including, but not limited to, Growth Direct system order volume and timing, whether customers have previously validated Growth Direct systems within their site or network, access to customer sites (including as a result of COVID-19 related restrictions and delays in 2021 and 2020), customer site readiness and the time to install and validate each individual system. As a result, we expect to experience continued fluctuations in our period-to-period number of Growth Direct systems validated due to the aforementioned factors.

Product and service revenue

We regularly assess trends relating to our combined product and service revenue as an indicator of our business performance. Product and service revenue represents all of our commercial revenue for the business. It excludes non-

commercial revenue, which typically supports other business functions such as research and development and is by its nature subject to significant variability.

During the years ended December 31, 2021 and 2020, restrictions on travel and access to customer sites related to COVID-19, and its variants, negatively impacted our ability to ship, install and validate systems, as well as train customers in certain geographies. This negatively impacted our product and service revenue in the year. While we expect these disruptions to continue to impact our operating results, the related financial impact and duration of these disruptions cannot be reasonably estimated at this time.

Recurring revenue

We regularly assess trends relating to recurring revenue, which is the revenue from consumables and service contracts, based on our product offerings, our customer base and our understanding of how our customers use our products. Recurring revenue was 33.7% and 24.3% of our total revenue for the years ended December 31, 2021 and 2020, respectively. Our recurring revenue as a percentage of the total product and service revenue will generally vary based upon the cumulative number of validated Growth Direct systems in the period, as well as other variables such as the volume of tests being conducted, and the test application(s) being used on those Growth Direct systems. As our base of validated systems continues to grow, we expect our recurring revenue streams to grow at a faster rate than our non-recurring revenue streams and that this will ultimately result in our recurring revenue constituting the majority of our revenue over the longer term.

Components of results of operations

Revenue

We generate revenue from sales of our Growth Direct system (including our LIMS connection software), consumables, validation services, service contracts and field service as well as our contractual arrangement with BARDA. We primarily sell our products and services through direct sales representatives. The arrangements are noncancelable and nonrefundable after ownership passes to the customer.

	Year Ended December 31, 2021	Percentage of total revenue	Year Ended December 31, 2020	Percentage of total revenue
	(in thousands)		(in thousands)	
Product revenue	$ 15,512	66.8 %	$ 10,992	68.4 %
Service revenue	6,125	26.4 %	3,091	19.2 %
Non-commercial revenue	1,595	6.9 %	1,994	12.4 %
Total revenue	$ 23,232	100.0 %	$ 16,077	100.0 %

Product revenue

We derive product revenue primarily from the sale of our Growth Direct systems and related consumables as well as our LIMS connection software, which the majority of our customers purchase. As of December 31, 2021, we had placed 116 Growth Direct systems to over thirty customers globally, including over half of the top twenty pharmaceutical companies as measured by revenue and the manufacturers of 25% of globally approved cell and gene therapies.

Growth Direct systems

Growth Direct system revenue is a non-recurring product revenue stream that we recognize as revenue upon transfer of control of the system to the customer. The Growth Direct system is fully functional for use by the customer upon delivery and, as such, transfer of control occurs at shipment or delivery depending on contractual terms. We expect our Growth Direct system revenue to continue to grow over time as we increase system placements in our existing customers and markets and expand into new customers and markets.

Consumables

Our consumable revenue is a recurring product revenue stream composed of two proprietary consumables to capture test samples for analysis on the Growth Direct system, an Environmental Monitoring or EM, consumable, and a Water/Bioburden consumable, or W/BB consumable. Both proprietary consumables support the growth-based compendial method for MQC testing mandated by global regulators and provide results that are comparable to traditional consumables. Our consumables are designed with features that enable automation on the Growth Direct system, with bar coding for tracking and data integrity, and physical characteristics for robotic handling, to support vision detection, and to prevent counterfeiting.

We expect consumable revenue to increase in future periods as our base of cumulative validated Growth Direct systems grows and those systems utilize our consumables on a recurring, ongoing basis.

LIMS Connection Software

Our LIMS connection software is a non-recurring product revenue stream. Although optional, the majority of our customers elect to purchase this software, which allows Growth Direct systems to export result reports and securely link to a customer's two-way LIMS connection software to completely eliminate manual data entry and drive productivity.

Service revenue

We derive service revenue from validation services, field service including installations, and service contracts sold to our customers. Revenue from validation services and field service are non-recurring service revenue streams, while revenue from service contracts is a recurring service revenue stream.

We offer our customers validation services (including related documentation) that enable them to replace their existing manual testing method and utilize their Growth Direct systems in compliance with relevant MQC regulations. Validation services are recognized as revenue over time as these services are provided to the customer.

We offer our customers service contracts that can be purchased after the expiration of the one-year assurance warranty that all of our customers receive with the purchase of a Growth Direct system. Under these contracts, they are entitled to receive phone support, emergency on-site maintenance support and two preventative maintenance visits per year. These service contracts generally have fixed fees and a term of one year. We recognize revenue from the sale of service contracts over time as these services are provided over the respective contract term.

We also offer our customers field service which primarily consists of services provided by our field service engineers to install Growth Direct systems at customer sites. We recognize revenue from field service over time as these services are provided to the customer.

We expect service revenue to increase in future periods as the number of placed and validated Growth Direct systems grows and we are able to generate increasing non-recurring revenue from validation services and field service for newly placed systems and increasing recurring revenue from service contracts for validated systems.

Non-commercial revenue

We generate non-commercial revenue from long-term contracts with governmental agencies and third parties. To date, our non-commercial revenue has been derived from contracts with BARDA. Our current contract with BARDA is a cost-reimbursable, cost-sharing arrangement, whereby BARDA reimburses us for a percentage of the total cost incurred which includes allowable indirect costs. We recognize revenue from non-commercial revenue over time using an input method based on cost incurred to date in relation to total estimated cost.

Since the underlying contracts are typically fixed in terms of scope and value, the amount of non-commercial revenue recognized in each period is subject to variability depending on factors such as the number of active contracts as well as the work performed and value remaining under each contract.

In April 2021, we received additional funding from BARDA under our then-active contract with them. All funding under this contract was fully earned by the fourth quarter of 2021 and, as such, we do not currently anticipate recognizing any non-commercial revenue in the year ending December 31, 2022.

Costs and operating expenses

Costs of revenue

Cost of product revenue primarily consists of costs for raw material parts and associated freight, shipping and handling costs, salaries and other personnel costs including stock-based compensation expense, contract manufacturer costs, scrap, warranty cost, inventory reserves, royalties, depreciation and amortization expense, allocated information technology and facility-related costs, overhead and other costs related to those sales recognized as product revenue in the period.

Cost of service revenue primarily consists of salaries and other personnel costs including stock-based compensation expense, travel costs, materials consumed when performing installations, validations and other services, allocated information technology and facility-related costs, costs associated with training, and other expenses related to service revenue recognized in the period.

Cost of non-commercial revenue primarily consists of salaries and other personnel costs including stock-based compensation expense, consulting expense, materials, travel and other costs related to the revenue recognized as non-commercial revenue during the period. Our contract with BARDA is subject to the Federal Acquisition Regulation, or FAR and is priced based on estimated or actual costs of producing goods or providing services. The FAR provides guidance on the types of costs that are allowable in establishing prices for goods or services provided under U.S. government contracts.

We expect that our cost of revenue will generally increase or decrease to the extent that our revenue increases or decreases, but that such costs will increase more slowly than the related revenue streams over time.

Research and development

Research and development expenses consist primarily of costs incurred for our research activities, product development, hardware and software engineering and consultant services and other costs associated with our technology Growth Direct platform and products, which include:

- employee-related expenses, including costs for salaries, bonuses and other personnel costs including stock-based compensation expense, for employees engaged in research and development functions;
- the cost of developing, maintaining and improving new and existing product designs;
- the cost of hardware and software engineering;
- research materials and supplies;
- external costs of outside consultants engaged to conduct research and development associated with our technology and products; and
- allocated information technology and facility-related costs, which include direct and allocated expenses for rent, maintenance of facilities and insurance as well as related depreciation and amortization.

Our research and development costs are expensed as incurred. We believe that our continued investment in research and development is essential to our long-term competitive position, and we expect these expenses to increase in future periods.

Sales and marketing

Sales and marketing expenses consist primarily of salaries, commissions, benefits and other personnel costs including stock-based compensation expense as well as costs relating to travel, consulting, public relations and allocated information technology and facility-related costs for our employees engaged in sales and marketing activities. We expect sales and marketing expenses to increase in future periods as the number of sales and marketing personnel grows and we continue to expand our geographic reach and capabilities, broaden our customer base and introduce new products.

General and administrative

General and administrative expenses consist primarily of salaries, bonuses and other personnel costs including stock-based compensation expense for our finance, legal, human resources and general management employees, as well as professional fees for legal, patent, accounting, audit, investor relations, recruiting, consulting and other services. General and administrative expenses also include direct and allocated information technology and facility-related costs. General and administrative expenses are expected to increase in future periods as the number of administrative personnel grows to support increasing business size and complexity.

Following our IPO in July 2021, we began incurring incremental accounting, audit, legal, regulatory, compliance and director and officer insurance costs as well as investor relations expenses associated with operating as a public company.

Other income (expense)

Interest expense

Interest expense is comprised of interest cost associated with outstanding borrowings under our loan and security agreements and the amortization of deferred financing costs and debt discounts associated with such arrangements, as well as interest expense related to our capital lease obligation.

Change in fair value of preferred stock warrant liability

In connection with the May 2020 term loan facility we entered into with a lender, or 2020 Term Loan, we issued 1,195,652 warrants to purchase shares of Series C1 Preferred Stock at an exercise price of $1.15 per share. These warrants were immediately exercisable and expire 10 years after the issuance date. We also have other outstanding warrants to purchase preferred stock issued in connection with previous financing arrangements.

We classified all of our warrants to purchase preferred stock as a liability on our consolidated balance sheets until our IPO because the warrants are freestanding financial instruments that may require us to transfer assets upon exercise. The liability associated with each of these warrants was initially recorded at fair value upon the issuance date and was subsequently remeasured to fair value at each reporting date. The resulting change in the fair value of the preferred stock warrant liability was recorded as a component of other income (expense) in our consolidated statements of operations. We continued to recognize changes in the fair value of this preferred stock warrant liability at each reporting period until the IPO, when the preferred stock warrants were converted into common stock warrants that are equity classified.

In connection with the IPO, the preferred stock warrants were automatically converted to Class A common stock warrants. We determined the event resulted in equity classification of the Class A common stock warrants and derecognized the fair value of the preferred stock warrant liability as of the IPO date and reclassified to equity.

Loss on extinguishment of debt

Loss on extinguishment of debt includes a loss from the conversion of the 2020 Convertible Notes into Series C1 Preferred Stock in April 2020. In addition, the loss on extinguishment of debt includes unamortized issuance costs, back-end fees and early payment fees related to the refinancing of our $18.0 million term loan with a new $25.0 million term

loan in May 2020. We determined the loss on extinguishment of debt to be the difference between the reacquisition price of the debt and net carrying value of the extinguished debt.

Loss on extinguishment of debt recognized during the year ended December 31, 2021, includes a loss from the extinguishment of the 2020 Term Loan. In addition, the loss on extinguishment of debt includes unamortized issuance costs, unamortized prepaid commitment fees, and early payment fees associated with the 2020 Term Loan repayment.

Other income (expense)

Other income (expense) primarily consists of interest income as well as other miscellaneous income and expense unrelated to our core operations such as foreign currency transaction gains and losses.

Income tax expense

We generated significant taxable losses during the years ended December 31, 2021 and 2020, and, therefore, have not recorded any U.S. federal or state income tax expense during those periods. However, we did record an immaterial amount of foreign income tax expense during each of those periods.

We have not recorded any U.S. federal or state income tax benefits for the net operating losses we have incurred in each year or for the research and development tax credits we generated in the United States. As of December 31, 2021, we had U.S. federal and state net operating loss, or NOLs, carryforwards of $137.5 million and $62.7 million, respectively, which may be available to offset future taxable income and begin to expire in 2037 and 2032, respectively. Additionally, we had a federal NOL carryforward of $124.7 million generated since 2018 that will never expire. As of December 31, 2021, we also had U.S. federal and state research and development tax credit carryforwards of $1.1 million and $2.1 million, respectively, which may be available to offset future tax liabilities and begin to expire in 2038 and 2024, respectively. Utilization of the U.S. federal and state NOL carryforwards and research and development tax credit carryforwards may be subject to a substantial annual limitation due to ownership changes that have occurred previously or that could occur in the future.

The Company is in the process of performing a Section 382 study to assess whether a change of control has occurred or whether there have been multiple changes of control. These ownership changes are expected to materially limit the net operating loss carryforwards and research and development tax credits available to offset future tax liabilities. We expect to finalize the current Section 382 study during 2022.

We have recorded a full valuation allowance against our net deferred tax assets at each balance sheet date.

Results of operations

Comparison of the years ended December 31, 2021 and 2020

The following table summarizes our results of operations for the years ended December 31, 2021 and 2020:

	Year Ended December 31, 2021	December 31, 2020	Change Amount	Change %
	(dollars in thousands)			
Revenue:				
Product revenue	$ 15,512	$ 10,992	$ 4,520	41.1 %
Service revenue	6,125	3,091	3,034	98.2 %
Non-commercial revenue	1,595	1,994	(399)	(20.0)%
Total revenue	23,232	16,077	7,155	44.5 %
Costs and operating expenses:				
Cost of product revenue	23,434	18,642	4,792	25.7 %
Cost of service revenue	5,922	3,386	2,536	74.9 %
Cost of non-commercial revenue	1,617	2,120	(503)	(23.7)%
Research and development	9,781	6,531	3,250	49.8 %
Sales and marketing	11,815	5,962	5,853	98.2 %
General and administrative	17,895	9,976	7,919	79.4 %
Total costs and operating expenses	70,464	46,617	23,847	51.2 %
Loss from operations	(47,232)	(30,540)	(16,692)	54.7 %
Other income (expense):				
Interest expense	(2,650)	(3,447)	797	(23.1)%
Change in fair value of preferred stock warrant liability	(19,643)	(69)	(19,574)	28,368.1 %
Loss on extinguishment of debt	(3,100)	(2,910)	(190)	6.5 %
Other income (expense):	(808)	22	(830)	(3,772.7)%
Total other income (expense), net	(26,201)	(6,404)	(19,797)	309.1 %
Loss before income taxes	(73,433)	(36,944)	(36,489)	98.8 %
Income tax expense	91	134	(43)	(32.1)%
Net loss	$ (73,524)	$ (37,078)	$ (36,446)	98.3 %

Revenue

Product revenue increased by $4.5 million, or 41.1%, with the increase attributable to higher Growth Direct system placements as well as higher consumable shipment volumes due to an increase in cumulative validated Growth Direct systems. A $0.5 million benefit from higher average selling prices in the period was offset by a negative impact of consumable product mix of $0.5 million.

Service revenue increased by $3.0 million, or 98.2%. The increase in service revenue was primarily due to a $2.1 million increase in validation and installation revenue due to the increase in Growth Direct systems placed during 2021, as well as a $0.9 million increase in service contract revenue, driven by an increase in cumulative Growth Direct systems validated and under contract.

During the years ended December 31, 2021 and 2020, restriction on travel and access to customer sites related to COVID-19, and its variants, including the rapid onset of the Omicron variant in the second half of the fourth quarter of 2021. COVID-19, and its variants, negatively impacted our ability to sell, ship, install and validate Growth Direct systems, as well as train customers. This had an adverse impact our product and service revenue in the periods. While we expect these disruptions to continue to impact our operating results, the related financial impact and duration of these disruptions cannot be reasonably estimated at this time.

Non-commercial revenue decreased by $0.4 million, or 20.0%. The decrease in non-commercial revenue was primarily due to a reduction in cost sharing expenditures due to the stage of the project, partially offset by an increase in cost sharing percentage during the year ended December 31, 2021.

Costs and operating expenses

Costs of revenue

Cost of product revenue increased by $4.8 million, or 25.7%. The increase was primarily driven by $3.4 million in incremental costs related to higher sales volume of Growth Direct systems and consumables. Also contributing to the increase was higher freight cost due to incremental sales volume and inflation of $0.4 million, an increase of $1.8 million in personnel-related costs resulting from higher headcount to support increased production volume and manufacturing support activities as well as to provide redundancy in the event of potential disruptions from COVID-19 and its variants, and a $1.5 million increase in facilities and information technology costs. The increase from these factors was partially offset by a reduction in product cost and of $2.0 million driven by fixed cost leverage resulting from increased production volumes as well as a reduction in other product cost of revenue of $0.3 million.

Cost of service revenue increased by $2.5 million, or 74.9%. This increase was primarily due to higher headcount-related costs of $1.8 million associated with additional validation and field service employees hired in 2021 and 2020 to support increasing service activity, an increase in allocated facilities and information technology costs of $0.3 million, an increase of $0.3 million in materials and supplies, and $0.1 million in other cost of service revenue.

Cost of non-commercial revenue decreased by $0.5 million, or 23.7%. This decrease was primarily due to a reduction in spend due to the timing and extent of development activities in our contract with BARDA.

Research and development

	Year Ended December 31,		Change	
	2021	2020	Amount	%
	(dollars in thousands)			
Research and development	$ 9,781	$ 6,531	$ 3,250	49.8 %
Percentage of total revenue	42.1 %	40.6 %		

Research and development expenses increased by $3.3 million, or 49.8%. This increase was primarily due to an increase of $2.8 million in employee-related costs due primarily to higher headcount to support increased new product development activities, partially offset by a reduction in consulting expense of $0.5 million. In addition, the increase was also due to $0.3 million in higher spending on materials and prototypes used for research and development activities, an increase in allocated facility and information technology costs of $0.4 million, and a net increase of $0.3 million in other general research and development expenses.

Sales and marketing

	Year Ended December 31,		Change	
	2021	2020	Amount	%
	(dollars in thousands)			
Sales and marketing	$ 11,815	$ 5,962	$ 5,853	98.2 %
Percentage of total revenue	50.9 %	37.1 %		

Sales and marketing expenses increased by $5.8 million, or 98.2%. This increase was due to an increase in employee-related costs (including commissions earned) of $2.7 million primarily due to the expansion of our direct sales and marketing organizations, to drive sales growth, an increase in marketing consulting of $2.4 million, an increase in marketing activities of $0.4 million, and an increase in allocated facility and information technology costs of $0.3 million.

General and administrative

	Year Ended December 31,		Change	
	2021	2020	Amount	%
	(dollars in thousands)			
General and administrative	$ 17,895	$ 9,976	$ 7,919	79.4 %
Percentage of total revenue	77.0 %	62.1 %		

General and administrative expenses increased by $7.9 million, or 79.4%. This increase was driven by a $4.1 million increase in employee-related costs due to business headcount increase and higher benefit costs, $2.4 million increase in legal, audit, and business insurance costs driven by incremental services and policies associated with operating as a public company, an increase in consulting fees of $0.6 million, increase in facilities and information technology costs of $0.4 million, as well as a net increase of $0.3 million other costs.

Other income (expense)

Interest expense

Interest expense for the years ended December 31, 2021 and 2020 was $2.7 million and $3.4 million, respectively. The decrease of $0.8 million, or 23.1%, was due primarily to the repayment of our $25.0 million 2020 Term Loan in September 2021.

Change in fair value of preferred stock warrant liability

The change in fair value of preferred stock warrant liability was a loss of $19.6 million for the year ended December 31, 2021, compared to a loss of $0.1 million for the year ended December 31, 2020. The change was due primarily to an increase in the fair value of the underlying preferred stock used to determine the value of preferred stock warrants, to reflect the IPO price in 2021. The increase in fair value was recorded upon the IPO prior to the conversion to Class A common stock warrants and reclassification to equity.

Loss on extinguishment of debt

Loss on extinguishment of debt was $3.1 million for the year ended December 31, 2021, compared to a $2.9 million loss for the year ended December 31, 2020. The $3.1 million loss in 2021 was comprised of a $1.8 million prepayment penalty, $1.1 million expense related to unamortized discounts, and $0.2 million in unamortized prepaid facility fee and other charges and was incurred as a result of the repayment of the 2020 Term Loan. We determined the loss on extinguishment of debt to be the difference between the reacquisition price of the debt and the net carrying value of the extinguished debt. The loss for the year ended December 31, 2020 was comprised of unamortized issuance costs, unamortized prepaid commitment fees, and early payment fees due to the extinguishment of the 2018 Term Loan as well as a non-cash loss from the conversion of the 2020 Convertible Notes into Series C1 Preferred Stock incurred during the year ended December 31, 2020.

Other income (expense)

Other expense was $0.8 million for the year ended December 31, 2021 compared to less than $0.1 million income for the year ended December 31, 2020. The increase was due to the Exit Fee expense described under Contractual Obligations and Commitments below.

Income tax expense

Income tax expense was $0.1 million for each of the years ended December 31, 2021 and December 31, 2020. The expense relates primarily to tax expense recorded for our foreign entities.

Liquidity and capital resources

Since our inception, we have incurred significant operating losses. To date, we have funded our operations primarily through proceeds from sales of redeemable convertible preferred stock, borrowings under loan agreements, revenue from sales of our products, services and contracts and proceeds from our IPO. As of December 31, 2021, we had cash, cash equivalents and short- and long-term investments of $203.5 million. We believe that our cash, cash equivalents and investments will enable us to fund our operating expenses and capital expenditure requirements for at least twelve months following the date these consolidated financial statements are issued.

Contractual obligations and commitments

In October 2013, we entered into an operating lease for office and manufacturing space in Lowell, Massachusetts, which expires in July 2026. The terms of the lease include options for a one-time, five-year extension of the lease and early termination of the lease in July 2024 as well as a $0.7 million tenant improvement allowance which has been drawn down in full. Future minimum commitments under this lease through July 2026 were $2.2 million as of December 31, 2021, including $0.5 million in short-term obligations.

In December 2016, in connection with the amendment of a then-outstanding loan agreement with the lender, we entered into an agreement under which we are obligated to pay the lender an exit fee in the amount of $0.8 million in the event of a “qualifying exit event” prior to December 31, 2026. As defined in the agreement, a “qualifying exit event” includes a public offering of its common stock. No amounts were accrued at December 31, 2020 as a “qualifying exit event” was not deemed probable. Subsequently, the IPO was deemed to be a “qualifying event” and we expensed and paid the exit fee in July 2021.

In March 2020, we entered into an agreement with a supplier to secure future supply of certain materials used in the manufacturing of our Growth Direct systems. As of December 31, 2021, we had committed to minimum payments under these arrangements totaling $0.9 million through December 31, 2022. We had $0.1 million accrued for the supply agreement as of December 31, 2021 and December 31, 2020.

In December 2020, we entered into a non-cancelable agreement with a service provider for software as a service and cloud hosting services. As of December 31, 2021, we had committed to minimum payments under these arrangements totaling $1.1 million through January 31, 2026, including short-term obligations of $0.2 million. We had $0.1 million and zero accrued for the software subscription as of December 31, 2021 and December 31, 2020, respectively.

In June 2021, we entered into a Sublease agreement for office and back-up manufacturing space in Lexington, Massachusetts, which expires in June 2029. The Sublease agreement includes an option to terminate the sublease in July 2026, subject to an early termination fee. Monthly rent payments are fixed and future minimum lease payments over the term of the sublease are $5.6 million, including $0.7 million in short-term obligations. We also have the right to use furniture and equipment specified in the Sublease agreement for an additional $0.6 million in future payments over the term of the Sublease with the option to purchase the furniture and equipment at the end of the Sublease term. Short-term obligations related to the furniture and equipment are $0.1 million as of December 31, 2021. Concurrent with entering into the Sublease agreement, we executed an Option Agreement with the property owner which provides us the option to enter into a new direct lease for the Lexington facility for an additional five-years following expiration of the Sublease.

For additional information on our contractual obligation and commitments please see Note 16 — *Commitments and Contingencies* to our consolidated financial statements.

Cash flows

The following table summarizes our sources and uses of cash for each of the periods presented:

	Year Ended December 31,	
	2021	2020
Net cash used in operating activities	$ (54,964)	$ (30,996)
Net cash used in investing activities	(13,289)	(15,670)
Net cash provided by financing activities	216,745	64,234
Net increase in cash and cash equivalents and restricted cash	$ 148,492	$ 17,568

Operating activities

During the year ended December 31, 2021, operating activities used $55.0 million of cash, primarily resulting from our net loss of $73.5 million and net cash used by changes in our operating assets and liabilities of $8.0 million, partially offset by non-cash charges of $26.6 million. Net cash used by changes in our operating assets and liabilities for the year ended December 31, 2021 consisted primarily of an increase of $6.8 million in raw material inventory to build safety stock and support a projected increase in demand. An increase of $1.1 million in prepaid expenses and other current assets primarily due to insurance costs premium increases associated with operating as a public company. An increase of $0.9 million in other long-term assets primarily related to costs capitalized as a result of the implementation of a new Enterprise Resource Planning ("ERP") software during 2021. A decrease in deferred revenue $1.1 million due to timing of advanced billings for validation services and performance of the related services partially offset by an increase in advance billings related to a higher number of systems under service contracts. These net operating cash uses were partially offset by an increase of $1.8 million in accrued expenses, accounts payable and other current liabilities primarily due to timing of invoicing and cash disbursements, as well as an increase of $0.1 million in deferred rent.

During the year ended December 31, 2020, operating activities used $31.0 million of cash, primarily resulting from our net loss of $37.1 million and net cash used by changes in our operating assets and liabilities of $1.1 million, partially offset by non-cash charges of $7.2 million. Net cash used by changes in our operating assets and liabilities for the year ended December 31, 2020 consisted primarily of an increase of $3.4 million in inventory to build safety stock and support a projected increase in demand, an increase in accounts receivable of $1.4 million, an increase of $1.3 million in prepaid expenses and other current assets, and an increase of $0.4 million in other long-term assets. These cash uses were partially offset by an increase of $2.5 million in deferred revenue, an increase of $1.8 million in accrued expenses and other current liabilities, and an increase of $1.0 million in accounts payable. The increase in accounts payable and accrued expenses was due to timing of invoicing and cash disbursement. The increase in accounts receivable was a result of higher product revenue. The increase in deferred revenue was due to an increase in advance billings for validation services related to the volume and timing of Growth Direct system placements as well as an increase in advance billings related to a higher number of systems under service contracts.

Investing activities

During the year ended December 31, 2021, net cash used in investing activities was $13.3 million, consisting of capital expenditures of $3.2 million and $10.1 million in net purchases of investments.

During the year ended December 31, 2020, net cash used in investing activities was $15.7 million, consisting of $15.0 million in net purchases of short-term investments and capital expenditures of $0.7 million.

Financing activities

During the year ended December 31, 2021, net cash provided by financing activities was $216.7 million, consisting of net proceeds of $164.1 million from the initial public offering of Class A common stock, net of issuance costs, $79.7 million of net proceeds from the sale of the Series D1 and Series D2 Preferred Stock, net of issuance costs, and $0.9 million from the issuance of common stock upon exercise of stock options and purchase of restricted stock awards.

Partially offsetting cash provided by financing activities in 2021 was the repayment of term loans of $26.2 million and payment of debt extinguishment fees of $1.9 million.

During the year ended December 31, 2020, net cash provided by financing activities was $64.2 million, consisting primarily of net proceeds of $49.9 million from the issuance of Series C1 and C2 redeemable convertible preferred stock, net of issuance costs, $24.1 million in net proceeds from borrowings under our 2020 Term Loan and $9.5 million in proceeds from the issuance of the 2020 Convertible Notes. These cash inflows were partially offset by a $19.4 million cash outflow for principal and debt extinguishment fees paid in conjunction with the repayment of our 2018 term loan.

Long-term debt

In May 2020, we entered into the 2020 Term Loan which provided for borrowings of an initial $25.0 million tranche upon closing and options to borrow up to an aggregate of $35.0 million in two additional tranches of $20.0 million under the second tranche, or the Term B Loan, and $15.0 million under the third tranche, or the Term C Loan, subject to certain Growth Direct system sales milestones.

At closing, we issued warrants to purchase 1,195,652 shares of Series C1 Preferred Stock to the lender with an exercise price of $1.15 per share. We paid a $0.8 million facility fee in connection with the 2020 Term Loan.

In September 2021, we agreed to pay in full all of our outstanding obligations under the 2020 Term Loan in the amount of $28.7 million, comprised of the principal amount of the 2020 Term Loan, interest previously paid-in-kind, accrued cash interest, a prepayment premium, and other fees and expenses. As a result, the 2020 Term Loan, all liens and security interests granted thereunder, and all obligations thereunder (other than the warrants issued to the lender) were satisfied, released, discharged and/or terminated in full, except in respect of certain surviving obligations.

Seasonality

Our revenues can vary from quarter to quarter as a result of seasonality. For a more detailed discussion of the seasonality of our business, please see “Seasonality” in Part I, Item 1. “Business” in this Annual Report on Form 10-K.

Critical accounting policies and significant judgments and estimates

Our consolidated financial statements have been prepared in accordance with generally accepted accounting principles in the United States. The preparation of our consolidated financial statements and related disclosures requires us to make estimates and judgments that affect the reported amounts of assets, liabilities, costs and expenses, and the disclosure of contingent assets and liabilities in our consolidated financial statements. Our estimates are based on our historical experience, known trends and events and various other factors that we believe are reasonable under the circumstances, the results of which form the basis for making judgments about the carrying values of assets and liabilities that are not readily apparent from other sources. We evaluate our estimates and assumptions on an ongoing basis. Our actual results may differ from these estimates under different assumptions or conditions.

While our significant accounting policies are described in more detail in Note 2 — *Summary of Significant Accounting Policies* to our consolidated financial statements included elsewhere in this Annual Report on Form 10-K, we believe that the following critical accounting policies are those most important to the judgments and estimates used in the preparation of our consolidated financial statements.

Revenue recognition

Product revenue

We derive product revenue primarily from the sale of Growth Direct systems and related consumables. Product revenue is recognized when control of the promised systems and consumables is transferred to our customers, in an amount that reflects the consideration we expect to be entitled to in exchange for those products or consumables (the

transaction price). For Growth Direct systems and consumables sold by us, control transfers to the customer at a point in time.

Service revenue

We derive service revenue primarily from the sale of validation services, service contracts and field service (including installation). Revenue is recognized when services are provided to our customers, in an amount that reflects the consideration we expect to be entitled to in exchange for those services (the transaction price). Service revenue is recognized over time using an input method based on time lapsed for service contracts and using an output method based on milestones achieved for validation services and field service.

Performance obligations

A performance obligation is a promise in a contract to transfer a distinct product or service to a customer that are both capable of being distinct, whereby the customer can benefit from the product or service either on its own or together with other resources that are readily available, and are distinct in the context of the contract, whereby the transfer of the product or service is separately identifiable from other promises in the contract. Our main performance obligations in customer arrangements are Growth Direct systems, LIMS connection software, proprietary consumables, validation services, field service and services due under service contracts.

Multiple performance obligations

Our contracts may include multiple performance obligations when customers purchase a combination of products and services such as Growth Direct system sold together with the LIMS connection software, proprietary consumables or services. For these arrangements, we allocate the contract's transaction price to each performance obligation on a relative standalone selling price basis using our best estimate of the standalone selling price of each distinct product or service in the contract. The primary methods used to estimate standalone selling prices are based on the prices observed in standalone sales to customers or cost-plus margin depending on the nature of the obligation and available evidence of fair value. Allocation of the transaction price is determined at contract's inception.

Non-commercial revenue

We generate revenue from a long-term contract with BARDA, which is part of the U.S. government. The contract is a cost-reimbursable, cost-sharing contract, whereby BARDA reimburses us for a percentage of the total costs that have been incurred including indirect allowable rates. We include the unconstrained amount of consideration in the transaction price. The amount included in the transaction price is constrained to the amount for which it is probable that a significant reversal of cumulative revenue recognized will not occur.

Stock-based compensation

We measure stock-based option awards granted to employees, officers and directors based on their fair value on the date of grant using the Black-Scholes option-pricing model. Compensation expense for those awards is recognized over the requisite service period, which is generally the vesting period of the respective award. We account for forfeitures as they occur. The straight-line method of expense recognition is applied to all awards with service-only conditions.

The fair value of each stock option is estimated on the grant date using the Black-Scholes option-pricing model, which uses inputs such as the fair value of our common stock and assumptions we make for the volatility of our common stock, the expected term of our common stock options, the risk-free interest rate for a period that approximates the expected term of our common stock options, and our expected dividend yield.

We measure all restricted common stock granted to employees based on the common stock value on the date of grant. The purchase price of the restricted common stock is the common stock value on the date of grant. The restricted common stock includes a repurchase right, whereas upon the occurrence of a specific event, we have the right to

repurchase unvested restricted common stock shares. As such the fair value of the restricted common stock is included in other long-term liabilities in the consolidated balance sheet.

Determination of fair value of common stock

As there had been no public market for our common stock prior to the IPO, the estimated fair value of our common stock prior to our IPO was determined by our board of directors as of the date of each option grant, with input from management. The board considered our most recently available third-party valuations of common stock and an assessment of additional objective and subjective factors that it believed were relevant and which may have changed from the date of the most recent valuation through the date of the grant. These third-party valuations were performed in accordance with the guidance outlined in the American Institute of Certified Public Accountants' Accounting and Valuation Guide, Valuation of Privately-Held-Company Equity Securities Issued as Compensation.

Prior to our IPO, our common stock valuations were prepared using either an option pricing method, or OPM, or a hybrid method, both of which use market approaches and income approaches to estimate our enterprise value. The hybrid method is a probability-weighted expected return method, or PWERM, where the equity value in two or more of the scenarios is calculated using an OPM. The PWERM is a scenario-based methodology that estimates the fair value of common stock based upon an analysis of future values for the company, assuming various outcomes. The common stock value is based on the probability-weighted present value of expected future investment returns considering each of the possible outcomes available as well as the rights of each class of stock. The future value of the common stock under each outcome is discounted back to the valuation date at an appropriate risk-adjusted discount rate and probability weighted to arrive at an indication of value for the common stock. A discount for lack of marketability of the common stock is then applied to arrive at an indication of value for the common stock. The OPM treats common stock and preferred stock as call options on the total equity value of a company, with exercise prices based on the value thresholds at which the allocation among the various holders of a company's securities changes. Under this method, the common stock has value only if the funds available for distribution to stockholders exceeded the value of the preferred stock liquidation preferences at the time of the liquidity event, such as a strategic sale or a merger.

In addition to considering the results of these third-party valuations, our board of directors considered various objective and subjective factors to determine the fair value of our common stock as of each grant date, including:

- the prices at which we sold shares of preferred stock (including our sale of Series D1 and Series D2 redeemable convertible preferred stock in March 2021) and the superior rights and preferences of the preferred stock relative to our common stock at the time of each grant;
- the progress of the research and development of our products;
- our stage of development and commercialization and our business strategy;
- external market conditions affecting our industry and the global pharmaceutical industry;
- our financial position, including cash on hand, and our historical and forecasted performance and operating results;
- the lack of an active public market for our common stock and our preferred stock;
- the likelihood of achieving a liquidity event, such as an initial public offering, or IPO, or sale of our company in light of prevailing market conditions; and
- the analysis of IPOs and the market performance of similar companies in the life sciences tools and diagnostics industries.

The assumptions underlying these valuations represent management's best estimates, which involve inherent uncertainties and the application of management's judgment. As a result, if we had used significantly different assumptions or estimates, the fair value of our common stock and our stock-based compensation expense could have been materially different.

For valuations after the completion of the IPO, the fair value of our common stock is determined based on the quoted market price of our common stock on the date of grant.

Valuation of warrants to purchase preferred stock

We have historically classified warrants to purchase shares of our redeemable convertible preferred stock as liabilities on our consolidated balance sheets as these warrants were free-standing financial instruments that may have required us to transfer assets upon exercise. The preferred stock warrant liability is initially recorded at fair value on the issuance date of each warrant and was subsequently remeasured to fair value at each reporting date. Changes in the fair value of the preferred stock warrant liability were recognized as a component of other income (expense) in our consolidated statements of operations. We adjusted the liability for changes in fair value until the warrants were exercised, expire or qualified for equity classification.

We utilized the Black-Scholes option-pricing model, which incorporates management's assumptions and estimates, to value the preferred stock warrants. We assessed these assumptions and estimates on a quarterly basis as additional information impacting the assumptions was obtained. Estimates and assumptions impacting the fair value measurement include the fair value per share of the underlying redeemable convertible preferred stock, the remaining contractual term of the warrants, risk-free interest rate, expected dividend yield and expected volatility of the price of the underlying preferred stock. We determined the fair value per share of the underlying preferred stock by taking into consideration our most recent sales of our preferred stock as well as additional factors that we deemed relevant. We have historically been a private company and lacked company-specific historical and implied volatility information of our stock. Therefore, we estimated expected stock volatility based on the historical volatility of publicly traded peer companies for a term equal to the remaining contractual term of the warrants. The risk-free interest rate was determined by reference to the U.S. Treasury yield curve for time periods approximately equal to the remaining contractual term of the warrants. We estimated a 0% dividend yield based on the expected dividend yield and the fact that we have never paid or declared dividends.

Upon closing of the IPO, all the warrants to purchase shares of redeemable convertible preferred stock became exercisable for shares of common stock, at which time we adjusted the redeemable convertible preferred stock warrant liability to fair value prior to reclassifying the redeemable convertible preferred stock warrant liability to additional paid-in capital. As a result, following the closing of the IPO, the warrants were no longer subject to fair value accounting.

Valuation of inventory

We value inventory at the lower of cost or net realizable value. Cost is computed using the first-in, first-out method. We regularly review inventory quantities on-hand for excess and obsolescence and, when circumstances indicate, we record charges to write down inventories to their estimated net realizable value after evaluating future demand, expected product life cycles and current inventory levels. Such charges are classified as cost of product revenue in the statements of operations. Any write-down of inventory to net realizable value creates a new cost basis.

Valuation of derivatives

We record derivatives initially at fair value upon the issuance of our Unsecured Subordinated Convertible Promissory Notes, or Convertible Notes, issued in February 2020 which relates to a conversion option whereby upon the closing of a specified financing event the Convertible Note will automatically convert into shares of the same class and series of capital stock we issued to other investors in the financing at a conversion price equal to 80% of the price per share of the securities paid by the other investor. The initial fair value was determined using management's assumption on the likelihood a qualified financing event would occur. Changes in the fair value of the derivative liability were

recognized as a component of other income (expense), net in the consolidated statement of operations. In April 2020, the specified financing event was consummated, and as such, the notes were converted into shares of Series C1 Preferred Stock, and the derivative liability was extinguished, and the unamortized derivative discount was recognized as an extinguishment loss.

Recently issued accounting pronouncements

A description of recently issued accounting pronouncements that may potentially impact our financial position, results of operations or cash flows is disclosed in Note 2 — *Summary of Significant Accounting Policies* to our consolidated financial statements appearing elsewhere in this Annual Report on Form 10-K.

Emerging growth company status

The Jumpstart Our Business Startups Act of 2012, or the JOBS Act, permits an "emerging growth company" such as us to take advantage of an extended transition period to comply with new or revised accounting standards applicable to public companies until those standards would otherwise apply to private companies. We have elected to use this extended transition period for complying with new or revised accounting standards that have different effective dates for public and private companies until the earlier of the date we (i) are no longer an emerging growth company or (ii) affirmatively and irrevocably opt out of the extended transition period provided in the JOBS Act. As a result, we will not be subject to the same new or revised accounting standards as other public companies that are not emerging growth companies, and our financial statements may not be comparable to other public companies that comply with new or revised accounting pronouncements as of public company effective dates. We may choose to early adopt any new or revised accounting standards whenever such early adoption is permitted for private companies.

We will cease to be an emerging growth company on the date that is the earliest of (i) the last day of the fiscal year in which we have total annual gross revenues of $1.07 billion or more, (ii) the last day of our fiscal year following the fifth anniversary of the date of the closing of the IPO, (iii) the date on which we have issued more than $1.0 billion in nonconvertible debt during the previous three years or (iv) the date on which we are deemed to be a large accelerated filer under the rules of the Securities and Exchange Commission.

Further, even after we no longer qualify as an emerging growth company, we may still qualify as a "smaller reporting company," which would allow us to take advantage of many of the same exemptions from disclosure requirements, including reduced disclosure obligations regarding executive compensation in our periodic reports and proxy statements.

Item 7A. Quantitative and Qualitative Disclosures About Market Risk.

Interest rate risk

As of December 31, 2021, we had cash, cash equivalents and short- and long-term investments of $203.5 million, which consisted of cash, money market funds, U.S. treasury bills, and U.S. treasury notes. Interest income is sensitive to changes in the general level of interest rates; however, due to the nature of these investments, an immediate 10% change in interest rates would not have a material effect on the fair market value of our investment portfolio.

Foreign currency exchange risk

We are not currently exposed to significant market risk related to changes in foreign currency exchange rates. Our operations may be subject to fluctuations in foreign currency exchange rates in the future.

Inflation risk

While we have experienced some impact from inflation related mainly to our materials, labor and freight costs, we have been able to mitigate further impacts through the maintenance of increased inventory levels and long-term contracts

and commitments with key suppliers, some of which was implemented under our COVID-19 risk mitigation strategy. As a result, we do not believe that inflation has had a material effect on our business, financial condition or results of operations. If our costs were to become subject to significant incremental inflationary pressures, we may not be able to meaningfully offset such higher costs through price increases. Our inability or failure to do so could harm our business, financial condition or results of operations.

Item 8. Financial Statements and Supplementary Data.

The financial statements required to be filed pursuant to this Item 8 are appended to this report. An index of those financial statements is found in Item 15 of Part IV of this Annual Report on Form 10-K.

Item 9. Changes in and Disagreements with Accountants on Accounting and Financial Disclosure.

None.

Item 9A. Controls and Procedures.

Limitations on effectiveness of controls and procedures

In designing and evaluating our disclosure controls and procedures, management recognizes that any controls and procedures, no matter how well designed and operated, can provide only reasonable assurance of achieving the desired control objectives. In addition, the design of disclosure controls and procedures must reflect the fact that there are resource constraints and that management is required to apply judgment in evaluating the benefits of possible controls and procedures relative to their costs.

Evaluation of disclosure controls and procedures

Our management, with the participation of our principal executive officer and principal financial officer, evaluated, as of the end of the period covered by this Annual Report on Form 10-K, the effectiveness of our disclosure controls and procedures (as defined in Rules 13a-15(e) and 15d-15(e) under the Exchange Act). Based on that evaluation, our principal executive officer and principal financial officer concluded that, as of December 31, 2021, our disclosure controls and procedures were effective at the reasonable assurance level.

Management's annual report on internal control over financial reporting and attestation report of independent public accounting firm

This Annual Report on Form 10-K does not include a report of management's assessment regarding our internal control over financial reporting (as defined in Rules 13a-15(f) and 15d-15(f) under the Exchange Act) or an attestation report of our independent registered public accounting firm due to a transition period established by rules of the SEC for newly public companies. Additionally, our independent registered public accounting firm will not be required to opine on the effectiveness of our internal control over financial reporting pursuant to Section 404 until we are no longer an "emerging growth company" as defined in the JOBS Act.

Changes in internal control over financial reporting

There were no changes in our internal control over financial reporting (as defined in Rules 13a-15(f) and 15d-15(f) under the Exchange Act) during the quarter ended December 31, 2021 that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

Item 9B. Other Information.

None.

Item 9C. Disclosure Regarding Foreign Jurisdictions that Prevent Inspections.

Not Applicable.

PART III

Item 10. Directors, Executive Officers and Corporate Governance.

The information required by this Item 10 will be set forth in our Proxy Statement for the 2022 Annual Meeting of Stockholders and is incorporated in this Annual Report on Form 10-K by reference.

Item 11. Executive Compensation.

The information required by this Item 11 will be set forth in our Proxy Statement for the 2022 Annual Meeting of Stockholders and is incorporated in this Annual Report on Form 10-K by reference.

Item 12. Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters.

The information required by this Item 12 will be set forth in our Proxy Statement for the 2022 Annual Meeting of Stockholders and is incorporated in this Annual Report on Form 10-K by reference.

Item 13. Certain Relationships and Related Transactions, and Director Independence.

The information required by this Item 13 will be set forth in our Proxy Statement for the 2022 Annual Meeting of Stockholders and is incorporated in this Annual Report on Form 10-K by reference

Item 14. Principal Accountant Fees and Services.

Our independent public accounting firm is PricewaterhouseCoopers LLP, Boston, Massachusetts (PCAOB Auditor ID: 238)

The information required by this Item 14 will be set forth in our Definitive Proxy Statement for our 2022 Annual Meeting of Stockholders and is incorporated in this Annual Report on Form 10-K by reference.

PART IV

Item 15. Exhibits and Financial Statement Schedules

The following documents are filed as part of this Annual Report on Form 10-K:

(a)(1) Financial Statements.

For a list of consolidated financial statements included herein, see Index to Consolidated Financial Statements on page F-1 attached to this Annual Report on Form 10-K, incorporated into this item by reference.

(a)(2) Financial Statement Schedules.

Financial statement schedules have been omitted because they are either not required or not applicable or the information is included in the consolidated financial statements or the notes thereto.

(a)(3) Exhibits.

The exhibits filed as part of this Annual Report on Form 10-K are listed in the Exhibit index immediately preceding the signature page, which Exhibit Index is incorporated herein by reference.

Item 16. Form 10-K Summary.

We may voluntarily include a summary of information required by Form 10-K under this Item 16. We have elected not to include such summary information.

EXHIBIT INDEX

Exhibit Number	Description of Exhibit
3.1	Restated Certificate of Incorporation (incorporated by reference to Exhibit 3.1 to the Registrant's Current Report on Form 8-K (File No. 001-40952) filed on July 21, 2021)
3.2	Amended and Restated Bylaws (incorporated by reference to Exhibit 3.2 to the Registrant's Current Report on Form 8-K (File No. 001-40952) filed on July 21, 2021)
4.1	Specimen Stock Certificate evidencing the shares of Common Stock (incorporated by reference to Exhibit 4.1 to the Registrant's Registration Statement on Form S-1 (Reg. No. 333-257431) filed on June 25, 2021)
4.2	Forms of Common Stock Warrant Agreements (incorporated by reference to Exhibit 4.2 to the Registrant's Registration Statement on Form S-1 (Reg. No. 333-257431) filed on June 25, 2021)
4.3	Form of Series A1 Warrant Agreement (incorporated by reference to Exhibit 4.3 to the Registrant's Registration Statement on Form S-1 (Reg. No. 333-257431) filed on June 25, 2021)
4.4	Form of Series B1 Warrant Agreement (incorporated by reference to Exhibit 4.4 to the Registrant's Registration Statement on Form S-1 (Reg. No. 333-257431) filed on June 25, 2021)
4.5	Form of Series C1 Warrant Agreement (incorporated by reference to Exhibit 4.5 to the Registrant's Registration Statement on Form S-1 (Reg. No. 333-257431) filed on June 25, 2021)
4.6*	Description of Capital Stock
10.1**	License Agreement, dated May 13, 2013 (incorporated by reference to Exhibit 10.14 to the Registrant's Registration Statement on Form S-1 (Reg. No. 333-257431) filed on June 25, 2021)
10.2	Lease Agreement, dated October 21, 2013, by and between the Registrant and Farley White Pawtucket, LLC, as amended (incorporated by reference to Exhibit 10.7 to the Registrant's Registration Statement on Form S-1 (Reg. No. 333-257431) filed on June 25, 2021)
10.3	Seventh Amended and Restated Investors' Rights Agreement (incorporated by reference to Exhibit 10.5 to the Registrant's Registration Statement on Form S-1 (Reg. No. 333-257431) filed on June 25, 2021)
10.4	Sublease, dated June 8, 2021, by and between the Registrant and National Medical Care, Inc. (incorporated by reference to Exhibit 10.8 to the Registrant's Registration Statement on Form S-1 (Reg. No. 333-257431) filed on June 25, 2021)
10.5†	Rapid Micro Biosystems, Inc. 2010 Stock Option and Grant Plan, as amended, and forms of award agreements thereunder (incorporated by reference to Exhibit 10.1 to the Registrant's Registration Statement on Form S-1 (Reg. No. 333-257431) filed on June 25, 2021)
10.6†	Rapid Micro Biosystems, Inc. 2021 Incentive Award Plan and forms of award agreements thereunder (incorporated by reference to Exhibit 10.2 to Amendment No. 1 to the Registrant's Registration Statement on Form S-1 (Reg. No. 333-257431) filed on July 12, 2021)
10.7†	Rapid Micro Biosystems, Inc. 2021 Employee Stock Purchase Plan (incorporated by reference to Exhibit 10.3 to Amendment No. 1 to the Registrant's Registration Statement on Form S-1 (Reg. No. 333-257431) filed on July 12, 2021)
10.8	Non-Employee Director Compensation Program (incorporated by reference to Exhibit 10.4 to Amendment No. 1 to the Registrant's Registration Statement on Form S-1 (Reg. No. 333-257431) filed on July 12, 2021)
10.9†	Form of Indemnification Agreement for Directors and Executive Officers (incorporated by reference to Exhibit 10.6 to Amendment No. 1 to the Registrant's Registration Statement on Form S-1 (Reg. No. 333-257431) filed on July 12, 2021)
10.10†	Employment Agreement, dated July 8, 2021, by and between the Registrant and Robert Spignesi (incorporated by reference to Exhibit 10.9 to Amendment No. 1 to the Registrant's Registration Statement on Form S-1 (Reg. No. 333-257431) filed on July 12, 2021)
10.11†	Employment Agreement, dated July 8, 2021, by and between the Registrant and Sean Wirtjes (incorporated by reference to Exhibit 10.10 to Amendment No. 1 to the Registrant's Registration Statement on Form S-1 (Reg. No. 333-257431) filed on July 12, 2021)
10.12†	Employment Agreement, dated July 8, 2021, by and between the Registrant and John Wilson (incorporated by reference to Exhibit 10.11 to Amendment No. 1 to the Registrant's Registration Statement on Form S-1 (Reg. No. 333-257431) filed on July 12, 2021)

Exhibit Number	Description of Exhibit
10.13†	Employment Agreement, dated July 8, 2021, by and between the Registrant and Victoria Vezina (incorporated by reference to Exhibit 10.12 to Amendment No. 1 to the Registrant's Registration Statement on Form S-1 (Reg. No. 333-257431) filed on July 12, 2021)
10.14†	Employment Agreement, dated July 8, 2021, by and between the Registrant and Jonathan Paris (incorporated by reference to Exhibit 10.13 to Amendment No. 1 to the Registrant's Registration Statement on Form S-1 (Reg. No. 333-257431) filed on July 12, 2021)
10.15*†	Employment Agreement, dated October 1, 2021, by and between the Registrant and Richard A. Keys
10.16*†	2021 Incentive Award Plan UK Sub-Plan
10.17*†	Form of Global Restricted Stock Unit Agreement under the Rapid Micro Biosystems, Inc. 2021 Incentive Award Plan
10.18*†	Form of Global Stock Option Grant Agreement under the Rapid Micro Biosystems, Inc. 2021 Incentive Award Plan
10.19*	Seventh Amendment to Lease Agreement as amended, dated March 18, 2022, by and between the Registrant and Farley White Pawtucket, LLC
21.1	Subsidiaries of the Registrant (incorporated by reference to Exhibit 21.1 to the Registrant's Registration Statement on Form S-1 (Reg. No. 333-257431) filed on June 25, 2021)
23.1	Consent of PricewaterhouseCoopers LLP, Independent Registered Public Accounting Firm
24.1*	Power of Attorney (included in signature page)
31.1*	Certification of Principal Executive Officer pursuant to Rule 13a-14(a) or Rule 15d-14(a) of the Securities Exchange Act of 1934, as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002
31.2*	Certification of Principal Financial Officer pursuant to Rule 13a-14(a) or Rule 15d-14(a) of the Securities Exchange Act of 1934, as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002
32.1#	Certification of Principal Executive Officer pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002
32.2#	Certification of Principal Financial Officer pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002
101.INS*	Inline XBRL Instance Document – the instance document does not appear in the Interactive Data File because its XBRL tags are embedded within the Inline XBRL document
101.SCH*	Inline XBRL Taxonomy Extension Schema Document.
101.CAL*	Inline XBRL Taxonomy Extension Calculation Linkbase Document.
101.DEF*	Inline XBRL Taxonomy Extension Definition Linkbase Document
101.LAB*	Inline XBRL Taxonomy Extension Label Linkbase Document
101.PRE*	Inline XBRL Taxonomy Extension Presentation Linkbase Document
104*	Cover Page Interactive Data File (formatted as Inline XBRL and contained in Exhibit 101)

* Filed herewith.
\# Furnished herewith.
† Indicates management contract or compensatory plan.
** Portions of this exhibit (indicated by asterisks) have been redacted in compliance with Regulation S-K Item 601(b)(10)(iv).

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, as amended, the registrant has duly caused this Annual Report on Form 10-K to be signed on its behalf by the undersigned, thereunto duly authorized.

RAPID MICRO BIOSYSTEMS, INC.

Date: March 24, 2022

By: /s/ Robert Spignesi
Robert Spignesi
President and Chief Executive Officer

POWER OF ATTORNEY AND SIGNATURES

Each person whose individual signature appears below hereby authorizes and appoints Robert Spignesi and Sean Wirtjes, and each of them, with full power of substitution and resubstitution and full power to act without the other, as his or her true and lawful attorney-in-fact and agent to act in his or her name, place and stead and to execute in the name and on behalf of each person, individually and in each capacity stated below, and to file any and all amendments to this Annual Report on Form 10-K and to file the same, with all exhibits thereto, and other documents in connection therewith, with the Securities and Exchange Commission, granting unto said attorneys-in-fact and agents, and each of them, full power and authority to do and perform each and every act and thing, ratifying and confirming all that said attorneys-in-fact and agents or any of them or their or his or her substitute or substitutes may lawfully do or cause to be done by virtue thereof.

Pursuant to the requirements of the Securities Exchange Act of 1934, as amended, this Annual Report on Form 10-K has been signed below by the following persons on behalf of the registrant in the capacities and on the dates indicated.

Name	Title	Date
/s/ Robert Spignesi **Robert Spignesi**	President, Chief Executive Officer and Director *(principal executive officer)*	March 24, 2022
/s/ Sean Wirtjes **Sean Wirtjes**	Chief Financial Officer *(principal financial officer and principal accounting officer)*	March 24, 2022
/s/ Jeffrey Schwartz **Jeffrey Schwartz**	Director	March 24, 2022
/s/ David Hirsch, M.D., Ph.D. **David Hirsch, M.D., Ph.D.**	Director	March 24, 2022
/s/ Richard Kollender **Richard Kollender**	Director	March 24, 2022
/s/ Melinda Litherland **Melinda Litherland**	Director	March 24, 2022
/s/ Inese Lowenstein **Inese Lowenstein**	Director	March 24, 2022
/s/ Natale Ricciardi **Natale Ricciardi**	Director	March 24, 2022
/s/ Alexander Schmitz **Alexander Schmitz**	Director	March 24, 2022

INDEX TO CONSOLIDATED FINANCIAL STATEMENTS

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Board of Directors and Stockholders of Rapid Micro Biosystems, Inc.

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheets of Rapid Micro Biosystems, Inc. and its subsidiaries (the "Company") as of December 31, 2021 and 2020, and the related consolidated statements of operations, of comprehensive loss, of redeemable convertible preferred stock and stockholders' equity (deficit) and of cash flows for the years then ended, including the related notes (collectively referred to as the "consolidated financial statements"). In our opinion, the consolidated financial statements present fairly, in all material respects, the financial position of the Company as of December 31, 2021 and 2020, and the results of its operations and its cash flows for the years then ended in conformity with accounting principles generally accepted in the United States of America.

Basis for Opinion

These consolidated financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on the Company's consolidated financial statements based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) (PCAOB) and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits of these consolidated financial statements in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audits to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement, whether due to error or fraud.

Our audits included performing procedures to assess the risks of material misstatement of the consolidated financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the consolidated financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the consolidated financial statements. We believe that our audits provide a reasonable basis for our opinion.

/s/ PricewaterhouseCoopers LLP
Boston, Massachusetts
March 24, 2022

We have served as the Company's auditor since 2010.

RAPID MICRO BIOSYSTEMS, INC.
Consolidated balance sheets
(In thousands, except share and per share amounts)

	December 31, 2021	December 31, 2020
Assets		
Current assets:		
Cash and cash equivalents	$ 178,387	$ 30,079
Short-term investments	15,110	14,998
Accounts receivable	5,005	4,988
Inventory	15,671	8,965
Prepaid expenses and other current assets	3,951	3,120
Total current assets	218,124	62,150
Property and equipment, net	11,304	7,052
Long-term investments	9,966	—
Other long-term assets	1,491	695
Restricted cash	284	100
Total assets	$ 241,169	$ 69,997
Liabilities, Redeemable Convertible Preferred Stock and Stockholders' Equity (Deficit)		
Current liabilities:		
Accounts payable	$ 3,944	$ 4,468
Accrued expenses and other current liabilities	10,917	6,654
Deferred revenue	3,305	4,423
Total current liabilities	18,166	15,545
Preferred stock warrant liability	—	4,117
Notes payable, net of unamortized discount	—	24,810
Deferred rent, long term	813	705
Other long-term liabilities	1,210	—
Total liabilities	20,189	45,177
Commitments and contingencies (Note 16)		
Redeemable convertible preferred stock (Series A1, B1, C1, C2, D1, and D2), $0.01 par value; zero shares and 161,455,689 shares authorized at December 31, 2021 and December 31, 2020, respectively; zero shares and 133,021,640 shares issued and outstanding at December 31, 2021 and December 31, 2020, respectively	—	151,826
Stockholders' equity (deficit):		
Class A common stock, $0.01 par value; 210,000,000 shares and 35,000,000 shares authorized at December 31, 2021 and December 31, 2020, respectively; 34,564,040 shares and 612,850 shares issued and outstanding at December 31, 2021 and December 31, 2020, respectively	346	6
Class B common stock, $0.01 par value; 10,000,000 shares and zero shares authorized at December 31, 2021 and December 31, 2020, respectively; 6,903,379 shares and zero shares issued and outstanding at December 31, 2021 and December 31, 2020, respectively	69	—
Preferred stock, $0.01 par value: 10,000,000 shares and zero shares authorized at December 31, 2021 and December 31, 2020, respectively; zero shares issued and outstanding at December 31, 2021 and December 31, 2020	—	—
Additional paid-in capital	535,693	114,575
Accumulated deficit	(315,112)	(241,588)
Accumulated other comprehensive income (loss)	(16)	1
Total stockholders' equity (deficit)	220,980	(127,006)
Total liabilities, redeemable convertible preferred stock and stockholders' equity (deficit)	$ 241,169	$ 69,997

The accompanying notes are an integral part of these consolidated financial statements.

RAPID MICRO BIOSYSTEMS, INC.
Consolidated statements of operations
(In thousands, except share and per share amounts)

	Year Ended December 31,	
	2021	2020
Revenue:		
Product revenue	$ 15,512	$ 10,992
Service revenue	6,125	3,091
Non-commercial revenue	1,595	1,994
Total revenue	23,232	16,077
Costs and operating expenses:		
Cost of product revenue	23,434	18,642
Cost of service revenue	5,922	3,386
Cost of non-commercial revenue	1,617	2,120
Research and development	9,781	6,531
Sales and marketing	11,815	5,962
General and administrative	17,895	9,976
Total costs and operating expenses	70,464	46,617
Loss from operations	(47,232)	(30,540)
Other income (expense):		
Interest expense	(2,650)	(3,447)
Change in fair value of preferred stock warrant liability	(19,643)	(69)
Loss on extinguishment of debt	(3,100)	(2,910)
Other income (expense)	(808)	22
Total other income (expense), net	(26,201)	(6,404)
Loss before income taxes	(73,433)	(36,944)
Income tax expense	91	134
Net loss	(73,524)	(37,078)
Accretion of redeemable convertible preferred stock to redemption value	(1,761)	(3,745)
Cumulative redeemable convertible preferred stock dividends	(2,747)	(4,398)
Net loss attributable to common stockholders — basic and diluted	$ (78,032)	$ (45,221)
Net loss per share attributable to Class A and Class B common stockholders — basic and diluted	$ (3.94)	$ (126.11)
Weighted average common shares outstanding — basic and diluted	19,783,539	358,582

The accompanying notes are an integral part of these consolidated financial statements.

RAPID MICRO BIOSYSTEMS, INC.
Consolidated statements of comprehensive loss (In thousands)

	Year Ended December 31,	
	2021	2020
Net loss	$ (73,524)	$ (37,078)
Other comprehensive income:		
Unrealized income (loss) on short-term investments, net of tax	(17)	1
Comprehensive loss	$ (73,541)	$ (37,077)

The accompanying notes are an integral part of these consolidated financial statements.

RAPID MICRO BIOSYSTEMS, INC.
Consolidated statements of redeemable convertible preferred stock and stockholders' equity (deficit)
(In thousands, except share amounts)

	Redeemable convertible preferred stock		Class A Common stock		Class B Common stock		Additional paid-in capital	Accumulated deficit	Accumulated other comprehensive income	Total
	Shares	Amount	Shares	Amount	Shares	Amount				
Balances at December 31, 2020	133,021,640	$ 151,826	612,850	$ 6	—	$ —	$ 114,575	$ (241,588)	$ 1	$(127,006)
Issuance of Series D1 redeemable convertible preferred stock, net of issuance costs of $1,278	22,086,725	78,274	—		—	—	—	—	—	—
Issuance of Series D2 redeemable convertible preferred stock, net of issuance costs of $19	413,268	1,469	—		—	—	—	—	—	—
Accretion of redeemable convertible preferred stock to redemption value	—	1,761	—	—	—	—	(1,761)	—	—	(1,761)
Cumulative redeemable convertible preferred stock dividends	—	2,747	—	—	—	—	(2,747)	—	—	(2,747)
Conversion of preferred stock to common stock	(155,521,633)	(236,077)	24,200,920	242	6,903,379	69	235,766	—	—	236,077
Conversion of preferred stock warrants to Class A common stock warrants	—	—	—	—	—	—	23,760	—	—	23,760
Issuance of Class A common stock in initial public offering, net of issuance costs of $16,032	—	—	9,006,604	90	—	—	164,010	—	—	164,100
Restricted stock award liability accretion	—	—	—	—	—	—	19	—	—	19
Issuance of Class A common stock upon exercise of common stock warrants	—	—	268,718	2	—	—	11	—	—	13
Issuance of Class A common stock upon exercise of common stock options	—	—	226,043	4	—	—	219	—	—	223
Issuance of restricted Class A common stock awards	—	—	248,905	2	—	—	(2)	—	—	—
Stock-based compensation expense	—	—	—	—	—	—	1,843	—	—	1,843
Net loss	—	—	—	—	—	—	—	(73,524)	—	(73,524)
Other comprehensive income	—	—	—	—	—	—	—	—	(17)	(17)
Balances at December 31, 2021	—	$ —	34,564,040	$ 346	6,903,379	$ 69	$ 535,693	$ (315,112)	$ (16)	$ 220,980

	Redeemable convertible preferred stock		Class A Common stock		Class B Common stock		Additional paid-in capital	Accumulated deficit	Accumulated other comprehensive income	Total
	Shares	Amount	Shares	Amount	Shares	Amount				
Balances at December 31, 2019	78,757,540	$ 81,850	353,465	$ 4	—	$ —	$ 121,931	$ (204,510)	$ —	$ (82,575)
Issuance of Series C1 redeemable convertible preferred stock, net of issuance costs of $261	23,611,208	26,891	—	—	—	—	—	—	—	—
Issuance of Series C2 redeemable convertible preferred stock, net of issuance costs of $303	20,301,829	23,044	—	—	—	—	—	—	—	—
Conversion of bridge notes to C1 redeemable convertible preferred stock	10,351,063	11,898	—	—	—	—	—	—	—	—
Accretion of redeemable convertible preferred stock to redemption value	—	3,745	—	—	—	—	(3,745)	—	—	(3,745)
Cumulative redeemable convertible preferred stock dividends	—	4,398	—	—	—	—	(4,398)	—	—	(4,398)
Issuance of Class A common stock upon exercise of common stock options	—	—	259,385	2	—	—	254	—	—	256
Stock-based compensation expense	—	—	—	—	—	—	533	—	—	533
Net loss	—	—	—	—	—	—	—	(37,078)	—	(37,078)
Other comprehensive income	—	—	—	—	—	—	—	—	1	1
Balances at December 31, 2020	133,021,640	$ 151,826	612,850	$ 6	—	$ —	$ 114,575	$ (241,588)	$ 1	$ (127,006)

The accompanying notes are an integral part of these consolidated financial statements.

RAPID MICRO BIOSYSTEMS, INC.
Consolidated statements of cash flows (In thousands)

	Year Ended December 31,	
	2021	2020
Cash flows from operating activities:		
Net loss	$ (73,524)	$ (37,078)
Adjustments to reconcile net loss to net cash used in operating activities:		
Depreciation and amortization expense	1,529	1,509
Stock-based compensation expense	1,843	533
Change in fair value of preferred stock warrant liability	19,643	69
Provision recorded for inventory	60	154
Noncash interest expense	390	2,023
Gain on disposal of property and equipment	(18)	—
Accretion on investments	(3)	—
Loss on extinguishment of debt	3,100	2,910
Other, net	14	(17)
Changes in operating assets and liabilities		
Accounts receivable	(17)	(1,361)
Inventory	(6,766)	(3,367)
Prepaid expenses and other current assets	(1,105)	(1,325)
Other long-term assets	(851)	(363)
Accounts payable	(524)	978
Accrued expenses and other current liabilities	2,305	1,775
Deferred revenue	(1,117)	2,542
Deferred rent, long term	107	22
Other long-term liabilities	(30)	—
Net cash used in operating activities	(54,964)	(30,996)
Cash flows from investing activities:		
Purchases of property and equipment	(3,217)	(690)
Proceeds from sale of property and equipment	20	—
Purchases of investments	(25,092)	(24,980)
Maturity of investments	15,000	10,000
Net cash used in investing activities	(13,289)	(15,670)
Cash flows from financing activities:		
Proceeds from issuance of redeemable convertible preferred stock, net of issuance costs	79,743	49,935
Proceeds from issuance of Class A common stock upon stock option exercise	403	72
Proceeds from issuance of restricted Class A stock award	523	—
Proceeds from initial public offering of Class A and Class B common stock, net of issuance costs	164,100	—
Proceeds from exercise of Class A common stock warrants	13	—
Payments on capital lease obligations	(12)	—
Proceeds from issuance of convertible notes, net of issuance costs	—	9,500
Proceeds from issuance of notes payable, net of issuance costs	—	25,000
Payments of debt issuance costs	—	(875)
Repayment of term loans	(26,159)	(18,000)
Payment of debt extinguishment fees	(1,866)	(1,398)
Net cash provided by financing activities	216,745	64,234
Net increase in cash, cash equivalents and restricted cash	148,492	17,568
Cash, cash equivalents and restricted cash at beginning of period	30,179	12,611
Cash, cash equivalents and restricted cash at end of period	$ 178,671	$ 30,179

The accompanying notes are an integral part of these consolidated financial statements.

RAPID MICRO BIOSYSTEMS, INC.
Consolidated statements of cash flows (In thousands)

	Year Ended December 31,	
	2021	2020
Supplemental disclosure of cash flow information		
Cash paid for interest	$ 2,590	$ 1,977
Supplemental disclosure of non-cash investing activities		
Establishment of property and equipment retirement cost asset	$ 188	$ —
Purchases of property and equipment in accounts payable	$ 1,957	$ 279
Supplemental disclosure of non-cash financing activities		
Conversion of convertible notes to Series C1 preferred stock	$ —	$ 9,523
Issuance of preferred stock warrants in connection with redeemable convertible preferred stock	$ —	$ 652
Issuance of Class A common stock in connection with stock option exercises not settled	$ —	$ 184
Initial fair value of derivative liability	$ —	$ 2,375
Assets acquired under capital lease	$ 372	$ —
Offering costs included in accounts payable and accrued expenses	$ —	$ 62
Conversion of preferred stock to Class A and Class B common stock	$ 236,077	$ —
Conversion of preferred stock warrants to Class A common stock warrants	$ 23,760	$ —
Accretion of redeemable convertible preferred stock to redemption value	$ 1,761	$ 3,745
Cumulative redeemable convertible preferred stock dividends	$ 2,747	$ 4,398

The accompanying notes are an integral part of these consolidated financial statements.

RAPID MICRO BIOSYSTEMS, INC.
Notes to consolidated financial statements
(Amounts in thousands, except share and per share amounts)

1. Nature of the business and basis of presentation

Rapid Micro Biosystems, Inc. (the "Company") was incorporated under the laws of the State of Delaware on December 29, 2006. The Company develops, manufactures, markets and sells Growth Direct systems ("Systems") proprietary consumables, laboratory information management system ("LIMS") connection software, and services to address rapid microbial analysis used for quality control in the manufacture of pharmaceuticals, medical devices and personal care products. The Company's technology uses a highly sensitive camera and the natural auto fluorescence of living cells to identify and quantify microbial growth faster and more accurately than the traditional method, which relies on the human eye. The Company currently sells to customers in North America, Europe and Asia. The Company is headquartered in Lowell, Massachusetts.

The Company is subject to risks and uncertainties common to companies in the pharmaceutical and biotech quality control laboratory testing and instrumentation industry including, but not limited to, the successful development, commercialization, marketing and sale of products, fluctuations in operating results and financial risks, protection of proprietary knowledge and patent risks, dependence on key personnel, competition, technological and medical risks, customer demand, compliance with governmental regulations and management of growth. Potential risks and uncertainties also include, without limitation, uncertainties regarding the duration and magnitude of the impact of the COVID-19 pandemic on the Company's business and the economy in general. Products currently under development will require additional research and development efforts prior to commercialization and will require additional capital and adequate personnel and infrastructure. The Company's research and development may not be successfully completed, adequate protection for the Company's technology may not be obtained, the Company may not obtain necessary government regulatory approval, and approved products may not prove commercially viable. The Company operates in an environment of rapid change in technology and competition.

In March 2020, the World Health Organization declared the global novel coronavirus disease 2019 ("COVID-19") outbreak a pandemic. The impact of this pandemic has been and will likely continue to be extensive in many aspects of society, which has resulted in and will likely continue to result in significant disruptions to the global economy, as well as businesses and capital markets around the world. The Company cannot at this time predict the ultimate extent, duration, or full impact that the COVID-19 pandemic will have on its future financial condition and operations. The impact of the COVID-19 coronavirus outbreak on the Company's financial performance will depend on future developments, including the duration and spread of the pandemic and related governmental advisories and restrictions. These developments and the impact of COVID-19 on the financial markets and the overall economy are highly uncertain and cannot be predicted. If the financial markets and/or the overall economy are impacted for an extended period, the Company's results may be materially adversely affected.

Future impacts to the Company's business as a result of COVID-19, and its variants, could include disruptions to the Company's manufacturing operations and supply chain caused by facility closures, reductions in operating hours, staggered shifts and other social distancing efforts; labor shortages; decreased productivity and unavailability of materials or components; limitations on its employees' and customers' ability to travel, and delays in shipments to and from affected countries and within the United States. While the Company maintains an inventory of finished products and raw materials used in its products, a prolonged pandemic could lead to shortages in the raw materials necessary to manufacture its products.

Basis of presentation

The consolidated financial statements have been prepared in accordance with accounting principles generally accepted in the United States of America ("GAAP") and include the accounts of the Company and its wholly owned subsidiaries in Germany and Switzerland. All intercompany accounts and transactions have been eliminated in consolidation. Any reference in these notes to applicable guidance is meant to refer to the authoritative GAAP as found

in the Accounting Standards Codification ("ASC") and Accounting Standards Update ("ASU") of the Financial Accounting Standards Board ("FASB").

Reverse split

On July 9, 2021, the Company effected a one-for-five reverse stock split of its issued and outstanding shares of common stock and a proportional adjustment to the existing conversion ratios for each series of the Company's Preferred Stock (see Note 10). Accordingly, all share and per share amounts for all periods presented in the accompanying consolidated financial statements and notes thereto have been adjusted retroactively, where applicable, to reflect this reverse stock split and adjustment of the Preferred Stock conversion ratios.

Initial public offering

On July 19, 2021, the Company closed an initial public offering ("IPO") of its Class A common stock, which resulted in the sale of 7,920,000 shares of its Class A common stock at a public offering price of $20.00 per share, before underwriting discounts. The offering resulted in gross proceeds of $158.4 million and net proceeds to the Company of $143.8 million from the initial public offering after deducting underwriting discounts, commissions and offering expenses payable by the Company.

On August 4, 2021, the underwriters exercised their overallotment option in part and purchased 1,086,604 shares of Class A common stock at the initial public offering price of $20.00 per share less underwriting discounts and commissions. The overallotment option exercise resulted in net proceeds of $20.2 million.

Liquidity

The Company has incurred recurring losses and net cash outflows from operations since its inception. The Company expects to continue to generate significant operating losses for the foreseeable future. The Company expects that its existing cash and cash equivalents and investments will be sufficient to fund its operating expenses and capital expenditure requirements for at least twelve months following the date these consolidated financial statements were issued.

2. Summary of significant accounting policies

Use of estimates

The preparation of the Company's consolidated financial statements in conformity with GAAP requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities, the disclosure of contingent assets and liabilities at the date of the consolidated financial statements, and the reported amounts of revenue and expenses during the reporting periods. Significant estimates and assumptions reflected in these consolidated financial statements include, but are not limited to, calculating the standalone selling price of products and services for revenue recognition, the valuation of inventory, the valuation of common stock and stock-based awards, and the valuation of the preferred stock warrant liability. The Company bases its estimates on historical experience, known trends and other market-specific and relevant factors that it believes to be reasonable under the circumstances. On an ongoing basis, management evaluates its estimates when there are changes in circumstances, facts and experience. Changes in estimates are recorded in the period in which they become known. Actual results could differ from those estimates.

Due to the COVID-19 pandemic, there has been uncertainty and disruption in the global economy and financial markets. The Company is not aware of any specific event or circumstance that would require an update to its estimates or judgments or a revision of the carrying value of its assets or liabilities as of [March 24, 2022], the date the consolidated financial statements were issued. These estimates may change as new events occur and additional information is obtained.

Risk of concentrations of credit, significant customers and significant suppliers

Financial instruments that potentially expose the Company to concentrations of credit risk consist primarily of cash and cash equivalents, short-term and long-term investments and accounts receivable. Periodically, the Company maintains deposits in accredited financial institutions in excess of federally insured limits. The Company maintains its cash and cash equivalents with financial institutions that management believes to be of high credit quality. The Company has not experienced any losses on such accounts or any other-than-temporary losses with respect to its cash equivalents and investments and does not believe it is exposed to any unusual credit risk beyond the normal credit risk associated with commercial banking relationships.

Significant customers are those which represent more than 10% of the Company's total revenue or accounts receivable balance at each respective balance sheet date. The following table presents customers that represent 10% or more of the Company's total revenue:

	Year Ended December 31,	
	2021	2020
Customer A	16.7 %	23.2 %
Customer B	*	12.4 %
Customer C	*	10.5 %
	16.7 %	46.1 %

* – less than 10%

The following table presents customers that represent 10% or more of the Company's accounts receivable:

	Year Ended December 31,	
	2021	2020
Customer A	19.5 %	41.9 %
Customer D	12.6 %	*
Customer E	10.6 %	*
Customer F	10.0 %	*
Customer G	*	18.7 %
Customer H	*	13.4 %
Customer I	*	10.1 %
	52.7 %	84.1 %

* – less than 10%

The Company relies on third parties for the supply and manufacture of its products as well as logistics. In instances where these parties fail to perform their obligations, the Company may be unable to find alternative suppliers to satisfactorily deliver its products to its customers on time, if at all, which could have a material adverse effect on the Company's operating results, financial condition and cash flows and damage its customer relationships. There are no significant concentrations around a single third-party supplier or manufacturer for the year ended December 31, 2021 or 2020.

Deferred offering costs

The Company capitalizes certain legal, accounting and other third-party fees that are directly associated with in-process equity financings as deferred offering costs until such financings are consummated. After consummation of an equity financing, these costs are recorded in stockholders' equity (deficit) as a reduction of additional paid-in capital generated as a result of the offering or as a reduction to the carrying value of redeemable convertible preferred stock. If the in-process equity financing is abandoned, the deferred offering costs will be expensed immediately as a charge to

operating expenses in the consolidated statements of operations. As of December 31, 2021 and 2020, the Company had zero and $0.1 million, respectively, in deferred offering costs in the consolidated balance sheets.

Debt issuance costs

The Company capitalizes certain legal and other third-party fees that are directly associated with the issuance of debt as debt issuance costs. Debt issuance costs are recorded as a direct reduction of the carrying amount of the associated debt on the consolidated balance sheets and amortized as interest expense on the consolidated statement of operations using the effective interest method, which approximates the straight-line method. As of December 31, 2021 and 2020, debt issuance costs totaled zero and $1.3 million, respectively. During the year ended December 31, 2021 and 2020, the Company recorded $0.4 million and $0.9 million, respectively, in amortization of debt issuance costs within interest expense in the consolidated statement of operations.

Cash equivalents

The Company considers all highly liquid investments with an original maturity of 90 days or less at the time of purchase to be cash equivalents. Cash equivalents that are readily convertible to cash are stated at cost, which approximates fair value. At December 31, 2021 and 2020, the Company held cash of $0.3 million and $0.1 million in banks located outside of the U.S., respectively.

Restricted cash

As of December 31, 2021 and 2020, the Company was required to maintain guaranteed investment certificates of $0.3 million and $0.1 million, respectively, with maturities of three months to one year that are subject to an insignificant risk of changes in value. The guaranteed investment certificates are held for the benefit of a landlord in connection with an operating lease which has a remaining term of greater than one year and are classified as restricted cash (non-current) on the Company’s consolidated balance sheets.

Investments

The Company’s short-term and long-term investments are classified as available-for-sale and recorded at fair value based upon market prices at period end. Unrealized gains and losses are recorded in accumulated other comprehensive income as a separate component of stockholders’ deficit. Realized gains and losses and declines in value of investments determined to be other than temporary are included as a component of interest income in the consolidated statements of operations. The costs of investments for purposes of computing realized and unrealized gains and losses is based on the specific identification method.

The Company evaluates its short-term and long-term investments with unrealized losses for other-than-temporary impairment. When assessing investments for other-than-temporary declines in value, the Company considers such factors as, among other things, how significant the decline in value is as a percentage of the original cost, how long the market value of the investment has been less than its original cost, the Company’s ability and intent to retain the investment for a period of time sufficient to allow for any anticipated recovery in fair value and market conditions in general. If any adjustment to fair value reflects a decline in the value of the investment that the Company considers to be other-than-temporary, the Company reduces the investment to fair value through a charge to the consolidated statements of operations. No such adjustments were necessary during the periods presented.

The Company’s short-term investments as of December 31, 2021 and 2020 had maturities of less than one year and long-term investments at December 31, 2021 had maturities greater than one year.

Accounts receivable

Accounts receivable are customer obligations that are unconditional. Accounts receivable are presented net of an allowance for doubtful accounts, which represents an estimate of amounts that may not be collectible. The Company

performs ongoing credit evaluations of its customers and, if necessary, provides an allowance for doubtful accounts and expected losses. The Company writes off accounts receivable against the allowance when it determines a balance is uncollectible and no longer actively pursues collection of the receivable. The Company does not have any off-balance-sheet credit exposure related to customers. As of December 31, 2021 and 2020, the Company recorded zero allowance for doubtful accounts. Additionally, for the years ended December 31, 2021 and 2020, the Company recorded zero provision for bad debts or recoveries.

Inventory

Inventory is valued at the lower of cost or net realizable value. Cost is computed using the first-in, first-out method. The Company regularly reviews inventory quantities on-hand for excess and obsolete inventory and, when circumstances indicate, records charges to write down inventories to their estimated net realizable value, after evaluating historical sales, future demand, market conditions and expected product life cycles. Such charges are classified as cost of product revenue in the consolidated statements of operations. Any write-down of inventory to net realizable value creates a new cost basis.

Property and equipment

Property and equipment are stated at cost less accumulated depreciation and amortization. Depreciation and amortization expense is recognized using the straight-line method over the estimated useful life of each asset, as follows:

	Estimated Useful Life
Manufacturing and laboratory equipment	5-10 years
Computer hardware and software	3 years
Office furniture and fixtures	5-7 years
Leasehold improvements	Shorter of remaining life of lease or useful life

Estimated useful lives are periodically assessed to determine if changes are appropriate. Maintenance and repairs are charged to expense as incurred. When assets are retired or otherwise disposed of, the cost of these assets and related accumulated depreciation or amortization are eliminated from the consolidated balance sheet and any resulting gains or losses are included in the consolidated statement of operations in the period of disposal. Costs for capital assets not yet placed into service are capitalized as construction-in-progress and depreciated once placed into service.

Software development costs

The Company accounts for software development costs for internal-use software under the provisions of ASC 350-40, “Internal-Use Software” (“ASC 350”). Accordingly, certain costs to develop internal-use computer software are capitalized, provided these costs are expected to be recoverable. There was $1.3 million of software development costs capitalized in other long-term assets at December 31, 2021, net of accumulated amortization of $0.1 million. The capitalized costs are being amortized on a straight-line basis over the initial subscription term of five years. There was $0.1 million of amortization expense recorded in the consolidated statement of operations for the year ended December 31, 2021.

Impairment of long-lived assets

Long-lived assets consist of property and equipment. Long-lived assets to be held and used are tested for recoverability whenever events or changes in business circumstances indicate that the carrying amount of the assets may not be fully recoverable. Factors that the Company considers in deciding when to perform an impairment review include significant underperformance of the business in relation to expectations, significant negative industry or economic trends and significant changes or planned changes in the use of the assets. If an impairment review is performed to evaluate a long-lived asset group for recoverability, the Company compares forecasts of undiscounted cash flows expected to result

from the use and eventual disposition of the long-lived asset group to its carrying value. An impairment loss would be recognized in loss from operations when estimated undiscounted future cash flows expected to result from the use of an asset group are less than its carrying amount. The impairment loss is based on the excess of the carrying value of the impaired asset group over its fair value, determined based on discounted cash flows. The Company did not record any impairment losses on long-lived assets during the years ended December 31, 2021 or 2020.

Fair value measurements

Certain assets and liabilities of the Company are carried at fair value under GAAP. Fair value is defined as the exchange price that would be received for an asset or paid to transfer a liability (an exit price) in the principal or most advantageous market for the asset or liability in an orderly transaction between market participants on the measurement date. Valuation techniques used to measure fair value must maximize the use of observable inputs and minimize the use of unobservable inputs. Financial assets and liabilities carried at fair value are to be classified and disclosed in one of the following three levels of the fair value hierarchy, of which the first two are considered observable and the last is considered unobservable:

- Level 1—Quoted prices in active markets for identical assets or liabilities.
- Level 2—Observable inputs (other than Level 1 quoted prices), such as quoted prices in active markets for similar assets or liabilities, quoted prices in markets that are not active for identical or similar assets or liabilities, or other inputs that are observable or can be corroborated by observable market data.
- Level 3—Unobservable inputs that are supported by little or no market activity that are significant to determining the fair value of the assets or liabilities, including pricing models, discounted cash flow methodologies and similar techniques.

The Company’s cash equivalents, investments, derivative liability and its redeemable convertible preferred stock warrant liability are carried at fair value, determined according to the fair value hierarchy described above (see Note 3). The carrying values of the Company’s accounts receivable, prepaid expenses and other current assets, accounts payable and accrued expenses and other current liabilities approximate their fair values due to the short-term nature of these assets and liabilities. The carrying value of the Company’s long-term debt approximates its fair value (a level 2 measurement) at each balance sheet date due to its variable interest rate, which approximates a market interest rate. There was no debt outstanding as of December 31, 2021.

Product warranties

The Company offers a one-year limited assurance warranty on System sales, which is included in the selling price. Product warranties provide assurance that the Company’s product functions in accordance with standard specifications. Warranties cover for repairs and replacements when the product does not function in accordance with agreed specifications. The standard assurance warranty does not cover, and no warranty is provided for, parts which by their nature are normally required to be replaced periodically. The accrued warranty cost is based on estimated material, labor and other costs that the Company expects to incur to fulfill the warranty obligation. Estimates are primarily based on historical information, current cost data and future forecast. The Company periodically assesses the adequacy of the warranty accrual and adjusts the amount as necessary. If the historical data used to calculate the adequacy of the warranty accrual are not indicative of future requirements, additional or reduced warranty accrual may be required. The

warranty accrual is included in accrued expenses and other current liabilities in the consolidated balance sheets. The following table presents a summary of changes in the amount reserved for warranty cost (in thousands):

	Year Ended December 31,	
	2021	2020
Balance, beginning of the period	$ 637	$ 848
Warranty provisions	—	14
Warranty repairs	(39)	(225)
Balance, end of the year	$ 598	$ 637

Classification and accretion of redeemable convertible preferred stock

Prior to the IPO and the conversion of redeemable convertible preferred stock to Class A and Class B common stock, the Company had classified redeemable convertible preferred stock outside of stockholders' equity (deficit) because the shares contained certain redemption features that were not solely within the control of the Company. Costs incurred in connection with the issuance of each series of redeemable convertible preferred stock was recorded as a reduction of gross proceeds from issuance. The Company recorded periodic accretion to the carrying values of its outstanding redeemable convertible preferred stock such that the carrying value of the redeemable convertible preferred stock would have been equal to the redemption value at the earliest date of redemption. Adjustments to the carrying values of the redeemable convertible preferred stock to record this accretion at each reporting date were considered deemed dividends, which adjusted retained earnings (or in the absence of retained earnings, additional paid-in capital) and increased or decreased net loss attributable to common stockholders in computing basic and diluted earnings per share.

Preferred stock warrant liability

Prior to the IPO and the conversion of redeemable convertible preferred stock warrant liabilities to Class A common stock warrants, the Company classified warrants for the purchase of shares of its redeemable convertible preferred stock (see Notes 3 and 10) as a liability on its consolidated balance sheets as these warrants were freestanding financial instruments that may have required the Company to transfer assets upon exercise. The warrant liability was initially recorded at fair value on the issuance date of each warrant and was subsequently remeasured to fair value at each reporting date using the Black-Scholes pricing model. Changes in the fair value of the warrant liability were recognized as a component of other income (expense) in the consolidated statements of operations. Changes in the fair value of the preferred stock warrant liability were recognized up until the warrants qualified for equity classification upon IPO.

Derivative liability

In February 2020, the Company issued convertible notes to several investors (see Note 9) that provided a conversion option whereby upon the closing of a specified financing event the notes would automatically convert into shares of the same class and series of capital stock of the Company issued to other investors in the financing at a conversion price equal to 80% of the price per share of the securities paid by the other investors. This conversion option was determined to be an embedded derivative that required to be bifurcated and accounted for separately from the notes. The derivative liability was initially recorded at fair value upon entering into the agreement. In April 2020, the specified financing event was consummated, as such the notes were converted into shares of Series C1 Preferred Stock (see Note 10), and the derivative liability was extinguished.

Segment information

The Company determined its operating segment after considering the Company's organizational structure and the information regularly reviewed and evaluated by the Company's chief operating decision maker ("CODM") in deciding how to allocate resources and assess performance. The Company has determined that its CODM is its Chief Executive Officer. The CODM reviews the financial information on a consolidated basis for purposes of evaluating financial performance and allocating resources. On the basis of these factors, the Company determined that it operates and

manages its business as one operating segment, that develops, manufactures, markets and sells Systems and related LIMS connection software, consumables and services; and accordingly has one reportable segment for financial reporting purposes. Substantially, all of the Company's long-lived assets are held in the United States.

Revenue recognition

Under ASC 606, revenue is recognized when a customer obtains control of promised goods or services, in an amount that reflects the consideration which the entity expects to receive in exchange for those goods or services. In order to achieve this core principle, the Company applies the following five steps when recording revenue:

(1) identify the contract, or contracts, with the customer, (2) identify the performance obligations in the contract, (3) determine the transaction price, (4) allocate the transaction price to the performance obligations in the contract and (5) recognize revenue when, or as, performance obligations are satisfied.

The Company derives revenue from the sale of its products and services through direct sale representatives. The Company's arrangements are generally noncancelable and nonrefundable after ownership passes to the customer.

Product revenue

The Company derives product revenue primarily from the sale of its Systems, optional LIMS connection software, which facilitates the transfer of data captured by the System to the customer's existing LIMS software, and proprietary consumables. Revenue is recognized when control of the products is transferred to the customer.

Transfer of control is generally at shipment or delivery, depending on contractual terms, and occurs when title and risk of loss transfers to the customer, which represents the point in time when the customer obtains the use of and substantially all of the benefits of the product. Upon delivery, the System is fully functional for use by the customer. As such, the Company's performance obligation related to product sales is satisfied at a point in time. The Company's principal terms of sale are free carrier ("FCA") shipping point.

Service revenue

The Company derives service revenue primarily from validation services, service contracts and field service (including installation). The Company's validation services include validation and documentation services performed utilizing Systems purchased by the customer. Service contracts are around-the-clock maintenance support which can be purchased by the customer after the expiration of the one-year assurance warranty included with each System purchase. Field service revenue primarily consists of services provided by field service engineers to install the System at the customer site and perform two preventative maintenance services during the warranty period. Service revenue is recognized over time using an input method based on time lapsed for service contracts and output method based on milestone achieved for validation services and field service.

Performance obligations

A performance obligation is a promise in a contract to transfer a distinct product or service to a customer that are both capable of being distinct, whereby the customer can benefit from the product or service either on its own or together with other resources that are readily available, and are distinct in the context of the contract, whereby the transfer of the product or service is separately identifiable from other promises in the contract. The Company's main performance obligations in customer arrangements are Systems, LIMS connection software, consumables, validation services, service contracts, and field service.

Payment terms

Payment terms for customer orders are typically between 30 to 90 days after the shipment or delivery of the product. For certain products, services and customer types, the Company requires payment before the products or services are

delivered to, or performed for, the customer. None of the Company's contracts contain a significant financing component.

Multiple performance obligations with an arrangement

The Company's contracts may include multiple performance obligations when customers purchase a combination of products and services such as System sold together with the LIMS connection software, consumables or services. For these arrangements, the Company allocates the contract's transaction price to each performance obligation on a relative standalone selling price basis using the Company's best estimate of the standalone selling price of each distinct product or service in the contract. The primary methods used to estimate standalone selling prices are based on the prices observed in standalone sales to customers or cost-plus margin depending on the nature of the obligation and available evidence of fair value. Allocation of the transaction price is determined at contract's inception.

Remaining performance obligations

The Company does not disclose the value of remaining performance obligations for (i) contracts with an original contract term of one year or less, (ii) contracts for which the Company recognizes revenue at the amount to which it has the right to invoice when that amount corresponds directly with the value of services performed, and (iii) variable consideration allocated entirely to a wholly unsatisfied performance obligation or to a wholly unsatisfied distinct service that forms part of a single performance obligation. The Company does not have material remaining performance obligations associated with contracts with terms greater than one year.

Contract balances from contracts with customers

Contract assets arise from unbilled amounts in customer arrangements when revenue recognized exceeds the amount billed to the customer and the Company's right to payment is conditional and not only subject to the passage of time. The Company had $0.3 million and $0.5 million in contract assets as of December 31, 2021 and 2020, respectively, included in prepaid expenses and other current assets. These balances relate to the BARDA agreement as well as unbilled amounts with commercial customers.

Contract liabilities represent the Company's obligation to transfer goods or services to a customer for which it has received consideration (or the amount is due) from the customer. The Company has a contract liability related to service revenue, which consists of amounts that have been invoiced but that have not been recognized as revenue. Amounts expected to be recognized as revenue within 12 months of the balance sheet date are classified as current deferred revenue and amounts expected to be recognized as revenue beyond 12 months of the balance sheet date are classified as noncurrent deferred revenue. The Company did not record any non-current deferred revenue as of December 31, 2021 or 2020. Deferred revenue was $3.3 million and $4.4 million at December 31, 2021 and 2020, respectively. Revenue recognized during the year ended December 31, 2021 that was included in deferred revenue at the prior year end was $3.8 million. Revenue recognized during the year ended December 31, 2020, that was included in deferred revenue at the prior year end was $1.0 million.

Non-commercial revenue

The Company generates revenue from a long-term contract with the U.S. Department of Health and Human Services Biomedical Advanced Research and Development Authority ("BARDA") a part of the U.S. government. The Company's contracts with the U.S. government typically are subject to the Federal Acquisition Regulation ("FAR") and are priced based on estimated or actual costs of producing goods or providing services. The FAR provides guidance on the types of costs that are allowable in establishing prices for goods or services provided under U.S. government contracts. In September 2017, the Company signed a contract with BARDA, which was subsequently modified on multiple occasions to increase the contract value and reduce the cost share reimbursement rate. Modifications were accounted for prospectively. The contract is a cost-reimbursable, cost- sharing arrangement, whereby BARDA reimburses the Company for a percentage of the total costs that have been incurred including indirect allowable costs. Revenue on the BARDA contract is recognized over time using an input method based on cost incurred to date in relation to total estimated cost. Due to the structure of the arrangement, the transaction price is variable in nature based

on actual cost incurred. As such the amount included in the transaction price is constrained to the amount for which it is probable that a significant reversal of cumulative revenue recognized will not occur.

Disaggregated revenue

The Company disaggregates revenue based on the recurring and non-recurring, and commercial and non-commercial, nature of the underlying sale. Recurring revenue includes sales of consumables and service contracts. Non-recurring revenue includes sales of Systems, LIMS connection software, validation services, field service, and revenue under the Company's contract with BARDA. The following table presents the Company's revenue by the recurring or non-recurring and commercial or non-commercial nature of the revenue stream (in thousands):

	Year Ended December 31,	
	2021	2020
Product and service revenue — recurring	$ 7,819	$ 3,908
Product and service revenue — non-recurring	13,818	10,175
Non-commercial revenue — non-recurring	1,595	1,994
Total revenue	$ 23,232	$ 16,077

The following table presents the Company's revenue by customer geography (in thousands):

	Year Ended December 31,	
	2021	2020
United States	$ 12,892	$ 7,304
Germany	1,695	1,920
Switzerland	4,314	4,111
All other countries	4,331	2,742
Total revenue	$ 23,232	$ 16,077

Contract acquisition costs

The Company incurs and pays commissions on Systems, LIMS connection software, validation services, field service arrangements, and starting in 2021, commissions on consumables and service contracts. The period of the related revenue stream is typically less than one year in duration, and as such, the Company applies the practical expedient to expense the costs in the period in which they were incurred. The Company does not pay commissions on non-commercial revenue with BARDA.

Shipping and handling fees

Shipping and handling fees billed to customers for product shipments are recorded in product revenue in the consolidated statements of operations. Shipping and handling costs incurred for inventory purchases and product shipments are recorded in cost of product revenue in the consolidated statements of operations.

Cost of revenue

Cost of product revenue primarily consists of costs for raw material parts and associated freight, shipping and handling costs, royalties, contract manufacturer costs, salaries and other personnel costs including stock-based compensation expense, depreciation and amortization expense, scrap, warranty cost, inventory reserves, allocated information technology and facility-related costs, overhead and other costs related to those sales recognized as product revenue in the period. Cost of service revenue primarily consists of salaries and other personnel costs including stock-based compensation expense, travel costs, materials consumed when performing installations, validations and other services, allocated information technology and facility-related costs, costs associated with training and other expenses related to service revenue recognized in the period. Cost of non-commercial revenue primarily consists of salaries and other personnel costs including stock-based compensation expense, consulting expense, materials, travel and other costs related to revenue recognized as non-commercial revenue during the period.

Research and development costs

Research and development costs are expensed as incurred. Research and development expenses consist of costs incurred in performing research and development activities including, employee-related expenses, such as salaries, bonuses and other personnel costs including stock-based compensation expense, the cost of developing maintaining and improving new and existing products designs, the cost of hardware and software engineering, the cost of research materials and supplies, external costs of outside consultants engaged to conduct research and development services associated with the Company's technology and products, and information technology and facilities expenses, which include direct and allocated expenses for rent, maintenance of facilities and insurance, as well as related depreciation and amortization. The costs incurred for the development of system software that will be sold are capitalized when technological feasibility has been established. The Company has continued to develop the software associated with its platform and products, and the associated costs have been expensed as incurred, as the nature of improvements did not significantly improve the performance or functionality of the software.

Advertising costs

Advertising costs are expensed as incurred and are included in sales and marketing expenses in the consolidated statements of operations. Advertising costs were $0.1 million during both of the years ended December 31, 2021 and 2020.

Patent costs

All patent-related costs incurred in connection with filing and prosecuting patent applications are expensed as incurred due to the uncertainty about the recovery of the expenditures. Amounts incurred are classified within general and administrative expense in the consolidated statement of operations.

Stock-based compensation

The Company measures all stock-based awards granted to employees, officers and directors based on their fair value on the date of the grant and recognizes compensation expense for those awards over the requisite service period, which is generally the vesting period of the respective award. The Company issues stock-based awards with only service-based vesting conditions and records the expense for these awards using the straight-line method. Forfeitures are accounted for as they occur. The Company has not issued any stock-based awards with performance-based vesting conditions.

The Company classifies stock-based compensation expense in its consolidated statement of operations in the same manner in which the award recipient's payroll costs are classified or in which the award recipient's service payments are classified.

The fair value of each stock option grant is estimated on the date of grant using the Black-Scholes option-pricing model, which uses the following inputs: (i) the fair value per share of the common stock issuable upon exercise of the option, (ii) the expected term of the option, (iii) expected volatility of the price of the common stock, (iv) the risk-free interest rate, and (v) the expected dividend yield. Prior to the IPO, the Company valued its common stock taking into consideration its most recently available valuation of common stock performed by third parties as well as additional factors which may have changed since the date of the most recent contemporaneous valuation through the date of grant. The exercise price of the option cannot be less than the fair market value of a share of common stock on the date of grant. The expected term of the Company's stock options has been determined utilizing the "simplified" method for awards that qualify as "plain-vanilla". The Company historically has been a private company and lacks company-specific historical and implied volatility information for its stock. Therefore, the Company estimates its expected stock price volatility based on the historical volatility of publicly traded peer companies and expects to continue to do so until such time as it has adequate historical data regarding the volatility of its own traded stock price. The risk-free interest rate is determined by reference to the U.S. Treasury yield curve in effect at the time of grant of the award for time periods approximately equal to the expected term of the award. Expected dividend yield is based on the fact that the Company has never paid cash dividends on its common stock and does not expect to pay any cash dividends in the foreseeable future.

Income taxes

The Company accounts for income taxes using the asset and liability method, which requires the recognition of deferred tax assets and liabilities for the expected future tax consequences of events that have been recognized in the consolidated financial statements or in the Company's tax returns. Deferred tax assets and liabilities are determined on the basis of the differences between the consolidated financial statements and tax basis of assets and liabilities using enacted tax rates in effect for the year in which the differences are expected to reverse. Changes in deferred tax assets and liabilities are recorded in the provision for income taxes. The Company assesses the likelihood that its deferred tax assets will be recovered from future taxable income and, to the extent it believes, based upon the weight of available evidence, that it is more likely than not that all or a portion of the deferred tax assets will not be realized, a valuation allowance is established through a charge to income tax expense. Potential for recovery of deferred tax assets is evaluated by estimating the future taxable profits expected and considering prudent and feasible tax planning strategies.

The Company accounts for uncertainty in income taxes recognized in the consolidated financial statements by applying a two-step process to determine the amount of tax benefit to be recognized. First, the tax position must be evaluated to determine the likelihood that it will be sustained upon external examination by the taxing authorities. If the tax position is deemed more-likely-than-not to be sustained, the tax position is then assessed to determine the amount of benefit to recognize in the consolidated financial statements. The amount of the benefit that may be recognized is the largest amount that has a greater than 50% likelihood of being realized upon ultimate settlement. The provision for income taxes includes the effects of any resulting tax reserves, or unrecognized tax benefits, that are considered appropriate as well as the related net interest and penalties.

Foreign currency translation and transactions

The Company has determined that the functional and reporting currency for its operations in Germany and Switzerland is the U.S. Dollar. Gains and losses arising from currency exchange rate fluctuations on transactions denominated in a currency other than the local functional currency are included in other income.

Comprehensive loss

Comprehensive loss includes net loss as well as other changes in stockholders' equity (deficit) that result from transactions and economic events other than those with stockholders. For the years ended December 31, 2021 and 2020, comprehensive loss included less than $0.1 million, respectively, of unrealized gains and losses on investments, net of tax.

Net loss per share attributable to common stockholders

The Company follows the two-class method when computing net income (loss) per share as the Company has issued shares that meet the definition of participating securities. The two-class method determines net income (loss) per share for each class of common and participating securities according to dividends declared or accumulated and participation rights in undistributed earnings. The two-class method requires income available to common stockholders for the period to be allocated between common and participating securities based upon their respective rights to receive dividends as if all income for the period had been distributed.

Basic net income (loss) per share attributable to common stockholders is computed by dividing the net income (loss) attributable to common stockholders by the weighted average number of common shares outstanding for the period. Diluted net income (loss) attributable to common stockholders is computed by adjusting net income (loss) attributable to common stockholders to reallocate undistributed earnings based on the potential impact of dilutive securities. Diluted net income (loss) per share attributable to common stockholders is computed by dividing the diluted net income (loss) attributable to common stockholders by the weighted average number of common shares outstanding for the period, including potential dilutive common shares. For purpose of this calculation, outstanding stock options, redeemable convertible preferred stock and warrants to purchase preferred stock are considered potential dilutive common shares.

The Company's redeemable convertible preferred stock contractually entitles the holders of such shares to participate in dividends but does not contractually require the holders of such shares to participate in losses of the Company. Accordingly, in periods in which the Company reports a net loss attributable to common stockholders such losses are not allocated to such participating securities. In periods in which the Company reports a net loss attributable to common stockholders diluted net loss per share attributable to common stockholders is the same as basic net loss per share attributable to common stockholders since dilutive common shares are not assumed to have been issued if their effect is anti-dilutive. The Company reported a net loss attributable to common stockholders for the years ended December 31, 2021 and 2020, as such basic net loss per share attributable to common stockholders was the same as diluted net loss per share attributable to common stockholders.

Recently adopted accounting pronouncements

In August 2018, the FASB issued ASU No. 2018-15, *Intangibles — Goodwill and Other — Internal-Use Software (Topic 350)*: Customer's Accounting for Implementation Costs Incurred in a Cloud Computing Arrangement that is a Service Contract, which requires capitalizing implementation costs incurred to develop or obtain internal-use software (and hosting arrangements that include an internal-use software license). The Company adopted this guidance effective on January 1, 2021 and adoption did not have a material impact on the condensed consolidated financial statements and related disclosures.

Recently issued accounting pronouncements

The Company qualifies as an "emerging growth company" as defined in the Jumpstart Our Business Startups Act of 2012 and has elected not to "opt out" of the extended transition related to complying with new or revised accounting standards, which means that when a standard is issued or revised and it has different application dates for public and nonpublic companies, the Company will adopt the newer revised standard at the time nonpublic companies adopt the new or revised standard and will do so until such time that the Company either (i) irrevocably elects to "opt out" of such extended transition period or (ii) no longer qualifies as an emerging growth company. The Company may choose to early adopt any new or revised accounting standards whenever such early adoption is permitted for nonpublic companies.

In June 2016, the FASB issued ASU No. 2016-13, *Financial Instruments — Credit Losses (Topic 326)* ("ASU 2016-13"). The new standard adjusts the accounting for assets held at amortized costs basis, including marketable securities accounted for as available for sale, and trade receivables. The standard eliminates the probable initial recognition threshold and requires an entity to reflect its current estimate of all expected credit losses. The allowance for credit losses is a valuation account that is deducted from the amortized cost basis of the financial assets to present the net amount expected to be collected. The Company expects to adopt this guidance effective January 1, 2023, and it is currently evaluating the impact on its consolidated financial statements and related disclosures.

In February 2016, the FASB issued ASU No. 2016-02, *Leases (Topic 842)* ("ASU 2016-02"), which sets out the principles for the recognition, measurement, presentation and disclosure of leases for both parties to a contract (i.e., lessees and lessors). The new standard requires lessees to apply a dual approach, classifying leases as either finance or operating leases based on the principle of whether or not the lease is effectively a financed purchase by the lessee. This classification will determine whether lease expense is recognized based on an effective interest method or on a straight-line basis over the term of the lease. A lessee is also required to record a right-of-use asset and a lease liability for all leases with a term of greater than 12 months regardless of their classification.

Leases with a term of 12 months or less may be accounted for similar to existing guidance for operating leases today.

The Company has adopted this guidance effective January 1, 2022 and elected the optional transition method that allows for a cumulative-effect adjustment in the period of adoption and did not restate prior periods. The Company applied the transition package of practical expedients allowed by the standard. The Company has completed the assessment of the new standard and is finalizing the new required disclosures. As a result of the Company's adoption of the new standard, the Company will record right-of-use assets and lease liabilities of approximately $6.0 million and $7.0 million, respectively, for existing operating leases, and finance lease right-of-use assets and lease

liabilities of $0.4 million for existing capital leases in the consolidated balance sheets at January 1, 2022. Additionally, the Company will reverse approximately $0.9 million of deferred rent liabilities previously recorded under the previous accounting guidance. The adoption of this new standard will not have a material impact on its consolidated results of operations or cash flows.

In December 2019, the FASB issued ASU 2019-12, Income Taxes (ASC 740): *Simplifying the Accounting for Income Taxes ("ASU 2019-12")*, which is intended to simplify various areas related to accounting for income taxes. ASU 2019-12 removes certain exceptions to the general principles in ASC 740 and also clarifies and amends existing guidance to improve consistent application. The Company adopted this guidance effective January 1, 2022, and the adoption did not have a material impact on the Company's consolidated financial statements and related disclosures.

3. Fair value of financial assets and liabilities

The following tables present information about the Company's financial assets and liabilities measured at fair value on a recurring basis and indicate the level of the fair value hierarchy used to determine such fair values (in thousands):

	Fair value measurements as of December 31, 2021			
	Level 1	Level 2	Level 3	Total
Assets				
Cash equivalents	$ 173,755	$ —	$ —	$ 173,755
Short-term investments	15,110	—	—	15,110
Long-term investments	9,966	—	—	9,966
	$ 198,831	$ —	$ —	$ 198,831

	Fair value measurements at December 31, 2020			
	Level 1	Level 2	Level 3	Total
Assets				
Cash equivalents	$ 23,456	$ —	$ —	$ 23,456
Short-term investments	14,998	—	—	14,998
	$ 38,454	$ —	$ —	$ 38,454
Liabilities				
Preferred stock warrant liability	$ —	$ —	$ 4,117	$ 4,117
	$ —	$ —	$ 4,117	$ 4,117

During the years ended December 31, 2021 and 2020, respectively, there were no transfers between Level 1, Level 2 and Level 3.

Valuation of short-term and long-term investments

U.S. Treasury bills and notes included in short-term and long-term investments were valued by the Company using quoted prices in active markets for identical securities, which represents a Level 1 measurement within the fair value hierarchy.

Valuation of preferred stock warrant liability

The warrant liability at December 31, 2020 was related to warrants (the "Warrants") to purchase shares of the Company's Series A1, B1, and C1 redeemable convertible preferred stock (see Note 11). The fair value of the warrant liability was determined based on inputs not observable in the market, which represents a Level 3 measurement within the fair value hierarchy.

The Company used the Black-Scholes option-pricing model, which incorporates assumptions and estimates, to value the warrant liability. Key estimates and assumptions impacting the fair value measurement include (i) the fair value per share of the underlying shares of applicable series of redeemable convertible preferred stock issuable upon exercise of the Warrants, (ii) the remaining contractual term of the Warrants, (iii) the risk-free interest rate, (iv) the expected dividend yield and (iv) expected volatility of the price of the underlying applicable series of redeemable convertible preferred stock. The Company estimated the fair value per share of the underlying applicable series of redeemable convertible preferred stock based, in part, on the results of third-party valuations and additional factors deemed relevant. The risk-free interest rate was determined by reference to the U.S. Treasury yield curve for time periods approximately equal to the remaining contractual term of the Warrant. The Company estimated a zero expected dividend yield based on the fact that the Company has never paid or declared dividends and does not intend to do so in the foreseeable future. As the Company has historically been a private company and lacks company-specific historical and implied volatility information of its stock, the expected stock volatility was based on the historical volatility of publicly traded peer companies for a term equal to the remaining contractual term of the Warrant.

In connection with the IPO, all of the Company's outstanding preferred stock warrants were automatically converted to Class A common stock warrants. The Company performed a final fair value assessment of these warrants as of the date of its IPO which resulted in a charge of $8.2 million that was recorded within other income (expense) in the Company's consolidated statement of operations. The Company determined the conversion to Class A common stock warrants resulted in equity classification of the Class A common stock warrants and reclassified the fair value of the preferred stock warrant liability as of the IPO date into stockholders' equity (see Note 12).

The table below quantifies the weighted average of the unobservable inputs used to fair value the preferred stock warrant liability prior to their conversion into common stock warrants in connection with the Company's IPO in July 2021:

	Year Ended December 31,	
	2021	2020
Fair value of Series A1 preferred stock	$ 3.01	$ 0.50
Fair value of Series B1 preferred stock	$ 3.26	$ 1.26
Fair value of Series C1 preferred stock	$ 3.30	$ 1.23
Remaining contractual term (in years)	6.8	7.3
Risk-free interest rate	1.2 %	0.6 %
Expected dividend yield	— %	— %
Expected volatility	42.0 %	40.0 %

The following table provides a rollforward of the aggregate fair values of the Company's preferred stock warrant liability, for which fair values are determined using Level 3 inputs (in thousands):

	Year Ended December 31,	
	2021	2020
Balance, beginning of period	$ 4,117	$ 3,396
Initial fair value of Series C1 preferred stock warrants	—	652
Change in fair value of preferred stock warrants	19,643	69
Conversion of preferred stock warrants to common stock warrants	(23,760)	—
Balance, end of period	$ —	$ 4,117

Valuation of derivative liability

The derivative liability was related to the conversion option included within the Unsecured Subordinated Convertible Promissory Notes ("Convertible Notes") issued in February 2020 (see Note 9). The Convertible Notes provided a conversion option whereby upon the closing of a specified financing event the Convertible Notes would automatically convert into shares of the same class and series of capital stock of the Company issued to other investors in the financing at a conversion price equal to 80% of the price per share of the securities paid by the other investors. This conversion option was determined to be an embedded derivative required to be bifurcated and

accounted for separately from the notes. The fair value of the derivative liability was determined based on inputs not observable in the market, which represents a Level 3 measurement within the fair value hierarchy.

Upon the closing of the sale of the Convertible Notes, management determined that the probability of completing the specified financing event was 100%; thus, the value of the automatic conversion option was determined to be 20% of the fair value of the capital stock to be issued upon conversion of the Convertible Notes, or $2.4 million. This amount represented the fair value of the embedded derivative at issuance (see Note 9).

Upon the occurrence of the specified financing event in April 2020, the Convertible Notes were converted into 10,351,063 shares of Series C1 Preferred Stock, as defined (see Note 9), and the derivative liability of $2.4 million was extinguished.

4. Investments

Short-term and long-term investments by investment type consisted of the following (in thousands):

	December 31, 2021			
	Amortized cost	Gross unrealized gains	Gross unrealized losses	Fair value
Short-term investments				
U.S. Government Treasury Bill	$ 4,983	$ —	$ (2)	$ 4,981
U.S. Government Treasury Notes	10,142		(13)	10,129
	$ 15,125	$ —	$ (15)	$ 15,110
Long-term Investments				
U.S. Government Treasury Notes - Maturity One - Five Years	9,966	—	—	9,966
	$ 9,966	$ —	$ —	$ 9,966

	December 31, 2020			
Short-term investments	Amortized cost	Gross unrealized gains	Gross unrealized losses	Fair value
U.S. Treasury bonds	$ 14,997	$ 1	$ —	$ 14,998
	$ 14,997	$ 1	$ —	$ 14,998

5. Inventory

Inventory consisted of the following (in thousands):

	December 31, 2021	December 31, 2020
Raw materials	$ 10,135	$ 6,754
Work in process	1,235	1,190
Finished goods	4,301	1,021
Total	$ 15,671	$ 8,965

Raw materials, work in process and finished goods were net of adjustments to net realizable value of $1.2 million and $1.0 million, as of December 31, 2021 and 2020, respectively.

6. Prepaid expenses and other current assets

Prepaid expenses and other current assets consisted of the following (in thousands):

	December 31, 2021	December 31, 2020
Prepaid insurance	$ 1,622	$ 355
Prepaid commitment fee on notes payable	—	275
Contract asset	396	471
Deposits	1,262	1,148
Lease receivables, current portion	231	325
Other	440	546
	$ 3,951	$ 3,120

7. Property and equipment, net

Property and equipment, net consisted of the following (in thousands):

	December 31, 2021	December 31, 2020
Manufacturing and laboratory equipment	$ 13,277	$ 12,961
Computer hardware and software	1,742	1,088
Office furniture and fixtures	745	343
Leasehold improvements	3,012	2,996
Construction-in-process	4,313	—
	23,089	17,388
Less: Accumulated depreciation	(11,785)	(10,336)
	$ 11,304	$ 7,052

Depreciation and amortization expense related to property and equipment was $1.5 million for the years ended December 31, 2021 and 2020. Amortization expense related to long-term assets was less than $0.1 million and zero for the years ended December 31, 2021 and 2020, respectively. The Company had less than $0.1 million of assets disposed of during the years ended December 31, 2021 and 2020.

As of December 31, 2021 and 2020, the Company's office furniture and fixtures shown in the above table included assets under a capital lease in the amount of $0.4 million and zero, respectively, and accumulated depreciation of less than $0.1 million and zero as of December 31, 2021 and 2020, respectively. As of December 31, 2021, future minimum lease payments under the capital lease were $0.6 million, with $0.2 million representing interest. The capital lease obligation is recorded in other long-term liabilities within the consolidated balance sheet.

8. Accrued expenses and other current liabilities

Accrued expenses and other current liabilities consisted of the following (in thousands):

	December 31, 2021	December 31, 2020
Accrued employee compensation and benefits expense	$ 3,569	$ 3,083
Accrued vendor expenses	5,500	1,685
Accrued warranty expense	598	637
Accrued interest	—	330
Deferred rent, current portion	131	118
Accrued taxes	781	688
Other	338	113
	$ 10,917	$ 6,654

9. Long-term debt

The components of the Company's long-term debt consisted of the following (in thousands):

	December 31, 2021	December 31, 2020
Notes payable	$ —	$ 25,000
Payment in kind interest	—	1,145
Less: Unamortized discount	—	(1,335)
Long-term debt, net of discount	$ —	$ 24,810

Term loan agreements

2018 Term Loan

In April 2018, the Company entered into an $18.0 million term loan with a lender (the "2018 Term Loan")

The Company repaid the 2018 Term Loan in full in May 2020 using the proceeds from the 2020 Term Loan as discussed below. The Company paid $19.4 million to extinguish the outstanding principal and accrued interest owed, including the non-refundable end-of-term exit fee of $1.3 million (out of which $0.6 million was accrued for in prior years as interest expense) and an early termination fee of $0.1 million.

The loss on extinguishment of debt was $0.8 million which included the write-off of unamortized financing and end-of-term exit fee costs of $0.7 million and $0.1 million in early payment and documentation fees and was included as a component of other income (expense) in the consolidated statements of operations during the year ended December 31, 2020. Interest expense on the 2018 Term Loan totaled $0.9 million for year ended December 31, 2020, which includes amortization of the debt discount $0.2 million.

2020 Term Loan

In May 2020, the Company entered into a $60.0 million term loan facility with a new lender (the "2020 Term Loan"), which provided for borrowings of an initial $25.0 million tranche upon closing and options to borrow up to an aggregate of $35.0 million in two additional tranches of $20.0 million under the second tranche (the "Term B Loan") and $15.0 million under the third tranche (the "Term C Loan").

At closing, the Company issued warrants to purchase 1,195,652 shares of Series C1 Preferred Stock to the lender with an exercise price of $1.15 per share which were accounted for as debt discount. The Company paid a $0.8 million facility fee in connection with the term loan facility. The Company allocated the $0.8 million term loan facility fee on a pro-rata basis based on the amount available to be drawn down under each tranche. The Company allocated $0.3 million to the initial draw which was recorded within debt issuance cost as an offset to the carrying value of the 2020 Term Loan and amortized over the term of the loan within interest expense on the consolidated statement of operations. Additionally, the Company allocated $0.3 million to Term B Loan and $0.2 million to Term C Loan and recorded within prepaid expenses and other current assets on the consolidated balance sheet and amortized on a straight-line basis over the debt access period within interest expense on the consolidated statement of operations.

The Company incurred debt issuance costs of $1.5 million in connection with the 2020 Term Loan including $0.9 million of professional fees and $0.6 million for the fair value of warrants issued with the debt.

In September 2021, the Company repaid the 2020 Term Loan and incurred a debt extinguishment loss of $3.1 million, which was comprised of a $1.8 million prepayment penalty, $1.1 million expense related to unamortized discounts, and $0.2 million in unamortized prepaid facility fees and other charges. As of December 31, 2021, the Company had no outstanding balance on the 2020 Term Loan.

Interest expense on the 2020 Term Loan totaled $2.5 million and $2.2 million for the year ended December 31, 2021 and 2020, respectively. As of December 31, 2020, the unamortized debt discount was $1.3 million. Accrued interest on the 2020 Term Loan totaled zero and $0.3 million at December 31, 2021 and 2020, respectively, which is included in accrued expenses and other current liabilities in consolidated balance sheets.

Convertible Notes

In February 2020, the Company issued Convertible Notes to several investors in the aggregate amount of $9.5 million with a stated interest rate of 1.5% per annum and a maturity date of February 28, 2021. The Convertible Notes provided a conversion option whereby upon the closing of a financing event, in which the aggregate gross proceeds of the issuance of preferred stock totaled at least $20.0 million, the notes would automatically convert into shares of the same class and series of capital stock of the Company issued to other investors in the financing at a conversion price equal to 80% of the price per share paid by the other investors. The conversion option met the definition of an embedded derivative and was required to be bifurcated and accounted for separately from the notes. The proceeds from the Convertible Notes were allocated between the derivative liability, with a fair value at issuance of $2.4 million, and the notes, with an initial carrying value of $7.1 million, included in long-term liabilities on the Company's consolidated balance sheets. The difference between the initial carrying value of the notes and the stated value of the notes represented a discount and that was accreted to interest expense over the term of the Convertible Notes using the effective interest method.

In April 2020, the Convertible Notes, including outstanding principal and accrued interest totaling $9.5 million, were automatically converted into 10,351,063 shares of Series C1 Preferred Stock. Upon conversion, the remaining unamortized discount was recognized as loss on extinguishment of debt in the consolidated statement of operations.

Interest expense on the Convertible Notes totaled $0.4 million for the year ended December 31, 2020, which includes amortization of the debt discount of $0.3 million.

10. Redeemable convertible preferred stock

The Company has issued Series A1 redeemable convertible preferred stock (the "Series A1 Preferred Stock"), Series B1 redeemable convertible preferred stock (the "Series B1 Preferred Stock"), Series C1 redeemable convertible preferred stock (the "Series C1 Preferred Stock"), and Series C2 redeemable convertible preferred stock (the "Series C2 Preferred Stock"), Series D1 redeemable convertible preferred stock (the "Series D1 Preferred Stock") and Series D2 redeemable convertible preferred stock (the "Series D2 Preferred Stock"). The Series A1 Preferred Stock, Series B1 Preferred Stock, Series C1 Preferred Stock, Series C2 Preferred Stock, Series D1 Preferred Stock, and Series D2 Preferred Stock are collectively referred to as the "Preferred Stock".

In April 2020, the Company sold and issued 23,611,208 shares of Series C1 Preferred Stock and 20,301,829 shares of Series C2 Preferred Stock to new and existing investors at a price of $1.15 per share for gross proceeds of $27.2 million and $23.3 million, respectively. Additionally, the Company's Convertible Notes, including outstanding principal and accrued interest totaling $9.5 million (see Note 9), were automatically converted into 10,351,063 shares of Series C1 Preferred Stock. The Company incurred issuance costs in connection with this transaction of $0.6 million and recorded them as a reduction to the carrying value of the Series C1 Preferred Stock and Series C2 Preferred Stock.

In March 2021, the Company sold and issued 22,086,725 shares of Series D1 Preferred Stock and 413,268 shares of Series D2 Preferred Stock to new and existing investors at a price of $3.60 per share for gross proceeds of $79.5 million and $1.5 million, respectively. The Company incurred issuance costs in connection with this transaction of $1.3 million and recorded them as a reduction to the carrying value of the Series D1 Preferred Stock and Series D2 Preferred Stock.

In June 2021, the Series C1 and D1 investors exchanged a total of 11,437,301 shares and 2,364,509 shares of Series C1 and D1 Preferred Stock to an equal number of shares of Series C2 and D2 Preferred Stock, respectively.

In July 2021, the IPO resulted in the automatic conversion Series A1, Series B1, Series C1 and Series D1 preferred stock to 24,200,920 shares of Class A common stock and Series C2 and Series D2 converted into 6,903,379 shares of Class B common stock. On July 19, 2021, the Company restated its certificate of incorporation and authorized 10,000,000 shares of $0.01 par value Preferred Stock. As of December 31, 2021, there was no Preferred Stock outstanding.

As of December 31, 2020, the Preferred Stock consisted of the following (in thousands, except for share data):

	December 31, 2020				
	Preferred stock authorized	Preferred stock issued and outstanding	Carrying value	Liquidation preference	Common stock issuable upon conversion
Series A1 Preferred Stock	22,563,639	18,740,115	$ 18,542	$ 21,176	3,748,022
Series B1 Preferred Stock	61,217,425	60,017,425	68,511	90,026	12,003,474
Series C1 Preferred Stock	57,372,796	33,962,271	40,632	58,585	6,792,445
Series C2 Preferred Stock	20,301,829	20,301,829	24,141	35,021	4,060,365
	161,455,689	133,021,640	$ 151,826	$ 204,808	26,604,306

Prior to the conversion of the Preferred Stock upon closing of the IPO, the holders of the Preferred Stock had the following rights and preferences:

Voting

The holders of the Preferred Stock, except for Series C2 Preferred Stock and Series D2 Preferred Stock which are non-voting shares, are entitled to vote, together with the holders of Class A common stock voting as a single class, on all matters submitted to the stockholders for a vote. Each holder of Preferred Stock, except for Series C2 Preferred Stock and Series D2 Preferred Stock which are non-voting shares, is entitled to the number of votes equal to the number of shares of Class A common stock into which each share of Preferred Stock is convertible as of the record date for determining stockholders entitled to vote on such matter.

Conversion

Each share Preferred Stock, except for the Series C2 Preferred Stock and Series D2 Preferred Stock, is convertible into shares of Class A common stock at the option of the holder at any time after the date of issuance and without the payment of additional consideration by the holder. Each share of the Series C1/D1 Preferred Stock shall be convertible, at the option of the holder thereof, at any time after the date of issuance, into an equal number of shares of Class B common stock; provided, that, after conversion, each initial holder of Series C2/D2 Preferred Stock would represent less than ten percent of the combined voting power of the Company's outstanding voting securities. Each share of the Preferred Stock will be mandatorily converted upon the closing of a firm commitment underwritten public offering of the Company's common stock with gross proceeds to the Company of at least $30.0 million and at a price per share of not less than $3.00.

Notwithstanding the previous provision, no shares of Series C2 Preferred Stock or Series D2 Preferred stock shall automatically convert into any other class of capital stock of the Company unless and until the Company has authorized a sufficient number of shares of non-voting common stock to support the conversion of all such shares of Series C2/D2 Preferred stock into non-voting common stock. Upon the sale, assignment, transfer or other disposition of any shares of Series C2/D2 Preferred Stock to a person or entity other than the initial holder of the Series C2/D2 Preferred stock, each such outstanding share of Series C2/D2 Preferred shall be automatically converted into one fully paid and non-assessable share of Series C2 or Series D2 Preferred Stock. Upon the occurrence of a Restriction Removal Event, defined as the holder of Series C2/D2 Preferred stock and the Company submitting a specified U.S. governmental body a notice or declaration concerning the proposed conversion and the governmental body takes no issue or the initial holder of the Series C2/D2 Preferred stock and the Company agree that such filing to with such governmental body is not

necessary, each share of Series C2/D2 Preferred Stock then outstanding shall be automatically converted into one fully paid and non-assessable share of Series C1/D1 Preferred stock.

The conversion ratio of each series of Preferred Stock is determined by dividing the Original Issue Price of each series by the Conversion Price of each series. The Original Issue Price per share is $1.00 for Series A1 Preferred Stock, $1.00 for Series B1 Preferred Stock, $1.15 for Series C1 Preferred Stock, $1.15 for Series C2 Preferred Stock, $3.60 for Series D1 Preferred Stock and $3.60 for Series D2 Preferred Stock. The Conversion Price per share is $5.00 for Series A1 Preferred Stock, $5.00 for Series B1 Preferred Stock, $5.75 for Series C1 Preferred Stock, $5.75 for Series C2 Preferred Stock $18.00 for Series D1 Preferred Stock and $18.00 for Series D2 Preferred Stock, each subject to appropriate adjustment in the event of any stock split, stock dividend, combination or other similar recapitalization and other adjustments as set forth in the Company's certificate of incorporation, as amended and restated.

Dividends

From and after the date of issuance, each share of Series A1 Preferred Stock accrues a dividend at the rate of $0.04 per annum. The dividends accrue ratably on a quarterly basis, whether or not declared. The Preferred Stock accruing dividends shall be payable only when, as, and if declared by the Board of Directors and the Company shall be under no obligation to pay such Preferred Stock accruing dividends.

From and after the date of issuance, each share of Series B1 Preferred Stock accrues a dividend at the rate of $0.04 per annum. If the Series B1 Preferred Stock is not redeemed on any of the three eligible annual installments, per the redemption rights, the rate the dividend accrues is increased to $0.10 per share per annum. The dividends accrue ratably on a quarterly basis, whether or not declared. The Preferred Stock accruing dividends shall be payable only when, as, and if declared by the Board of Directors and the Company shall be under no obligation to pay such Preferred Stock accruing dividends.

From and after the date of issuance, each share of Series C1 and Series C2 Preferred Stock accrues a dividend at the rate of $0.046 per annum. If the Series C1 Preferred Stock is not redeemed on any of the three eligible annual installments, per the redemption rights, the rate the dividend accrues is increased to $0.115 per share per annum. The dividends accrue ratably on a quarterly basis, whether or not declared. The Preferred Stock accruing dividends shall be payable only when, as, and if declared by the Board of Directors and the Company shall be under no obligation to pay such Preferred Stock accruing dividends.

The holders of any Series C1 Preferred Stock, Series C2 Preferred Stock and Series B1 Preferred Stock shall be entitled to be paid, on an equal basis, the amount due for any accrued dividends before any payment shall be made to the holders of Series A1 Preferred Stock.

The holders of the Series D1 Preferred Stock and Series D2 Preferred Stock are not entitled to accruing dividends.

Through the conversion of the Preferred Stock upon closing of the IPO, no dividends have been declared on any series or class of stock.

Liquidation

In the event of any voluntary or involuntary liquidation, dissolution or winding up of the Company, the holders of Series D1 Preferred Stock, Series D2 Preferred Stock, Series C1 Preferred Stock, Series C2 Preferred Stock and Series B1 Preferred Stock then outstanding shall be entitled to be paid out of the assets of the Company available for distribution to its stockholders, and before any payment shall be made to the holders of Series A1 Preferred Stock or common stock or any other class or series of capital stock ranking on liquidation junior to the Series D1 Preferred Stock, Series D2 Preferred Stock, Series C1 Preferred Stock, Series C2 Preferred Stock and Series B1 Preferred Stock by reason of their ownership thereof, an amount equal to the greater of (i) $3.60 per share for Series D1 Preferred Stock and Series D2 Preferred Stock, $1.725 per share for Series C1 Preferred Stock and Series C2 Preferred Stock and $1.50 per share for Series B1 Preferred Stock, all subject to appropriate adjustment in the event of any stock dividend, stock split,

combination or other similar recapitalization with respect to the applicable series of Preferred Stock, and (ii) the sum of (x) the Original Issue Price of the applicable series of Preferred Stock, (y) any accruing dividends accrued but unpaid on the applicable series of Preferred Stock, and (z) any other dividends declared but unpaid on the applicable series of Preferred Stock (the greater of clauses (i) and (ii) for the Series C1 Preferred Stock and Series C2 Preferred Stock, the "Series C Liquidation Preference" and the greater of clauses (i) and (ii) for the Series B1 Preferred Stock, the "Series B1 Liquidation Preference"). If upon any such liquidation, dissolution or winding up of the Company, the assets of the Company available for distribution to its stockholders shall be insufficient to pay the holders of shares of Series D1 Preferred Stock, Series D2 Preferred Stock, Series C1 Preferred Stock, Series C2 Preferred Stock and Series B1 Preferred Stock the full amount to which they shall be entitled, the holders of shares of Series D1 Preferred Stock, Series D2 Preferred Stock, Series C1 Preferred Stock, Series C2 Preferred Stock and Series B1 Preferred Stock shall share ratably in any distribution of the assets available for distribution in proportion to the respective amounts which would otherwise be payable in respect of the shares held by them upon such distribution if all amounts payable on or with respect to such shares were paid in full.

Following the aforementioned payments to the holders of Series D1 Preferred Stock, Series D2 Preferred Stock, Series C1 Preferred Stock, Series C2 Preferred Stock and Series B1 Preferred Stock, and before any payment shall be made to the holders of common stock by reason of their ownership thereof, the holders of Series A1 Preferred Stock then outstanding shall be entitled to be paid out of the assets of the Company available for distribution to its stockholders an amount equal to the sum of (x) $1.00 per share, subject to appropriate adjustment in the event of any stock dividend, stock split, combination or other similar recapitalization with respect to the Series A1 Preferred Stock, (y) any accruing dividends accrued but unpaid on the shares of Series A1 Preferred Stock, and (z) any other dividends declared but unpaid on the Series A1 Preferred Stock (the "Series A1 Liquidation Preference" and, together with the Series B1 Liquidation Preference and Series C Liquidation Preference, the "Liquidation Preferences"). If upon any such liquidation, dissolution or winding up of the Company, the assets of the Company available for distribution to its stockholders shall be insufficient to pay the holders of shares of Series A1 Preferred Stock the full amount to which they shall be entitled, the holders of shares of Series A1 Preferred Stock shall share ratably in any distribution of the assets available for distribution in proportion to the respective amounts which would otherwise be payable in respect of the shares held by them upon such distribution if all amounts payable on or with respect to such shares were paid in full.

After the payment of the applicable Liquidation Preferences to the holders of Preferred Stock, the assets of the Company available for the distribution to it stockholders shall be distributed among such holders in the following order: (1) the Series A1 Preferred Stock and common stock, pro rata based on the number of shares held by each such holder, on an as-converted basis, until the holders of shares of Series A1 Preferred Stock have received an aggregate per share amount in respect of the Series A1 Preferred Stock equal to the Series B1 Liquidation Preference;(2) among the holders of the Series B1 Preferred Stock, Series A1 Preferred Stock and common stock, pro rata based on the number of shares held by each such holder, on an as-converted basis, until the holders of shares of Series B1 Preferred Stock have received an aggregate per share amount in respect of the Series B1 Preferred Stock equal to the Series C Liquidation Preference; (3) among the holders of the Series C1, Series B1 Preferred Stock, Series A1 Preferred Stock and common stock, pro rata based on the number of shares held by each such holder, on an as-converted basis, until the holders of shares of Series C1 Preferred Stock have received an aggregate per share amount in respect of the Series C1 Preferred Stock equal to the Series D Liquidation Preference; and (4) among the holders of the Series D1 Preferred Stock, Series D2 Preferred Stock, Series C1 Preferred Stock, Series C2 Preferred Stock, Series B1 Preferred Stock, Series A1 Preferred Stock and common stock, pro rata based on the number of shares held by each such holder, on an as-converted basis.

Redemption

Unless otherwise prohibited by Delaware law governing distribution to stockholders, shares of Preferred Stock shall be redeemed by the Company at a price equal to the Liquidation Preference applicable to each series of Preferred Stock in three annual installments commencing not more than 60 days after the receipt by the Company of written notice, at any time on or after the fifth anniversary of the Series D1 original issue date, from the requisite holders, requesting redemption of all shares of Preferred Stock. The Preferred Stock shall be redeemed in the following amounts: one-third of the amount payable based on the Liquidation Preference shall be redeemed on the first installment, 50% of the aggregate amount of the amount unpaid calculated as of the second installment, and the remaining amount due on the

third installment. On each installment, holders of Series D1 Preferred Stock, Series D2 Preferred Stock, Series C1 Preferred Stock, Series C2 Preferred Stock and Series B1 Preferred Stock shall receive the amounts due based on the respective Liquidation Preferences per share before any payment is made to the holders of Series A1 Preferred Stock.

The Company entered into an agreement with a holder of Series B1 Preferred Stock that includes a special redemption right in the event the Company breaches specified conditions set forth in the agreement, including covenants around specified business activities the Company may participate in, specified business activity ratios and financial ratios related to investments and indebtedness. If the Company breaches the terms of the agreement, and does not cure such breach by the date that is one year following written notice of such breach, such holder of Series B1 Preferred Stock shall have the right to redeem all shares of Preferred Stock outstanding and held by such holder at a price equal to two times the applicable original issue price, plus any applicable dividends accrued but unpaid on such shares of Preferred Stock, plus any other dividends declared but unpaid on such shares of Preferred Stock. In such event, shares of Preferred Stock shall be redeemed by the Company in three annual installments commencing not more than 60 days after the receipt by the Company of written notice, at any time on or after the fifth anniversary of the special redemption date. In the event such holder of Series B1 Preferred Stock requests such special redemption, all other holders of Preferred Stock may elect to participate in such special redemption alongside the holders of Series B1 Preferred Stock. If any holder of Preferred Stock elects not to participate in the special redemption, their shares shall not be redeemed in accordance with the special redemption.

11. Preferred stock warrants

In connection with the 2020 Term Loan, the Company issued 1,195,652 warrants to purchase shares of Series C1 Preferred Stock at an exercise price of $1.15 per share. The Company's warrants were immediately exercisable and expire 10 years after issuance. The fair value of the warrants on the issuance date was $0.7 million. Prior to the IPO, the Company also had outstanding warrants to purchase shares of Preferred Stock issued in connection with previous financing agreements.

In connection with the IPO, all outstanding preferred stock warrants were automatically converted to Class A common stock warrants. The Company determined the event resulted in equity classification of the Class A common stock warrants and reclassified the fair value of the preferred stock warrant liability as of the IPO date into stockholders' equity (deficit).

As of December 31, 2020, warrants to purchase the following classes of preferred stock outstanding consisted of the following (in thousands, except for share and per share data):

	December 31, 2020					
Issuance date	Contractual term (in years)	Series of redeemable convertible preferred stock	Balance sheet classification	Preferred shares issuable upon exercise of warrant	Weighted average exercise price	Warrant fair value
April 24, 2017	10	Series A1	Liability	3,823,524	$ 0.01	$ 1,875
April 12, 2018	10	Series B1	Liability	1,199,994	$ 0.01	1,501
May 14, 2020	10	Series C1	Liability	1,195,652	$ 1.15	741
				6,219,170		$ 4,117

12. Common stock and common stock warrants

On June 25, 2021, the Company filed an amended and restated certificate of incorporation, which effected a recapitalization of the Company's then outstanding common stock to Class A common stock and authorized an additional new class of common stock (Class B common stock).

Each share of Class A common stock entitles the holder to one vote on all matters submitted to a vote of the Company's stockholders. The Company's Class B common stock is non-voting. Class A and Class B common stockholders are entitled to receive dividends, as may be declared by the board of directors, if any, subject to the preferential dividend rights of Preferred Stock. As of December 31, 2021 and December 31, 2020, no cash dividends had been declared or paid.

As of December 31, 2021 and 2020, the Company's amended certificate of incorporation authorized the issuance of 210,000,000 shares and 35,000,000 shares, respectively, of $0.01 par value Class A common stock.

As of December 31, 2021, the Company had reserved 20,028,342 shares of common stock for the exercise of outstanding stock options, the number of shares remaining available for grant under the Company's 2021 Incentive Award Plan (see Note 13), the number of shares available for purchase under the Company's Employee Stock Purchase Plan (see Note 13), shares of common stock for the exercise of outstanding common stock warrants and the conversion of Class B common stock.

As of December 31, 2020, the Company had reserved 32,574,029 shares of common stock for the conversion of the outstanding Preferred Stock, exercise of outstanding stock options, the number of shares remaining available for grant under the Company's 2010 Stock Incentive Plan (see Note 13) and the exercise of outstanding warrants to purchase shares of preferred stock (see Note 11) and Class A common stock.

In prior years the Company issued warrants to purchase common stock in conjunction with previous financing arrangements. In connection with the IPO, preferred stock warrants were automatically converted to Class A common stock warrants. The contractual term of the converted Class A common stock warrants remained consistent with the original term of the preferred stock warrants. The Company determined the event resulted in equity classification of the Class A common stock warrants and reclassified the fair value of the preferred stock warrant liability as of the IPO date into equity.

As of December 31, 2021 and 2020, warrants to purchase the Class A common stock outstanding consisted of the following (in thousands, except for share and per share data)

	December 31, 2021			
Issuance date	Contractual term (in years)	Balance sheet classification	Shares of common stock issuable upon exercise of warrant	Weighted average exercise price
July 24, 2017	10	Equity	25,835	$ 295.15
April 12, 2018	10	Equity	30,000	$ 1.00
July 14, 2021	10	Equity	975,109	$ 1.46
			1,030,944	

	December 31, 2020			
Issuance date	Contractual term (in years)	Balance sheet classification	Shares of common stock issuable upon exercise of warrant	Weighted average exercise price
July 24, 2017	10	Equity	25,835	$ 295.15
April 12, 2018	10	Equity	30,000	$ 1.00
			55,835	

13. Stock-based compensation

2010 stock option and grant plan

The Company's 2010 Stock Option and Grant Plan (the "2010 Plan") provides for the Company to grant incentive stock options or nonqualified stock options, restricted stock awards and other stock-based awards to employees, officers, directors and consultants of the Company.

In March 2021, the Board of Directors approved an increase to the 2010 Plan shares by 382,889 shares. Following the effectiveness of the IPO, no additional awards are being granted under the 2010 Plan and shares of existing outstanding options that are forfeited or cancelled will be available for grant under the 2021 Incentive Award Plan.

2021 Incentive Award Plan

In July 2021, the Board of Directors adopted, and the Company's stockholders approved, the 2021 Incentive Award Plan (the "2021 Plan"), which became effective in connection with the IPO of Class A common stock. The 2021 Plan provides for the grant of stock options, including incentive stock options and non-qualified stock options, stock appreciation rights, restricted stock, restricted stock units, and other stock-based and cash-based awards. The 2021 Plan has a term of ten years. The aggregate number of shares of Class A common stock available for issuance under the 2021 Plan is equal to (i) 4,200,000 shares; (ii) any shares which are subject to the 2010 Plan awards that become available for issuance under the 2021 Plan; and (iii) an annual increase for ten years on the first day of each calendar year beginning on January 1, 2022, equal to the lesser of (A) 5% of the aggregate number of shares of Class A common stock outstanding on the last day of the immediately preceding calendar year and (B) such smaller amount of shares as determined by the Board of Directors. No more than 33,900,000 shares of Class A common stock may be issued under the 2021 Plan upon the exercise of incentive stock options. As of December 31, 2021, there are 3,774,298 shares available for issuance under the 2021 Plan.

The 2021 Plan is administered by the Board of Directors or, at the discretion of the Board of Directors, by a committee of the board of directors. The exercise prices, vesting and other restrictions are determined at the discretion of the Board of Directors, or its committee or management if so delegated, except that the exercise price per share of stock options may not be less than 100% of the fair market value of a share of common stock on the date of grant and the term of the stock option may not be greater than ten years. Stock options granted to employees, officers, and consultants typically vest over a four-year period, and stock options granted to members of the Board of directors typically vest over a three-year period.

During the years ended December 31, 2021 and 2020, the Company granted to employees, officers and directors options to purchase 2,011,479 shares and 1,347,000 shares, respectively, of common stock. The Company recorded stock-based compensation expense for options granted to employees, officers, and directors of $1.8 million and $0.5 million during the years ended December 31, 2021 and 2020.

The following table presents, on a weighted average basis, the assumptions used in the Black-Scholes option- pricing model to determine the grant-date fair value of stock options granted to employees and directors:

	Year Ended December 31,	
	2021	2020
Risk-free interest rate	1.02 %	0.36 %
Expected term (in years)	6.0	6.0
Expected volatility	44.4 %	42.4 %
Expected dividend yield	0 %	0 %

Stock options

The following table summarizes the Company's stock option activity since December 31, 2020 (in thousands, except for share and per share data):

	Number of shares	Weighted average exercise price	Weighted average remaining contractual term (in years)	Aggregate intrinsic value
Outstanding as of December 31, 2020	3,604,584	$ 0.91	8.12	$ 4,272
Granted	2,011,479	11.38		
Exercised	(226,045)	1.80		
Expired	(36,195)	1.48		
Forfeited	(530,723)	2.75		
Outstanding as of December 31, 2021	4,823,100	$ 5.06	7.62	$ 31,041
Options vested and expected to vest as of December 31, 2021	4,823,100	$ 5.06	7.62	$ 31,041
Options exercisable as of December 31, 2021	2,210,701	$ 1.39	5.89	$ 20,705

The aggregate intrinsic value of options is calculated as the difference between the exercise price of the stock options and the fair value of the Company's common stock for those options that had exercise prices lower than the fair value of the Company's common stock.

The intrinsic value of stock options exercised during the years ended December 31, 2021 and 2020 was $1.6 million and zero, respectively.

The weighted average grant-date fair value per share of stock options granted during the year ended December 31, 2021 and 2020 was $4.89 and $0.55, respectively.

Restricted Stock

In February 2021, the Company granted 248,903 shares of restricted stock to an employee under the 2010 Plan with a four-year vesting term. In connection with the grant, the employee paid $0.5 million, which represents the $2.10 per share fair value of the common stock on the date of the restricted stock grant. The restricted common stock includes a repurchase right, whereas upon the occurrence of the employee's resignation or termination for cause or good reason the Company shall have the right to repurchase unvested restricted common stock shares. At December 31, 2021 and December 31, 2020, the Company has $0.5 million and zero in unvested restricted common stock liability included in other long-term liabilities, respectively.

The following table summarizes the Company's restricted stock activity since December 31, 2020 (in thousands except for share and per share data):

	Number of shares	Weighted average fair value (in years)
Unvested as of December 31, 2020	-	
Granted	248,903	$ 2.10
Vested	-	
Forfeited	-	
Unvested as of December 31, 2021	248,903	$ 2.10

Stock-based compensation

Stock-based compensation expense was classified in the consolidated statements of operations as follows (in thousands):

	Year Ended December 31,	
	2021	2020
Cost of revenue	$ 329	$ 47
General and administrative	1,025	378
Sales and marketing	346	58
Research and development	143	50
Total stock-based compensation expense	$ 1,843	$ 533

As of December 31, 2021, total unrecognized compensation expense related to unvested stock options held by employees and directors was $8.5 million, which is expected to be recognized over weighted average period of 1.4 years.

2021 Employee Stock Purchase Plan

In July 2021, the Board of Directors adopted, and the Company's stockholders approved, the 2021 Employee Stock Purchase Plan (the "2021 ESPP"), which became effective in connection with the IPO of Class A common stock. The aggregate number of shares of Class A common stock available for issuance under the 2021 ESPP is equal to (i) 400,000 shares and (ii) an annual increase for ten years on the first day of each calendar year beginning on January 1, 2022, equal to the lesser of (A) 1% of the aggregate number of shares of Class A common stock outstanding on the last day of the immediately preceding calendar year and (B) such smaller amount of shares as determined by the Board of Directors. No more than 6,300,000 shares of Class A common stock may be issued under the 2021 ESPP. As of December 30, 2021, no offering periods have been initiated.

14. Income taxes

The components of the Company's loss before income tax expense are as follows (in thousands):

	Year Ended December 31,	
	2021	2020
United States	$ (73,643)	$ (37,049)
Foreign	210	105
Loss before income tax provision	$ (73,433)	$ (36,944)

The components of income tax expense are as follows (in thousands):

	Year Ended December 31,	
	2021	2020
Current income tax provision:		
Federal	$ —	$ —
State	—	54
Foreign	91	80
Total current income tax provision	91	134
Deferred income tax benefit:		
Federal	17,099	(7,455)
State	2,923	(282)
Foreign	—	—
Total deferred income tax benefit	20,022	(7,737)
Change in deferred tax asset valuation allowance	(20,022)	7,737
Total provision for income taxes	$ 91	$ 134

During the years ended December 31, 2021 and 2020, the Company did not record income tax benefits for the net operating losses incurred or for the research and development tax credits generated in each year, due to its uncertainty of realizing a benefit from those items. The income tax provision was generated primarily from operations in Germany and Switzerland. A reconciliation of the U.S. federal statutory income tax rate to the Company's effective income tax rate is as follows:

	Year Ended December 31,	
	2021	2020
Federal statutory income tax rate	21.0 %	21.0 %
State income taxes, net of federal benefit	(3.1)	0.5
Federal and state research and development tax credits	0.5	0.9
Unrecognized tax benefits reserve and interest change	(0.1)	(0.2)
Change in valuation allowance	26.4	(20.8)
Permanent differences	(0.5)	(0.3)
Loss on extinguishment of debt	—	(1.2)
Section 382/383 limitation	(38.7)	—
Unrealized loss on value of warrants	(5.6)	(0.1)
Other	—	(0.2)
Effective income tax rate	(0.1)%	(0.4)%

Net deferred tax assets consisted of the following (in thousands):

	December 31, 2021	December 31, 2020
Deferred tax assets:		
Net loss carryforwards	$ 33,663	$ 52,624
Research and development tax credit carryforwards	3,605	5,425
Research and development capitalized costs	4,041	3,636
Inventory	196	148
Accrued expenses	1,076	644
Other	139	88
Total deferred tax assets	42,720	62,565
Deferred tax liabilities:		
Depreciation	(229)	(52)
Total deferred tax liabilities	(229)	(52)
Net deferred tax assets	42,491	62,513
Valuation allowance	(42,491)	(62,513)
Net deferred tax assets	$ —	$ —

As of December 31, 2021, the Company had U.S. federal and state net operating loss ("NOL") carryforwards of $137.5 million and $62.7 million, respectively, which may be available to offset future taxable income and begin to expire at various dates beginning in 2027 and 2032, respectively. Additionally, the Company had federal NOLs of $124.7 million generated since 2018 that will never expire. The Tax Cuts and Jobs Act (TCJA) enacted on December 22, 2017 limits a taxpayer's ability to utilize an NOL deduction in a year to 80% taxable income for federal NOL arising in tax years beginning after 2017. The Coronavirus Aid, Relief, and Economic Security (CARES) Act enacted on March 27, 2020 removes the 80% taxable income limitation for federal NOL deductions in taxable years before January 1, 2021.

As of December 31, 2021, the Company also had U.S. federal and state research and development tax credit carryforwards of $1.1 million and $2.1 million, respectively, which may be available to offset future tax liabilities and begin to expire in 2038 and 2024, respectively.

Utilization of the U.S. federal and state NOL carryforwards and research and development tax credit carryforwards may be subject to a substantial annual limitation under Sections 382 and 383 of the Internal Revenue Code of 1986, and

corresponding provisions of state law, due to ownership changes that have occurred previously or that could occur in the future. These ownership changes may limit the amount of carryforwards that can be utilized annually to offset future taxable income or tax liabilities. In general, an ownership change, as defined by Section 382, results from transactions increasing the ownership of certain stockholders or public groups in the stock of a corporation by more than 50% over a three-year period. The Company is in the process of performing a Section 382 study to assess whether a change of control has occurred or whether there have been multiple changes of control. These ownership changes are expected to materially limit the net operating loss carryforwards and research and development tax credits available to offset future tax liabilities. Approximately $121.5 million of federal net operating loss carryforwards, $58.4 million of state net operating loss carryforwards, and $2.4 million of federal research and development tax credits are expected to expire unutilized from these ownership changes. These estimated expirations and unutilized net operating loss carryforwards and research and development tax credits have been reflected in the amounts of net operating loss carryforwards, research and development tax credits, and deferred tax assets disclosed above. The Company expects to finalize the Section 382 studies during 2022.

The Company has evaluated the positive and negative evidence bearing upon its ability to realize the deferred tax assets. The Company considered its history of cumulative net operating losses incurred since inception and has concluded that it is more likely than not that the Company will not realize the benefits of the deferred tax assets. Accordingly, a full valuation allowance has been established against the net deferred tax assets as of December 31, 2021 and 2020. The Company reevaluates the positive and negative evidence at each reporting period.

Changes in the valuation allowance for deferred tax assets relates primarily to the decrease in NOL carryforwards and research and development tax credit carryforwards and were as follows (in thousands):

	December 31, 2021	December 31, 2020
Valuation allowance as of beginning of year	$ 62,513	$ 54,776
Increases recorded to income tax provision	13,067	8,802
Decreases recorded as a benefit to income tax provision	(33,089)	(1,065)
Valuation allowance as of end of year	$ 42,491	$ 62,513

A reconciliation of the beginning and ending amount of unrecognized tax benefits is as follows (in thousands):

	December 31, 2021	December 31, 2020
Unrecognized tax benefits as of beginning of year	$ 569	$ 532
Additions for tax positions of prior years	54	37
Reductions for tax positions of prior years	—	—
Unrecognized tax benefits as of end of year	$ 623	$ 569

The Company recognizes interest and penalties related to unrecognized tax benefits in U.S. Federal, state, and foreign income tax expense. For the each of years ended December 31, 2021, and 2020, the Company recognized less than $0.1 million in interest and penalties. The Company had approximately $0.1 million of interest and penalties accrued as of both December 31, 2021 and 2020.

The Company files U.S. income tax returns as prescribed by the tax laws of the jurisdictions in which it operates. In the normal course of business, the Company is subject to examination by federal and state jurisdictions, where applicable. There are currently no pending tax examinations in the U.S. The Company has not received notice of examination by any jurisdictions in the U.S.

The Company has a branch in Germany that is under examination in its local country for the years ended December 31, 2016 through the year ended December 31, 2018. Any adjustments that may result from the examinations are not expected to have a material impact on the financial position, liquidity, or results of operations of the Company.

15. Net loss per share

Net loss per share attributable to the common stockholders

As of December 31, 2021, the Company has Class A common stock and Class B common stock outstanding. According to the Company's restated certificate of incorporation, both classes have the same rights to the Company's earnings and neither of the shares have any prior or senior rights to dividends to other shares.

The Company reported net loss attributable to common stockholders for the year ended December 31, 2021 and 2020, as such basic net loss per share attributable to common stockholders was the same as diluted net loss per share attributable to common stockholders. Basic and diluted net loss per share attributable to common stockholders was calculated as follow (in thousands, except share and per share amounts):

	Year Ended December 31,	
	2021	2020
Numerator:		
Net loss	$ (73,524)	$ (37,078)
Accretion of redeemable convertible preferred stock to redemption value	(1,761)	(3,745)
Cumulative redeemable convertible preferred stock dividends	(2,747)	(4,398)
Net loss attributable to common stockholders—basic and diluted	$ (78,032)	$ (45,221)
Denominator:		
Weighted average Class A common shares outstanding—basic and diluted	16,568,267	358,582
Weighted average Class B common shares outstanding—basic and diluted	3,215,272	—
Total shares for EPS—basic and diluted	19,783,539	358,582
Net loss per share attributable to Class A common stockholders—basic and diluted	$ (3.94)	$ (126.11)
Net loss per share attributable to Class B common stockholders—basic and diluted	$ (3.94)	$ —

The Company's potentially dilutive securities, which include stock options, redeemable convertible preferred stock (prior to IPO), common stock warrants and preferred stock warrants (prior to IPO), have been excluded from the computation of diluted net loss per share as the effect would be to reduce the net loss per share. Therefore, the weighted average number of common shares outstanding used to calculate both basic and diluted net loss per share attributable to common stockholders is the same. The Company excluded the following potential common shares, presented based on amounts outstanding at each period end, from the computation of diluted net loss per share attributable to common stockholders for the periods indicated because including them would have had an anti-dilutive effect:

	Year Ended December 31,	
	2021	2020
Options to purchase common stock	4,823,100	3,604,581
Warrants to purchase common stock	294,964	55,835
Redeemable convertible preferred stock (as converted to common stock)	—	26,604,306
Warrants to purchase preferred stock (as converted to warrants to purchase common stock)	—	1,243,827
	5,118,064	31,508,549

16. Commitments and contingencies

Lease agreements

In October 2013, the Company entered into an operating lease for office and manufacturing space in in Lowell, Massachusetts, which expires in July 2026. The terms of the lease include options for a one-time, five-year extension of the lease and early termination of the lease in July 2024 as well as a $0.7 million tenant improvement allowance, which was fully utilized in prior periods.

In June 2021, the Company entered into a Sublease agreement for office and back-up manufacturing space in Lexington, Massachusetts, which expires in June 2029. The Sublease agreement includes an option to terminate the sublease in July 2026, subject to an early termination fee. The Company also has the right to use furniture and equipment specified in the Sublease agreement for $0.6 million in future payments over the term of the sublease with the option to purchase the furniture and equipment at the end of the sublease term. Additionally, the Sublease requires the Company to return part of the leased space back to its original condition upon termination. As a result, the Company recognized an asset retirement obligation in the amount of $0.2 million which is classified in other long-term liabilities within the consolidated balance sheet. Concurrent with entering into the Sublease agreement, the Company executed an Option Agreement with the property owner which provides the Company the option to enter into a new direct lease for the Lexington facility for an additional five years following expiration of the sublease.

The Company recognizes rent expense on a straight-line basis over the respective lease period. The Company has recorded deferred rent for rent expense incurred but not yet paid. Rent expense was $0.7 million and $0.4 million for the years ended December 31, 2021 and 2020, respectively.

Future minimum lease commitments under operating leases as of December 31, 2021 are as follows (in thousands):

Year ending December 31,	
2022	$ 1,139
2023	1,169
2024	1,199
2025	1,229
2026	1,044
Thereafter	1,953
Total	$ 7,733

Exit fee

In December 2016, in connection with the amendment of a then-outstanding loan agreement with the lender, the Company entered into an agreement under which it was obligated to pay the lender an exit fee in the amount of $0.8 million in the event of a qualifying exit event prior to December 31, 2026. A qualifying event was defined as any (i) liquidation, dissolution or winding up whether voluntary or involuntary; (ii) consolidation, merger or reverse merger; (iii) sale, lease, transfer, exclusive license, exchange, dividend or other disposition of all or substantially all of the Company's assets; (iv) issuance and/or sale of the Company's stock that is greater than 50% of the shares of common stock immediately following such issuance; (v) any other form of acquisition or business combination that results in a change of control at the Company; or (vi) the consummation of any public offering of shares of common stock. There were no amounts accrued for the exit fee as of December 31, 2020, as the occurrence of a qualifying exit event was not deemed probable. The Company paid the exit fee following the IPO, which was considered a qualifying event. The exit fee expense is included in other income (expense) on the condensed consolidated statements of operations for the year ended December 31, 2021.

Supply agreement

In March 2020, the Company entered into an agreement with a supplier to provide raw materials used in the manufacturing process of the Growth Direct. As of December 31, 2021, the Company had committed to minimum payments under these arrangements totaling $0.9 million through December 31, 2022. The Company accrues a liability for such matters when it is probable that future expenditures will be made and such expenditures can be reasonably estimated. The Company had $0.1 million accrued for the supply agreement as of December 31, 2021 and 2020.

Software subscription

During the year-ended December 31, 2020, the Company entered into a non-cancelable agreement with a service provider for software as a service and cloud hosting services. The Company committed to minimum payments under

these arrangements totaling $1.1 million through January 31, 2026. The Company accrues a liability for such matters when it is probable that future expenditures will be made and such expenditures can be reasonably estimated. The Company had $0.1 million and zero accrued for the software subscription as of December 31, 2021 and December 31, 2020, respectively.

Indemnification agreements

In the ordinary course of business, the Company may provide indemnification of varying scope and terms to customers, vendors, lessors, business partners and other parties with respect to certain matters including, but not limited to, losses arising out of breach of such agreements or from intellectual property infringement claims made by third parties. In addition, the Company has entered into indemnification agreements with members of its board of directors and certain of its executive officers that will require the Company, among other things, to indemnify them against certain liabilities that may arise by reason of their status or service as directors or officers. The maximum potential amount of future payments the Company could be required to make under these indemnification agreements is, in many cases, unlimited. To date, the Company has not incurred any material costs as a result of such indemnifications. The Company is not currently aware of any indemnification claims and has not accrued any liabilities related to such obligations in its consolidated financial statements as of December 31, 2021 or 2020.

Legal proceedings

The Company is not a party to any litigation and does not have contingency reserves established for any litigation liabilities. At each reporting date, the Company evaluates whether or not a potential loss amount or a potential range of loss is probable and reasonably estimable under the provisions of the authoritative guidance that addresses accounting for contingencies. The Company expenses the costs related to such legal proceedings as they are incurred.

17. Benefit plans

The Company established a defined contribution savings plan under Section 401(k) of the Internal Revenue Code. This plan covers all employees who meet minimum age and service requirements and allows participants to defer a portion of their annual compensation on a pre-tax basis. Matching contributions to the plan may be made at the discretion of the Company's board of directors. The Company made contributions of $0.3 million and $0.2 million to the plan during the years ended December 31, 2021 and 2020, respectively.

18. Subsequent Events

In March 2022, the Company amended the lease for its office and manufacturing space in Lowell, Massachusetts (the "Amendment"). The Amendment increased the amount of facility space subject to the lease and extended the expiration of the lease from July 2026 to July 2029. The terms of the Amendment include options for a one-time, five-year extension of the lease and early termination of the lease in July 2026 (subject to an early termination fee), as well as a $0.3 million tenant improvement allowance. Monthly rent payments are fixed and future minimum lease payments under the lease (as amended) are $4.6 million.

DESCRIPTION OF CAPITAL STOCK

General

The following description of the capital stock of Rapid Micro Biosystems, Inc. (the "Company," "we," "us," and "our") summarizes some of the terms of our restated certificate of incorporation ("certificate of incorporation") and amended and restated bylaws ("bylaws"), our seventh amended and restated investors' rights agreement ("investors' rights agreement") and of the General Corporation Law of the State of Delaware ("DGCL"). Because it is only a summary, it does not contain all the information that may be important to you. For a complete description, you should refer to our certificate of incorporation, bylaws and investors' rights agreement, copies of which have been filed as exhibits to this Annual Report on 10-K, as well as the relevant provisions of the DGCL.

Our certificate of incorporation authorizes capital stock consisting of 210,000,000 shares of Class A common stock, par value $0.01 per share, 10,000,000 shares of Class B common stock, par value $0.01 per share and 10,000,000 shares of preferred stock, par value $0.01 per share.

We have no shares of preferred stock issued and outstanding. The following summary describes the material provisions of our capital stock.

Class A common stock and Class B common stock

Holders of our Class A common stock are entitled to one vote for each share held on all matters submitted to a vote of stockholders and do not have cumulative voting rights. An election of directors by our stockholders shall be determined by a plurality of the votes cast by the stockholders entitled to vote on the election. Subject to the supermajority votes for some matters, other matters shall be decided by the affirmative vote of our stockholders having a majority in voting power of the votes cast by the stockholders present or represented and voting on such matter. Our certificate of incorporation and bylaws also provide that our directors may be removed only for cause and only by the affirmative vote of the holders of at least two-thirds in voting power of the outstanding shares of capital stock entitled to vote thereon. In addition, the affirmative vote of the holders of at least two-thirds in voting power of the outstanding shares of capital stock entitled to vote thereon is required to amend or repeal, or to adopt any provision inconsistent with, several of the provisions of our certificate of incorporation. See below under "Anti-Takeover Effects of Delaware Law and Our Certificate of Incorporation and Bylaws —Amendment of Charter Provisions."

Holders of our Class B common stock have identical rights to holders of our Class A common stock as set forth in the preceding paragraph, other than as follows: (i) except as otherwise expressly provided in our certificate of incorporation or as required by applicable law, on any matter that is submitted to a vote by our stockholders, while holders of our Class A common stock are entitled to one vote per share of Class A common stock, holders of our Class B common stock are not entitled to any votes per share of Class B common stock, including for the election of directors, and (ii) while holders of our Class A common stock have no conversion rights, holders of our Class B common stock shall have the right to convert each share of our Class B common stock into one share of Class A common stock at such holder's election, provided that as a result of such conversion, such holder would not beneficially own in excess of 4.9% of any class of our securities registered under the Exchange Act. Accordingly, the holders of a majority of the outstanding shares of Class A common stock entitled to vote in any election can elect all of the directors standing for election, if they so choose, other than any directors that holders of any preferred stock we may issue may be entitled to elect.

Holders of common stock are entitled to receive proportionately any dividends as may be declared by our board of directors, subject to any preferential dividend rights of any series of preferred stock that we may designate and issue in the future.

In the event of our liquidation or dissolution, the holders of Class A common stock are entitled to receive proportionately our net assets available for distribution to stockholders after the payment of all debts and other liabilities and subject to the prior rights of any outstanding preferred stock. Holders of Class A common stock have no preemptive, subscription, redemption or conversion rights. Our outstanding shares of Class A common stock are, when issued and paid for, validly

issued, fully paid and nonassessable. The rights, preferences and privileges of holders of Class A common stock are subject to and may be adversely affected by the rights of the holders of shares of any series of preferred stock that we may designate and issue in the future.

Preferred Stock

Under the terms of our certificate of incorporation, our board of directors is authorized to direct us to issue shares of preferred stock in one or more series without stockholder approval. Our board of directors has the discretion to determine the rights, preferences, privileges and restrictions, including voting rights, dividend rights, conversion rights, redemption privileges and liquidation preferences, of each series of preferred stock.

The purpose of authorizing our board of directors to issue preferred stock and determine its rights and preferences is to eliminate delays associated with a stockholder vote on specific issuances. The issuance of preferred stock, while providing flexibility in connection with possible acquisitions, future financings and other corporate purposes, could have the effect of making it more difficult for a third party to acquire, or could discourage a third party from seeking to acquire, a majority of our outstanding voting stock. We have no shares of preferred stock outstanding and no present plans to issue any shares of preferred stock.

Registration Rights

Certain holders of our Class A common stock and Class B common stock are entitled to certain rights with respect to the registration of such shares for public resale under the Securities Act of 1933, as amended (the “Securities Act”), pursuant to our investors’ rights agreement by and among us and certain of our stockholders, until the rights otherwise terminate pursuant to the terms of our investors’ rights agreement. The registration of shares of common stock as a result of the following rights being exercised would enable holders to trade these shares without restriction under the Securities Act when the applicable registration statement is declared effective.

Form S-1 Registration Rights

If at any time after the earlier of (i) three years after the date of our investors’ rights agreement or (ii) 180 days after the effective date of the registration statement for our initial public offering, which was July 14, 2021, the holders of a majority of our registrable securities request in writing that we effect a registration with respect to all or part of such registrable securities then outstanding and having an anticipated aggregate offering price of at least $50,000,000, we may be required to register their shares. We are obligated to effect at most two registrations in response to these demand registration rights. If the holders requesting registration intend to distribute their shares by means of an underwriting, the managing underwriter of such offering will have the right to limit the numbers of shares to be underwritten for reasons related to the marketing of the shares.

Piggyback Registration Rights

If at any time after our initial public offering we propose to register any shares of our common stock under the Securities Act, subject to certain exceptions, the holders of registrable securities will be entitled to notice of the registration and to include their shares of registrable securities in the registration. If our proposed registration involves an underwriting, the managing underwriter of such offering will have the right to limit the number of shares to be underwritten for reasons related to the marketing of the shares.

Form S-3 Registration Rights

If, at any time after we become entitled under the Securities Act to register our shares on a registration statement on Form S-3, the holders of at least twenty percent of our registrable securities request in writing that we effect a registration with respect to registrable securities at an aggregate price to the public in the offering of at least $3,000,000, we will be required to effect such registration; provided, however, that we will not be required to effect such a registration if, within any twelve month period, we have already effected two registrations on Form S-3 for the holders of registrable securities.

Expenses and Indemnification

Ordinarily, other than underwriting discounts and commissions, we will be required to pay all expenses incurred by us related to any registration effected pursuant to the exercise of these registration rights. These expenses may include all registration and filing fees, printing expenses, fees and disbursements of our counsel, reasonable fees and disbursements of a counsel for the selling securityholders and blue sky fees and expenses. Additionally, we have agreed to indemnify selling stockholders for damages, and any legal or other expenses reasonably incurred, arising from or based upon any untrue statement of a material fact contained in any registration statement, an omission or alleged omission to state a material fact in any registration statement or necessary to make the statements therein not misleading, or any violation or alleged violation by the indemnifying party of securities laws, subject to certain exceptions.

Termination of Registration Rights

The registration rights terminate upon the earlier of (i) the closing of certain liquidation events or a SPAC Transaction (as such term is defined in our investors' rights agreement), (ii) such time as Rule 144 of the Securities Act or another similar exemption under the Securities Act is available for the sale of all shares held by a holder of our registrable securities without limitation during a three-month period without registration, and (iii) three years after the effective date of the registration statement for our initial public offering, which was July 14, 2021.

Anti-Takeover Effects of Delaware Law and Our Certificate of Incorporation and Bylaws

Some provisions of Delaware law, our certificate of incorporation and our bylaws could make the following transactions more difficult:

- an acquisition of us by means of a tender offer;
- an acquisition of us by means of a proxy contest or otherwise; or
- the removal of our incumbent officers and directors.

It is possible that these provisions could make it more difficult to accomplish or could deter transactions that stockholders may otherwise consider to be in their best interest or in our best interests, including transactions which provide for payment of a premium over the market price for our shares.

These provisions, summarized below, are intended to discourage coercive takeover practices and inadequate takeover bids. These provisions are also designed to encourage persons seeking to acquire control of us to first negotiate with our board of directors. We believe that the benefits of the increased protection of our potential ability to negotiate with the proponent of an unfriendly or unsolicited proposal to acquire or restructure us outweigh the disadvantages of discouraging these proposals because negotiation of these proposals could result in an improvement of their terms.

Undesignated Preferred Stock

The ability of our board of directors, without action by the stockholders, to issue up to 10,000,000 shares of undesignated preferred stock with voting or other rights or preferences as designated by our board of directors could impede the success of any attempt to change control of us. These and other provisions may have the effect of deferring hostile takeovers or delaying changes in control or management of our company.

Stockholder Meetings

Our bylaws provide that a special meeting of stockholders may be called only by our chairman of the board, chief executive officer or president (in the absence of a chief executive officer), or by a resolution adopted by a majority of our board of directors.

Requirements for Advance Notification of Stockholder Nominations and Proposals

Our bylaws establish advance notice procedures with respect to stockholder proposals to be brought before a stockholder meeting and the nomination of candidates for election as directors, other than nominations made by or at the direction of the board of directors or a committee of the board of directors.

Elimination of Stockholder Action by Written Consent

Our certificate of incorporation eliminates the right of stockholders to act by written consent without a meeting.

Staggered Board

Our board of directors is divided into three classes. The directors in each class will serve for a three-year term, with one class being elected each year by our stockholders. This system of electing and removing directors may tend to discourage a third-party from making a tender offer or otherwise attempting to obtain control of us, because it generally makes it more difficult for stockholders to replace a majority of the directors.

Removal of Directors

Our certificate of incorporation provides that no member of our board of directors may be removed from office by our stockholders except for cause and, in addition to any other vote required by law, upon the approval of the holders of at least two-thirds in voting power of the outstanding shares of stock entitled to vote in the election of directors.

Stockholders Not Entitled to Cumulative Voting

Our certificate of incorporation does not permit stockholders to cumulate their votes in the election of directors. Accordingly, the holders of a majority of the outstanding shares of our Class A common stock entitled to vote in any election of directors can elect all of the directors standing for election, if they choose, other than any directors that holders of our preferred stock may be entitled to elect.

Delaware Anti-Takeover Statute

We are subject to Section 203 of the DGCL, which prohibits persons deemed to be “interested stockholders” from engaging in a “business combination” with a publicly held Delaware corporation for three years following the date these persons become interested stockholders unless the business combination is, or the transaction in which the person became an interested stockholder was, approved in a prescribed manner or another prescribed exception applies. Generally, an “interested stockholder” is a person who, together with affiliates and associates, owns, or within three years prior to the determination of interested stockholder status did own, 15% or more of a corporation’s voting stock. Generally, a “business combination” includes a merger, asset or stock sale, or other transaction resulting in a financial benefit to the interested stockholder. The existence of this provision may have an anti-takeover effect with respect to transactions not approved in advance by the board of directors.

Choice of Forum

Our certificate of incorporation provides that, unless we consent in writing to the selection of an alternative form, the Court of Chancery of the State of Delaware will be the sole and exclusive forum for: (1) any derivative action or proceeding brought on our behalf; (2) any action asserting a claim of breach of a fiduciary duty or other wrongdoing by any of our directors, officers, employees or agents to us or our stockholders; (3) any action asserting a claim against us arising pursuant to any provision of the DGCL or our certificate of incorporation or bylaws; (4) any action to interpret, apply, enforce or determine the validity of our certificate of incorporation or bylaws; or (5) any action asserting a claim governed by the internal affairs doctrine. Under our certificate of incorporation, this exclusive forum provision will not apply to claims which are vested in the exclusive jurisdiction of a court or forum other than the Court of Chancery of the State of Delaware, or for which the Court of Chancery of the State of Delaware does not have subject matter jurisdiction. For instance, the provision would not apply to actions arising under federal securities laws, including suits brought to enforce any liability or duty created by the Securities Act, Exchange Act, or the rules and regulations thereunder. Our certificate of incorporation further provides that, unless we consent in writing to the section of an alternative forum, the federal district courts of the United States of America, shall, to the fullest extent permitted by law, be the sole and

exclusive forum for the resolution of any complaint asserting a cause of action arising under the Securities Act. Our certificate of incorporation also provides that any person or entity purchasing or otherwise acquiring any interest in shares of our capital stock will be deemed to have notice of and to have consented to these choice of forum provisions. It is possible that a court of law could rule that either or both of the choice of forum provisions contained in our certificate of incorporation are inapplicable or unenforceable if they are challenged in a proceeding or otherwise.

Amendment of Charter Provisions

The amendment of any of the above provisions, except for the provision making it possible for our board of directors to issue preferred stock and the provision prohibiting cumulative voting, would require approval by holders of at least two-thirds in voting power of the outstanding shares of stock entitled to vote thereon.

The provisions of Delaware law, our certificate of incorporation and our bylaws could have the effect of discouraging others from attempting hostile takeovers and, as a consequence, they may also inhibit temporary fluctuations in the market price of our Class A common stock that often result from actual or rumored hostile takeover attempts. These provisions may also have the effect of preventing changes in the composition of our board and management. It is possible that these provisions could make it more difficult to accomplish transactions that stockholders may otherwise deem to be in their best interests.

Transfer Agent and Registrar

The transfer agent and registrar for our Class A common stock and Class B common stock Computershare Trust Company, N.A.

Stock Exchange Listing

Our Class A common stock is listed on The Nasdaq Global Select Market under the symbol “RPID.”

Employment Agreement

This Employment Agreement (this "Agreement"), dated as of October 1, 2021 (the "Effective Date"), is made by and between Rapid Micro Biosystems, Inc., a Delaware corporation (together with any successor thereto, the "Company"), and Richard Keys ("Executive") (collectively referred to herein as the "Parties" or individually referred to as a "Party").

RECITALS

A. It is the desire of the Company to assure itself of the services of Executive as of the Effective Date and thereafter by entering into this Agreement, which shall supersede and replace any prior employment arrangement.

B. Executive and the Company mutually desire that Executive provide services to the Company on the terms herein provided.

AGREEMENT

NOW, THEREFORE, in consideration of the foregoing and of the respective covenants and agreements set forth below, the Parties hereto agree as follows:

1. Employment.

(a) General. Effective on the Effective Date, the Company shall employ Executive, and Executive shall be in the employ of the Company, for the period and in the positions set forth in this Section 1, and subject to the other terms and conditions herein provided.

(b) At-Will Employment. The Company and Executive acknowledge that Executive's employment is and shall continue to be at-will, as defined under applicable law, and that Executive's employment with the Company may be terminated by either Party at any time for any or no reason (subject to the notice requirements of Section 3(b)). This "at-will" nature of Executive's employment shall remain unchanged during Executive's tenure as an employee and may not be changed, except in an express writing signed by Executive and a duly authorized officer of the Company. If Executive's employment terminates for any reason, Executive shall not be entitled to any payments, benefits, damages, award or compensation other than as provided in this Agreement or otherwise agreed to in writing by the Company or as provided by applicable law. The term of this Agreement (the "Term") shall commence on the Effective Date and end on the date this Agreement is terminated under Section 3.

(c) Positions and Duties. During the Term, Executive shall serve as Chief Commercial Officer of the Company, with such responsibilities, duties and authority normally associated with such position and as may from time to time be reasonably assigned to Executive by the Chief Executive Officer of the Company (the "CEO"). Executive shall devote substantially all of Executive's working time and efforts to the business and affairs of the Company (which shall include service to its affiliates, if applicable) and shall not engage in outside business activities (including serving on outside boards or committees) without the consent of the Board of Directors of the Company or an authorized committee of the Board (in either case, the "Board"), provided that Executive shall be permitted to (i) manage Executive's personal, financial and legal affairs, (ii) participate in trade associations, and (iii) serve on the board of directors of not-for-profit or tax-exempt charitable organizations, in each case, subject to compliance with this Agreement and provided that such activities do not materially interfere with Executive's performance of Executive's duties and responsibilities hereunder. Executive agrees to observe and comply with the rules and policies of the Company as adopted by the Company from time to

time, in each case, as amended from time to time, and as delivered or made available to Executive (each, a "Policy").

2. Compensation and Related Matters.

(a) Annual Base Salary. During the Term, Executive shall receive a base salary at a rate of $425,000 per annum, which shall be paid in accordance with the customary payroll practices of the Company and shall be pro-rated for partial years of employment. Such annual base salary shall be reviewed (and may be increased) from time to time by the Board (such annual base salary, as it may be increased from time to time, the "Annual Base Salary").

(b) Annual Cash Bonus Opportunity. During the Term, Executive will be eligible to participate in an annual incentive program established by the Board. Executive's annual incentive compensation under such incentive program (the "Annual Bonus") shall be targeted at 50% of Executive's Annual Base Salary (such target, as may be adjusted by the Board from time to time, the "Target Annual Bonus"). The Annual Bonus payable under the incentive program shall be based on the achievement of performance goals to be determined by the Board. The payment of any Annual Bonus pursuant to the incentive program shall be subject to Executive's continued employment with the Company through the date of payment, except as otherwise provided in Section 4(b).

(c) Commissions. During the Term, Executive will also be eligible to receive an annual commission based on the Company exceeding total revenue as compared to plan, which will be calculated as follows: if the Company exceeds total revenue as compared to plan, Executive will receive $7,000 for every 1% above 100% of total revenue in the plan up to an aggregate maximum annual total commission of $175,000. Any commission payments will be subject to Executive's continued employment with the Company through the payment date, except as otherwise provided in Section 4(b).

(d) Benefits. During the Term, Executive shall be eligible to participate in employee benefit plans, programs and arrangements of the Company, subject to the terms and eligibility requirements thereof and as such plans, programs and arrangements may be amended or in effect from time to time. In no event shall Executive be eligible to participate in any severance plan or program of the Company, except as set forth in Section 4 of this Agreement.

(e) Vacation. During the Term, Executive shall be entitled to paid personal leave in accordance with the Company's Policies. Any vacation shall be taken at the reasonable and mutual convenience of the Company and Executive.

(f) Business Expenses. During the Term, the Company shall reimburse Executive for all reasonable travel and other business expenses incurred by Executive in the performance of Executive's duties to the Company in accordance with the Company's expense reimbursement Policy.

(g) Sign-On Bonus. Within sixty (60) days of the Effective Date, Executive shall receive a sign-on bonus of $75,000 (the "Sign-On Bonus"), less applicable withholdings, plus an additional gross-up payment in an amount sufficient to provide that after payment of federal and state taxes on the Sign-On Bonus, together with any taxes on such gross-up payment, Executive will retain an amount equal to the Sign-On Bonus. In the event Executive is terminated by the Company for Cause or Executive resigns other than for Good Reason, in either case, prior to Executive's completion of one year of service to the Company, Executive will repay 100% of the gross amount of the Sign-On Bonus.

3. Termination.

Executive's employment hereunder and the Term may be terminated by the Company or Executive, as applicable, without any breach of this Agreement under the following circumstances and the Term will end on the Date of Termination:

(a) Circumstances.

(i) *Death*. Executive's employment hereunder shall terminate upon Executive's death.

(ii) *Disability*. If Executive has incurred a Disability, as defined below, the Company may terminate Executive's employment.

(iii) *Termination for Cause*. The Company may terminate Executive's employment for Cause, as defined below.

(iv) *Termination without Cause*. The Company may terminate Executive's employment without Cause.

(v) *Resignation from the Company with Good Reason.* Executive may resign Executive's employment with the Company with Good Reason, as defined below.

(vi) *Resignation from the Company without Good Reason*. Executive may resign Executive's employment with the Company for any reason other than Good Reason or for no reason.

(b) Notice of Termination. Any termination of Executive's employment by the Company or by Executive under this Section 3 (other than termination pursuant to Section 3(a)(i)) shall be communicated by a written notice to the other Party hereto (i) indicating the specific termination provision in this Agreement relied upon, (ii) setting forth in reasonable detail the facts and circumstances claimed to provide a basis for termination of Executive's employment under the provision so indicated, if applicable, and (iii) specifying a Date of Termination which, if submitted by Executive, shall be at least thirty (30) days following the date of such notice (a "Notice of Termination"); *provided, however*, that in the event that Executive delivers a Notice of Termination to the Company, the Company may, in its sole discretion, change the Date of Termination to any date that occurs following the date of the Company's receipt of such Notice of Termination and is prior to the date specified in such Notice of Termination, but the termination will still be considered a resignation by Executive, provided further that that if the Company selects a Date of Termination that is less than thirty (30) days after the date of the Notice of Termination, the Company will pay Executive in a lump sum at the same time that Executive receives the payment in Section 3(c)(i) the base salary Executive would have earned during the period commencing on the Date of Termination selected by the Company and ending thirty (30) days after the date of the Notice of Termination. A Notice of Termination submitted by the Company may provide for a Date of Termination on the date Executive receives the Notice of Termination, or any date thereafter elected by the Company. The failure by either Party to set forth in the Notice of Termination any fact or circumstance which contributes to a showing of Cause or Good Reason shall not waive any right of the Party hereunder or preclude the Party from asserting such fact or circumstance in enforcing the Party's rights hereunder.

(c) Company Obligations upon Termination. Upon termination of Executive's employment pursuant to any of the circumstances listed in this Section 3, Executive (or Executive's estate) shall be

entitled to receive the sum of: (i) the portion of Executive's Annual Base Salary earned through the Date of Termination, but not yet paid to Executive; (ii) any expense reimbursements owed to Executive pursuant to Section (f); and (iii) any amount accrued and arising from Executive's participation in, or benefits accrued under any employee benefit plans, accrued and unused vacation, programs or arrangements, which amounts shall be payable in accordance with the terms and conditions of such employee benefit plans, programs or arrangements (collectively, the "Company Arrangements"). Except as otherwise expressly required by law (e.g., COBRA) or as specifically provided herein, all of Executive's rights to salary, severance, benefits, bonuses and other compensatory amounts hereunder (if any) shall cease upon the termination of Executive's employment hereunder. In the event that Executive's employment is terminated by the Company for any reason, Executive's sole and exclusive remedy shall be to receive the payments and benefits described in this Section 3(c) or Section 4, as applicable.

(d) Deemed Resignation. Upon termination of Executive's employment for any reason, Executive shall be deemed to have resigned from all offices and directorships, if any, then held with the Company or any of its subsidiaries.

4. Severance Payments.

(a) Termination for Cause, or Termination Upon Death, Disability or Resignation from the Company Without Good Reason. If Executive's employment shall terminate as a result of Executive's death pursuant to Section 3(a)(i) or Disability pursuant to Section 3(a)(ii), pursuant to Section 3(a)(iii) for Cause, or pursuant to Section 3(a)(vi) for Executive's resignation from the Company without Good Reason, then Executive shall not be entitled to any severance payments or benefits, except as provided in Section 3(c).

(b) Termination without Cause or Resignation from the Company with Good Reason. If Executive's employment terminates without Cause pursuant to Section 3(a)(iv), or pursuant to Section 3(a)(v) due to Executive's resignation with Good Reason, then except as otherwise provided under Section 4(c) and subject to Executive signing on or before the 21st day following Executive's Separation from Service (as defined below), and not revoking, a release of claims substantially in the form attached as Exhibit A to this Agreement (the "Release") and Executive's continued compliance with Section 5, Executive shall receive, in addition to payments and benefits set forth in Section 3(c), the following:

(i) an amount in cash equal to 0.75 times the Annual Base Salary, payable in the form of salary continuation in regular installments over the 9-month period following the date of Executive's Separation from Service (the "Severance Period") in accordance with the Company's normal payroll practices;

(ii) to the extent unpaid as of the Date of Termination, an amount in cash equal to any Annual Bonus earned by Executive for the Company's fiscal year prior to the fiscal year in which the Date of Termination occurs, as determined by the Board in its discretion based upon actual performance achieved, which Annual Bonus, if any, shall be paid to Executive in the fiscal year in which the Date of Termination occurs when bonuses for such prior fiscal year are paid in the ordinary course to actively employed senior executives of the Company;

(iii) an amount in cash equal to a prorated portion of any Annual Bonus for the year in which the Date of Termination occurs, as determined by the Board in its discretion based upon actual performance achieved, with such proration based on the portion of the year that Executive was employed by the Company prior to the Date of Termination, which Annual Bonus, if any, shall be paid to Executive when bonuses for the year in which the Date of Termination occurs are

paid in the ordinary course to actively employed senior executives of the Company, but no later than December 31 of the year immediately following the year in which the Date of Termination occurs; and

(iv) if Executive timely elects to receive continued medical, dental or vision coverage under one or more of the Company's group medical, dental or vision plans pursuant to the Consolidated Omnibus Budget Reconciliation Act of 1985, as amended ("COBRA"), then the Company shall directly pay, or reimburse Executive for, the COBRA premiums for Executive and Executive's covered dependents under such plans, less the amount Executive would have had to pay to receive such coverage as an active employee based on the cost sharing levels in effect on the Date of Termination, during the period commencing on Executive's Separation from Service and ending upon the earliest of (A) the last day of the Severance Period, (B) the date that Executive and/or Executive's covered dependents become no longer eligible for COBRA and (C) the date Executive becomes eligible to receive medical, dental or vision coverage, as applicable, from a subsequent employer (and Executive agrees to promptly notify the Company of such eligibility) (the "COBRA Continuation Period"). Notwithstanding the foregoing, if the Company determines it cannot provide the foregoing benefit without potentially violating applicable law (including, without limitation, Section 2716 of the Public Health Service Act) or incurring an excise tax, the Company shall in lieu thereof provide to Executive a taxable monthly payment in an amount equal to the monthly COBRA premium that Executive would be required to pay to continue Executive's and Executive's covered dependents' group health coverage in effect on the Date of Termination (which amount shall be based on the premium for the first month of COBRA coverage), less the amount Executive would have had to pay to receive group health coverage as an active employee for Executive and his or her covered dependents based on the cost sharing levels in effect on the Date of Termination, which payments shall be made for the remainder of the COBRA Continuation Period.

(c) Change in Control. In lieu of the payments and benefits set forth in Section 4(b), in the event Executive's employment terminates without Cause pursuant to Section 3(a)(iv), or pursuant to Section 3(a)(v) due to Executive's resignation with Good Reason, in either case, during the three (3) month period prior to the date of a Change in Control or on or within twelve (12) months following the date of a Change in Control, subject to Executive signing on or before the 21st day following Executive's Separation from Service, and not revoking, the Release and Executive's continued compliance with Section 5, Executive shall receive, in addition to the payments and benefits set forth in Section 3(c), the following:

(i) an amount in cash equal to 1.0 times the Annual Base Salary, payable in a lump sum on the later of the First Payment Date or the Company's first ordinary payroll date that occurs after the Change in Control, provided that if a Change in Control occurs after the Date of Termination, the amount payable under this Section 4(c)(i) shall be reduced by the gross amount of any severance payment installments previously made to Executive pursuant to Section 4(b)(i);

(ii) the payments set forth in Section 4(b)(ii);

(iii) the benefits set forth in Section 4(b)(iv), provided that for this purpose, the "Severance Period" will mean twelve (12) months;

(iv) an amount in cash equal to 1.0 times the Target Annual Bonus, payable in a lump sum on the later of the First Payment Date or the Company's first ordinary payroll date that occurs after the Change in Control; and

(v) notwithstanding anything to the contrary in the governing award agreement or applicable equity plan, all unvested equity or equity-based awards held by Executive under any Company equity compensation plans that vest solely based on continued employment or service shall immediately become 100% vested and non-forfeitable (and if the Date of Termination precedes the Change in Control, all such unvested awards shall remain outstanding and eligible to vest in accordance with this Section 4(c)(v) if a Change Control occurs within three months after the Date of Termination, provided that in no event will any such award remain outstanding beyond the final expiration date of the award set forth in the documents governing such award), with any other equity or equity-based awards being governed by the terms of the applicable award agreement.

(d) Survival. Notwithstanding anything to the contrary in this Agreement, the provisions of Sections 5 through 9 will survive the termination of Executive's employment and the termination of the Term.

5. Restrictive Covenants. As a condition to the effectiveness of this Agreement, Executive will have executed and delivered to the Company no later than contemporaneously herewith the Employee Proprietary Information and Inventions Assignment Agreement attached as Exhibit B (the "Restrictive Covenant Agreement"). Executive agrees to abide by the terms of the Restrictive Covenant Agreement, which are hereby incorporated by reference into this Agreement. Executive acknowledges that the provisions of the Restrictive Covenant Agreement will survive the termination of Executive's employment and the termination of the Term for the periods set forth in the Restrictive Covenant Agreement.

6. Assignment and Successors.

The Company may assign its rights and obligations under this Agreement to any of its affiliates or to any successor to all or substantially all of the business or the assets of the Company (by merger or otherwise). This Agreement shall be binding upon and inure to the benefit of the Company, Executive and their respective successors, assigns, personal and legal representatives, executors, administrators, heirs, distributees, devisees, and legatees, as applicable. None of Executive's rights or obligations may be assigned or transferred by Executive, other than Executive's rights to payments hereunder, which may be transferred only by will or operation of law. Notwithstanding the foregoing, Executive shall be entitled, to the extent permitted under applicable law and applicable Company Arrangements, to select and change a beneficiary or beneficiaries to receive compensation hereunder following Executive's death by giving written notice thereof to the Company.

7. Certain Definitions.

(a) Cause. The Company shall have "Cause" to terminate Executive's employment hereunder upon:

(i) Gross negligence or willful misconduct by Executive in the performance of Executive's duties under this Agreement;

(ii) Executive's conviction of (A) a felony or (B) any misdemeanor involving moral turpitude, deceit, dishonesty or fraud;

(iii) Executive's material breach of a material provision of this Agreement that, to the extent capable of cure, has remained uncured for a period of thirty (30) days following written notice from the Company;

(iv) Executive's violation of any material provision of any agreement(s) between Executive and the Company relating to non-competition, nondisclosure and/or assignment of inventions, including without limitation, the Restrictive Covenant Agreement;

(v) Executive's breach of any Policy that materially harms the Company that, to the extent capable of cure, has remained uncured for a period of thirty (30) days following written notice from the Company;

(vi) The Board's reasonable, good faith determination that Executive has refused to carry out the reasonable and lawful instructions of the Board concerning duties or actions consistent with the Executive's position with the Company and such event or omission results in demonstrable and material harm to the Company;

(vii) Executive's unlawful use (including being under the influence) or possession of illegal drugs on the Company's (or any of its affiliate's) premises or while performing Executive's duties and responsibilities under this Agreement; or

(viii) Executive's commission of any act of fraud, embezzlement, misappropriation, willful misconduct, or breach of fiduciary duty against the Company or any of its affiliates.

For purposes of this Agreement, no act or failure to act shall be considered "willful" unless it is done or omitted to be done by Executive in bad faith and without Executive's reasonable belief that Executive was acting in the best interests of the Company.

(b) Change in Control. "Change in Control" shall have the meaning set forth in the Rapid Micro Biosystems, Inc. 2021 Incentive Award Plan, provided that the applicable transaction also constitutes a "change in control event" under Treasury Regulation Section 1.409A-3(i)(5).

(c) Code. "Code" shall mean the Internal Revenue Code of 1986, as amended, and the regulations and guidance promulgated thereunder.

(d) Date of Termination. "Date of Termination" shall mean (i) if Executive's employment is terminated by Executive's death, the date of Executive's death; or (ii) if Executive's employment is terminated pursuant to Section 3(a)(ii) – (vi) either the date indicated in the Notice of Termination or the date specified by the Company pursuant to Section 3(b), whichever is earlier.

(e) Disability. "Disability" shall mean, at any time the Company or any of its affiliates sponsors a long-term disability plan for the Company's employees, "disability" as defined in such long-term disability plan for the purpose of determining a participant's eligibility for benefits, *provided*, *however*, if the long-term disability plan contains multiple definitions of disability, "Disability" shall refer to that definition of disability which, if Executive qualified for such disability benefits, would provide coverage for the longest period of time. The determination of whether Executive has a Disability shall be made by the person or persons required to make disability determinations under the long-term disability plan. At any time the Company does not sponsor a long-term disability plan for its employees, "Disability" shall mean Executive's inability to perform, with or without reasonable accommodation, the essential functions of Executive's positions hereunder for a total of three months during any six-month period as a result of incapacity due to mental or physical illness as determined by a physician selected by the Company or its insurers and acceptable to Executive or Executive's legal representative, with such agreement as to acceptability not to be unreasonably withheld or delayed. Any refusal by Executive to submit to a medical examination for the purpose of determining Disability shall be deemed to constitute conclusive evidence of Executive's Disability.

(f) Good Reason. For the sole purpose of determining Executive's right to severance payments and benefits as described above, Executive's resignation will be with "Good Reason", unless Executive consents in writing to the applicable event: (i) a reduction in Executive's Annual Base Salary, except for a reduction made as part of across-the-board reductions based on the Company's financial performance similarly affecting all or substantially all senior management employees of the Company in a similar percentage amount, (ii) a material decrease in Executive's duties, authority or areas of responsibility as are commensurate with Executive's title or position with the Company, (iii) the relocation of Executive's primary office to a location that results in an increase to Executive's one-way commute of more than fifty (50) miles or (iv) the Company's material breach of a material agreement between Executive and the Company. Notwithstanding the foregoing, no Good Reason will have occurred unless and until: (a) Executive has provided the Company, within ninety (90) days of Executive's knowledge of the occurrence of the facts and circumstances underlying the Good Reason event, written notice stating with specificity the applicable facts and circumstances underlying such finding of Good Reason; (b) to the extent capable of cure, the Company has had an opportunity to cure the same within thirty (30) days after the receipt of such notice; (c) the Company shall have failed to so cure within such period; and (d) Executive resigns within 60 days following the end of such cure period.

8. Parachute Payments.

(a) Notwithstanding any other provisions of this Agreement or any Company equity plan or agreement, in the event that any payment or benefit by the Company or otherwise to or for the benefit of Executive, whether paid or payable or distributed or distributable pursuant to the terms of this Agreement or otherwise (all such payments and benefits, including the payments and benefits under Section 4 hereof, being hereinafter referred to as the "Total Payments"), would be subject (in whole or in part) to the excise tax imposed by Section 4999 of the Code (the "Excise Tax"), then the Total Payments shall be reduced (in the order provided in Section 8(b)) to the minimum extent necessary to avoid the imposition of the Excise Tax on the Total Payments, but only if (i) the net amount of such Total Payments, as so reduced (and after subtracting the net amount of federal, state and local income and employment taxes on such reduced Total Payments and after taking into account the phase out of itemized deductions and personal exemptions attributable to such reduced Total Payments), is greater than or equal to (ii) the net amount of such Total Payments without such reduction (but after subtracting the net amount of federal, state and local income and employment taxes on such Total Payments and the amount of the Excise Tax to which Executive would be subject in respect of such unreduced Total Payments and after taking into account the phase out of itemized deductions and personal exemptions attributable to such unreduced Total Payments).

(b) The Total Payments shall be reduced in the following order: (i) reduction on a pro rata basis of any cash severance payments that are exempt from Section 409A of the Code ("Section 409A"), (ii) reduction on a pro rata basis of any non-cash severance payments or benefits that are exempt from Section 409A, (iii) reduction on a pro rata basis of any other payments or benefits that are exempt from Section 409A, and (iv) reduction of any payments or benefits otherwise payable to Executive on a pro rata basis or such other manner that complies with Section 409A; provided, in case of clauses (ii), (iii) and (iv), that reduction of any payments attributable to the acceleration of vesting of Company equity awards shall be first applied to Company equity awards that would otherwise vest last in time.

(c) All determinations regarding the application of this Section 8 shall be made by an independent (i.e., has not in the three years prior to the Change in Control provided any services to the Company or its affiliates) national accounting firm or consulting group with experience in performing calculations regarding the applicability of Section 280G of the Code and the Excise Tax selected by the Company (the "Independent Advisors"). For purposes of determinations, no portion of the Total Payments shall be taken into account which, in the opinion of the Independent Advisors, (i) does not

constitute a "parachute payment" within the meaning of Section 280G(b)(2) of the Code (including by reason of Section 280G(b)(4)(A) of the Code) or (ii) constitutes reasonable compensation for services actually rendered, within the meaning of Section 280G(b)(4)(B) of the Code, in excess of the "base amount" (as defined in Section 280G(b)(3) of the Code) allocable to such reasonable compensation. The costs of obtaining such determination and all related fees and expenses (including related fees and expenses incurred in any later audit) shall be borne by the Company.

(d) In the event it is later determined that a greater reduction in the Total Payments should have been made to implement the objective and intent of this Section 8, the excess amount shall be returned promptly by Executive to the Company.

9. Indemnification/Insurance. As of no later than the Effective Date, the Company and Executive shall enter into an indemnification agreement in substantially the form attached hereto as Exhibit C (the "Indemnification Agreement").

10. Miscellaneous Provisions.

(a) Governing Law. This Agreement shall be governed, construed, interpreted and enforced in accordance with its express terms, and otherwise in accordance with the substantive laws of the Commonwealth of Massachusetts without reference to the principles of conflicts of law of the Commonwealth of Massachusetts or any other jurisdiction that would result in the application of the laws of a jurisdiction other than the Commonwealth of Massachusetts, and where applicable, the laws of the United States.

(b) Validity. The invalidity or unenforceability of any provision or provisions of this Agreement shall not affect the validity or enforceability of any other provision of this Agreement, which shall remain in full force and effect.

(c) Notices. Any notice, request, claim, demand, document and other communication hereunder to any Party shall be effective upon receipt (or refusal of receipt) and shall be in writing and delivered personally or sent by facsimile or certified or registered mail, postage prepaid, as follows:

(i) If to the Company, to the CEO of the Company at the Company's headquarters,

(ii) If to Executive, to the last address that the Company has in its personnel records for Executive, or

(iii) At any other address as any Party shall have specified by notice in writing to the other Party.

(d) Counterparts. This Agreement may be executed in several counterparts, each of which shall be deemed to be an original, but all of which together will constitute one and the same Agreement. Signatures delivered by facsimile or PDF shall be deemed effective for all purposes.

(e) Entire Agreement. The terms of this Agreement, and the Restrictive Covenant Agreement, are intended by the Parties to be the final expression of their agreement with respect to the subject matter hereof and supersede all prior understandings and agreements, whether written or oral. The Parties further intend that this Agreement shall constitute the complete and exclusive statement of their terms and that no extrinsic evidence whatsoever may be introduced in any judicial, administrative, or other legal proceeding to vary the terms of this Agreement.

(f) Amendments; Waivers. This Agreement may not be modified, amended, or terminated except by an instrument in writing, signed by Executive and a duly authorized officer of Company. By an instrument in writing similarly executed, Executive or a duly authorized officer of the Company may waive compliance by the other Party with any specifically identified provision of this Agreement that such other Party was or is obligated to comply with or perform; *provided*, *however*, that such waiver shall not operate as a waiver of, or estoppel with respect to, any other or subsequent failure. No failure to exercise and no delay in exercising any right, remedy, or power hereunder will preclude any other or further exercise of any other right, remedy, or power provided herein or by law or in equity.

(g) Construction. This Agreement shall be deemed drafted equally by both the Parties. Its language shall be construed as a whole and according to its fair meaning. Any presumption or principle that the language is to be construed against any Party shall not apply. The headings in this Agreement are only for convenience and are not intended to affect construction or interpretation. Any references to paragraphs, subparagraphs, sections or subsections are to those parts of this Agreement, unless the context clearly indicates to the contrary. Also, unless the context clearly indicates to the contrary, (i) the plural includes the singular and the singular includes the plural; (ii) "and" and "or" are each used both conjunctively and disjunctively; (iii) "any," "all," "each," or "every" means "any and all," and "each and every"; (iv) "includes" and "including" are each "without limitation"; (v) "herein," "hereof," "hereunder" and other similar compounds of the word "here" refer to the entire Agreement and not to any particular paragraph, subparagraph, section or subsection; and (vi) all pronouns and any variations thereof shall be deemed to refer to the masculine, feminine, neuter, singular or plural as the identity of the entities or persons referred to may require.

(h) Arbitration. Any controversy, claim or dispute arising out of or relating to this Agreement, shall be settled solely and exclusively by a binding arbitration process administered by JAMS/Endispute in Boston, Massachusetts. Such arbitration shall be conducted in accordance with the then-existing JAMS/Endispute Rules of Practice and Procedure, with the following exceptions if in conflict: (i) one arbitrator who is a retired judge shall be chosen by JAMS/Endispute; (ii) each Party to the arbitration will pay one-half of the expenses and fees of the arbitrator, together with other expenses of the arbitration incurred or approved by the arbitrator; and (iii) arbitration may proceed in the absence of any Party if written notice (pursuant to the JAMS/Endispute rules and regulations) of the proceedings has been given to such Party. Each Party shall bear its own attorney's fees and expenses; provided that the arbitrator may assess the prevailing Party's fees and costs against the non-prevailing Party as part of the arbitrator's award. The Parties agree to abide by all decisions and awards rendered in such proceedings. Such decisions and awards rendered by the arbitrator shall be final and conclusive. All such controversies, claims or disputes shall be settled in this manner in lieu of any action at law or equity; provided, however, that nothing in this subsection shall be construed as precluding the bringing of an action for injunctive relief or specific performance as provided in this Agreement or the Restrictive Covenant Agreement. This dispute resolution process and any arbitration hereunder shall be confidential and neither any Party nor the neutral arbitrator shall disclose the existence, contents or results of such process without the prior written consent of all Parties, except where necessary or compelled in a court to enforce this arbitration provision or an award from such arbitration or otherwise in a legal proceeding. If JAMS/Endispute no longer exists or is otherwise unavailable, the Parties agree that the American Arbitration Association ("AAA") shall administer the arbitration in accordance with its then-existing rules as modified by this subsection. In such event, all references herein to JAMS/Endispute shall mean AAA. Notwithstanding the foregoing, Executive and the Company each have the right to resolve any issue or dispute over intellectual property rights by court action instead of arbitration.

(i) Enforcement. If any provision of this Agreement is held to be illegal, invalid or unenforceable under present or future laws effective during the Term, such provision shall be fully severable; this Agreement shall be construed and enforced as if such illegal, invalid or unenforceable

provision had never comprised a portion of this Agreement; and the remaining provisions of this Agreement shall remain in full force and effect and shall not be affected by the illegal, invalid or unenforceable provision or by its severance from this Agreement. Furthermore, in lieu of such illegal, invalid or unenforceable provision there shall be added automatically as part of this Agreement a provision as similar in terms to such illegal, invalid or unenforceable provision as may be possible and be legal, valid and enforceable.

(j) Withholding. The Company shall be entitled to withhold from any amounts payable under this Agreement any federal, state, local or foreign withholding or other taxes or charges which the Company is required to withhold. The Company shall be entitled to rely on the advice of counsel if any questions as to the amount or requirement of withholding shall arise.

(k) Section 409A.

(i) *General.* The intent of the Parties is that the payments and benefits under this Agreement comply with or be exempt from Section 409A and, accordingly, to the maximum extent permitted, this Agreement shall be interpreted to be in compliance therewith.

(ii) *Separation from Service.* Notwithstanding anything in this Agreement to the contrary, any compensation or benefits payable under this Agreement that is designated under this Agreement as payable upon Executive's termination of employment shall be payable only upon Executive's "separation from service" with the Company within the meaning of Section 409A (a "Separation from Service") and, except as provided below, any such compensation or benefits described in Section 4 shall not be paid, or, in the case of installments, shall not commence payment, until the thirtieth (30th) day following Executive's Separation from Service (the "First Payment Date"). Any installment payments that would have been made to Executive during the thirty (30) day period immediately following Executive's Separation from Service but for the preceding sentence shall be paid to Executive on the First Payment Date and the remaining payments shall be made as provided in this Agreement.

(iii) *Specified Employee.* Notwithstanding anything in this Agreement to the contrary, if Executive is deemed by the Company at the time of Executive's Separation from Service to be a "specified employee" for purposes of Section 409A, to the extent delayed commencement of any portion of the benefits to which Executive is entitled under this Agreement is required in order to avoid a prohibited distribution under Section 409A, such portion of Executive's benefits shall not be provided to Executive prior to the earlier of (i) the expiration of the six-month period measured from the date of Executive's Separation from Service with the Company or (ii) the date of Executive's death. Upon the first business day following the expiration of the applicable Section 409A period, all payments deferred pursuant to the preceding sentence shall be paid in a lump sum to Executive (or Executive's estate or beneficiaries), and any remaining payments due to Executive under this Agreement shall be paid as otherwise provided herein.

(iv) *Expense Reimbursements.* To the extent that any reimbursements under this Agreement are subject to Section 409A, (A) any such reimbursements payable to Executive shall be paid to Executive no later than December 31 of the year following the year in which the expense was incurred, (B) Executive shall submit Executive's reimbursement request promptly following the date the expense is incurred, (C) the amount of expenses reimbursed in one year shall not affect the amount eligible for reimbursement in any subsequent year, other than medical expenses referred to in Section 105(b) of the Code, and (D) Executive's right to reimbursement under this Agreement will not be subject to liquidation or exchange for another benefit.

(v) *Installments.* Executive's right to receive any installment payments under this Agreement, including without limitation any continuation salary payments that are payable on Company payroll dates, shall be treated as a right to receive a series of separate payments and, accordingly, each such installment payment shall at all times be considered a separate and distinct payment as permitted under Section 409A. Except as otherwise permitted under Section 409A, no payment hereunder shall be accelerated or deferred unless such acceleration or deferral would not result in additional tax or interest pursuant to Section 409A.

11. Executive Acknowledgement.

Executive acknowledges that Executive has read and understands this Agreement, is fully aware of its legal effect, has not acted in reliance upon any representations or promises made by the Company other than those contained in writing herein, and has entered into this Agreement freely based on Executive's own judgment.

[*Signature Page Follows*]

IN WITNESS WHEREOF, the Parties have executed this Agreement on the date and year first above written.

RAPID MICRO BIOSYSTEMS, INC.

By: /s/ Victoria Vezina
Name: Victoria Vezina
Title: CHRO

EXECUTIVE

/s/ Richard A. Keys
Richard Keys

[Signature Page to Employment Agreement]

EXHIBIT A

Separation Agreement and Release

This Separation Agreement and Release ("Agreement") is made by and between _____ ("Executive") and Rapid Micro Biosystems, Inc. (the "Company") (collectively referred to as the "Parties" or individually referred to as a "Party"). Capitalized terms used but not defined in this Agreement shall have the meanings set forth in the Employment Agreement (as defined below).

WHEREAS, the Parties have previously entered into that certain Employment Agreement, dated as of _____, 2021 (the "Employment Agreement") and that certain Employee Proprietary Information and Inventions Assignment Agreement, dated as of _____, 20__ (the "Restrictive Covenant Agreement"); and

WHEREAS, in connection with Executive's termination of employment with the Company or a subsidiary or affiliate of the Company effective _____, 20__, the Parties wish to resolve any and all disputes, claims, complaints, grievances, charges, actions, petitions, and demands that Executive may have against the Company and any of the Releasees as defined below, including, but not limited to, any and all claims arising out of or in any way related to Executive's employment with or separation from the Company or its subsidiaries or affiliates but, for the avoidance of doubt, nothing herein will be deemed to release any rights or remedies in connection with Executive's ownership of vested equity securities of the Company, vested benefits or Executive's right to indemnification by the Company or any of its affiliates pursuant to contract or applicable law (collectively, the "Retained Claims").

NOW, THEREFORE, in consideration of the severance payments and benefits described in Section 4 of the Employment Agreement, which, pursuant to the Employment Agreement, are conditioned on Executive's execution and non-revocation of this Agreement, and in consideration of the mutual promises made herein, the Company and Executive hereby agree as follows:

1. Severance Payments and Benefits; Salary and Benefits. The Company agrees to provide Executive with the severance payments and benefits described in Section [4(b)/4(c)] of the Employment Agreement, payable at the times set forth in, and subject to the terms and conditions of, the Employment Agreement. In addition, to the extent not already paid, and subject to the terms and conditions of the Employment Agreement, the Company shall pay or provide to Executive all other payments or benefits described in Section 3(c) of the Employment Agreement, subject to and in accordance with the terms thereof.

2. Release of Claims. Executive agrees that, other than with respect to the Retained Claims, the foregoing consideration represents settlement in full of all outstanding obligations owed to Executive by the Company, any of its direct or indirect subsidiaries and affiliates, and any of its or their current and former officers, directors, equityholders, managers, employees, agents, investors, attorneys, shareholders, administrators, affiliates, benefit plans, plan administrators, insurers, trustees, divisions, and subsidiaries and predecessor and successor corporations and assigns (collectively, the "Releasees"). Executive, on Executive's own behalf and on behalf of any of Executive's affiliated companies or entities and any of their respective heirs, family members, executors, agents, and assigns, other than with respect to the Retained Claims, hereby and forever releases the Releasees from, and agrees not to sue concerning, or in any manner to institute, prosecute, or pursue, any claim, complaint, charge, duty, obligation, or cause of action relating to any matters of any kind, whether presently known or unknown, suspected or unsuspected, that Executive may possess against any of the Releasees arising from any omissions, acts,

facts, or damages that have occurred up until and including the date Executive signs this Agreement, including, without limitation:

(a) any and all claims relating to or arising from Executive's employment or service relationship with the Company or any of its direct or indirect subsidiaries or affiliates and the termination of that relationship;

(b) any and all claims relating to, or arising from, Executive's right to purchase, or actual purchase of any shares of stock or other equity interests of the Company or any of its affiliates, including, without limitation, any claims for fraud, misrepresentation, breach of fiduciary duty, breach of duty under applicable state law, and securities fraud under any state or federal law;

(c) any and all claims for wrongful discharge of employment; termination in violation of public policy; discrimination; harassment; retaliation; breach of contract, both express and implied; breach of covenant of good faith and fair dealing, both express and implied; promissory estoppel; negligent or intentional infliction of emotional distress; fraud; negligent or intentional misrepresentation; negligent or intentional interference with contract or prospective economic advantage; unfair business practices; defamation; libel; slander; negligence; personal injury; assault; battery; invasion of privacy; false imprisonment; conversion; and disability benefits;

(d) any and all claims for violation of any federal, state, or municipal statute, including, but not limited to, Title VII of the Civil Rights Act of 1964; the Civil Rights Act of 1991; the Rehabilitation Act of 1973; the Americans with Disabilities Act of 1990; the Equal Pay Act; the Fair Labor Standards Act; the Fair Credit Reporting Act; the Age Discrimination in Employment Act of 1967; the Older Workers Benefit Protection Act; the Employee Retirement Income Security Act of 1974; the Worker Adjustment and Retraining Notification Act; the Family and Medical Leave Act; and the Sarbanes-Oxley Act of 2002;

(e) any and all claims for violation of the federal or any state constitution;

(f) any and all claims arising out of any other laws and regulations relating to employment or employment discrimination;

(g) any claim for any loss, cost, damage, or expense arising out of any dispute over the non-withholding or other tax treatment of any of the proceeds received by Executive as a result of this Agreement;

(h) any and all claims arising out of the wage and hour and wage payments laws and regulations of the state or states in which Executive has provided service to the Company or any of its affiliates (including without limitation the Massachusetts Payment of Wages Law); and

(i) any and all claims for attorneys' fees and costs.

Executive agrees that the release set forth in this section shall be and remain in effect in all respects as a complete general release as to the matters released. This release does not release claims that cannot be released as a matter of law, including, but not limited to, Executive's right to report possible violations of federal law or regulation to any governmental agency or entity in accordance with the provisions of and rules promulgated under Section 21F of the Securities Exchange Act of 1934 or Section 806 of the Sarbanes-Oxley Act of 2002, or any other whistleblower protection provisions of state or federal law or

regulation and any right to receive an award for information provided thereunder, Executive's right to file a charge with or participate in a charge by the Equal Employment Opportunity Commission, or any other local, state, or federal administrative body or government agency that is authorized to enforce or administer laws related to employment, against the Company for discrimination (with the understanding that Executive's release of claims herein bars Executive from recovering such monetary relief from the Company or any Releasee for any alleged discriminatory treatment), claims for unemployment compensation or any state disability insurance benefits pursuant to the terms of applicable state law, rights to enforce this Agreement, rights to indemnification under Section 9 of the Employment Agreement, under the directors and officers insurance policy and the Indemnification Agreement, claims to continued participation in certain of the Company's group benefit plans pursuant to the terms and conditions of COBRA, claims to any benefit entitlements vested as the date of separation of Executive's employment, pursuant to written terms of any employee benefit plan of the Company or its affiliates and Executive's right under applicable law and any Retained Claims. This release further does not release claims for breach of Section 3(c) or Section 4 of the Employment Agreement.

3. Acknowledgment of Waiver of Claims under ADEA. Executive understands and acknowledges that Executive is waiving and releasing any rights Executive may have under the Age Discrimination in Employment Act of 1967 ("ADEA"), and that this waiver and release is knowing and voluntary. Executive understands and agrees that this waiver and release does not apply to any rights or claims that may arise under the ADEA after the date Executive signs this Agreement. Executive understands and acknowledges that the consideration given for this waiver and release is in addition to anything of value to which Executive was already entitled. Executive further understands and acknowledges that Executive has been advised by this writing that: (a) Executive should consult with an attorney prior to executing this Agreement; (b) Executive has 21 days within which to consider this Agreement, and the Parties agree that such time period to review this Agreement shall not be extended upon any material or immaterial changes to this Agreement; (c) Executive has seven business days following Executive's execution of this Agreement to revoke this Agreement pursuant to written notice to the General Counsel of the Company; (d) this Agreement shall not be effective until after the revocation period has expired; and (e) nothing in this Agreement prevents or precludes Executive from challenging or seeking a determination in good faith of the validity of this waiver under the ADEA, nor does it impose any condition precedent, penalties, or costs for doing so, unless specifically authorized by federal law. In the event Executive signs this Agreement and returns it to the Company in less than the 21 day period identified above, Executive hereby acknowledges that Executive has freely and voluntarily chosen to waive the time period allotted for considering this Agreement.

4. Restrictive Covenants.

(a) Executive acknowledges and agrees that the restrictive covenants and other post-termination obligations set forth in the Restrictive Covenant Agreement, including without limitation Executive's obligations relating to confidentiality, non-use and non-disclosure of Proprietary Information (as defined in the Restrictive Covenant Agreement), non-solicitation, cooperation, and return of property, are hereby incorporated by reference and shall remain in full force and effect pursuant to their terms to the maximum extent permitted by applicable law, except that the Parties expressly agree to modify the Restrictive Covenant Agreement by removing Section 6.1, and each subpart thereto, of the Restrictive Covenant Agreement, which shall be of no further force or effect upon the Effective Date (as defined below). Executive represents and warrants that Executive has complied with all provisions of the Restrictive Covenant Agreement at all times through the Effective Date.

(b) In consideration for the severance payments and benefits set forth in Section 1 of this Agreement, Executive agrees for a period of one year after the Effective Date (the "Non-Competition Restricted Period") to not, directly or indirectly, on Executive's own behalf or for the benefit of any other individual or entity other than the Company: (i) operate, conduct, or engage in, or prepare to operate, conduct, or engage in the Business (as defined below); (ii) own, finance, or invest in (except as the holder of not more than one percent of the outstanding stock of a publicly-held company) any Business; or (iii) participate in, render services to, or assist any person or entity that engages in or is preparing to engage in the Business in any capacity (whether as an employee, consultant, contractor, partner, officer, director, or otherwise) (x) which involves the same or similar types of services Executive performed for the Company at any time during the last two years of Executive's employment with the Company or (y) in which Executive could reasonably be expected to use or disclose Proprietary Information, in each case (i), (ii) or (iii) in the Restricted Territory (as defined below). Without limiting the Company's ability to seek other remedies available in law or equity, if Executive violates this Section 4(b), the Non-Competition Restricted Period shall be extended by one day for each day that Executive is in violation of such provisions, up to a maximum extension equal to the length of the Non-Competition Restricted Period, so as to give the Company the full benefit of the bargained-for length of forbearance.

(c) Executive's continued compliance with the terms of the Restrictive Covenant Agreement (as modified in Section 4(a) above) and the noncompetition obligations set forth in Section 4(b) above (collectively, the "Restrictive Covenants") is a material condition to receipt of the severance payments and benefits set forth in Section 1 of this Agreement. In the event Executive breaches any part of such Restrictive Covenants, then, in addition to any remedies and enforcement mechanisms set forth in the Restrictive Covenant Agreement, the Employment Agreement and this Agreement, and any other remedies available to the Company (including equitable and injunctive remedies), Executive shall forfeit any additional consideration owing and shall be obligated to promptly return to the Company (within fifteen (15) business days of any breach) the full gross amount of all severance payments and benefits provided.

(d) If any provision of the Restrictive Covenants shall be determined to be unenforceable by any court of competent jurisdiction or arbitrator by reason of its extending for too great a period of time or over too large a geographic area or over too great a range of activities, it shall be interpreted to extend only over the maximum period of time, geographic area or range of activities as to which it may be enforceable.

(e) As used in this Agreement:

(i) The term "Business" means any business or part thereof that develops, manufactures, markets, licenses, sells or provides any product or service that competes with any product or service developed, manufactured, marketed, licensed, sold or provided, or planned to be developed, manufactured, marketed, licensed, sold or provided, by the Company, in each case at any time during Executive's employment or engagement with the Company.

(ii) The term "Restricted Territory" means each city, county, state, territory and country in which (i) Executive provided services or had a material presence or influence at any time during the last two years of Executive's employment or engagement with the Company or (ii) the Company is engaged in or has plans to engage in the Business as of the termination of Executive's employment or engagement with the Company.

5. Severability. In the event that any provision or any portion of any provision hereof or any surviving agreement made a part hereof becomes or is declared by a court of competent jurisdiction or arbitrator to be illegal, unenforceable, or void, this Agreement shall continue in full force and effect without said provision or portion of provision.

6. No Oral Modification. This Agreement may only be amended in a writing signed by Executive and a duly authorized officer of the Company.

7. Governing Law; Notices; Dispute Resolution. This Agreement shall be subject to the provisions of Sections 10(a), 10(c), and (h) of the Employment Agreement.

8. Effective Date. Executive has seven business days after Executive signs this Agreement to revoke it and this Agreement will become effective on the day immediately following the seventh business day after Executive signed this Agreement (the "Effective Date"). For the avoidance of doubt, if Executive revokes this Agreement as provided herein, the Parties' modification to the Restrictive Covenant Agreement set forth in Section 4(a) above shall be void and of no effect and, unless the Company has elected or elects in writing to expressly waive Executive's noncompetition obligations set forth in Section 6.1(a) of the Restrictive Covenant Agreement as provided in Section 6.6 of the Restrictive Covenant Agreement, the Restrictive Covenant Agreement, including without limitation Section 6.1 of the Restrictive Covenant Agreement, shall remain in full force and effect.

9. Voluntary Execution of Agreement. Executive understands and agrees that Executive executed this Agreement voluntarily, without any duress or undue influence on the part or behalf of the Company or any third party, with the full intent of releasing all of Executive's claims against the Company and any of the other Releasees. Executive acknowledges that: (a) Executive has read this Agreement; (b) Executive has not relied upon any representations or statements made by the Company that are not specifically set forth in this Agreement; (c) Executive has been represented in the preparation, negotiation, and execution of this Agreement by legal counsel of Executive's own choice or has elected not to retain legal counsel; (d) Executive understands the terms and consequences of this Agreement and of the releases it contains; and (e) Executive is fully aware of the legal and binding effect of this Agreement.

IN WITNESS WHEREOF, the Parties have executed this Agreement on the respective dates set forth below.

EXECUTIVE

Dated: _____ Richard Keys

RAPID MICRO BIOSYSTEMS, INC.

Dated: _____ By:
Name:
Title:

EXHIBIT B
Restrictive Covenant Agreement
[attached]

EXHIBIT C
Indemnification Agreement
[attached]

Exhibit 10.16

RAPID MICRO BIOSYSTEMS, INC.

2021 INCENTIVE AWARD PLAN

SUB-PLAN FOR UK EMPLOYEES

1. Purpose

Pursuant to the powers granted to the Administrator in Article 10.5 of the Rapid Micro Biosystems Inc. 2021 Incentive Award Plan (as it may be amended or restated from time to time, the "Plan"), the Administrator has adopted this Sub-Plan for UK employees (the "Sub-Plan"). The purpose of the Sub-Plan is to provide incentives that will attract, retain and motivate highly competent employees to promote the success of Rapid Micro Biosystems Inc., a company organized under the laws of the State of Delaware (the "Company") and align employees' interests with stockholders' interests. Only UK employees may receive Awards under the Sub-Plan.

2. Construction, Definitions and Eligibility

2.1 Construction

(a) Capitalized terms used in the Sub-Plan which are not defined herein shall have the meaning given in the Plan, and where the context requires any references to the "Plan" in those definitions shall be a reference to the Sub-Plan. The singular pronoun shall include the plural where the context so indicates.

(b) In the event of a conflict between the terms of the Sub-Plan and the Plan with respect to Awards granted to Employees based in the United Kingdom under the Sub-Plan, the terms of the Sub-Plan will control.

2.2 Definitions

(a) Except as set out below, the provisions of Article 11 of the Plan shall apply to this Sub-Plan as if references to the Plan are references to the Sub-Plan.

(b) Section 11.12 ("Consultant") shall not apply to this Sub-Plan.

(c) Section 11.38 ("Service Provider") shall mean an Employee.

(d) Wherever the following terms are: (i) used in the Sub-Plan; or (ii) used in the Plan but apply to Awards made under the Sub-Plan, they shall have the meanings specified below, unless the context clearly indicates otherwise:

(i) "Award" means, individually, or collectively, a grant under the Sub-Plan of an Option, a Stock Appreciation Right, a Restricted Stock award, a Restricted Stock Unit award or an Other Stock or Cash Based Award;

(ii) "Service Provider" shall mean any person who is an Employee.

2.3 **Eligibility**

The Sub-Plan forms the rules of the employee share scheme applicable to Awards made under the Sub-Plan to Employees of the Company and any Subsidiaries based in the United Kingdom or in any other jurisdiction at the discretion of the Administrator. Other Service Providers who are not Employees (such as Consultants and non-employee Directors) are not eligible to receive Awards and become Participants under this Sub-Plan. References to the phrase "Service Provider" shall be interpreted as referring only to Employees when that phrase in the Plan is used in the context of the Sub-Plan and Awards granted to Employees under this Sub-Plan.

3. Administration and Delegation

The provisions of Article 3 of the Plan shall apply to this Sub-Plan as if references to the Plan are references to the Sub-Plan.

4. Stock Available for Awards

(a) Except as set out below, and subject to the terms of 4(c) of this Sub-Plan, the provisions of Article 4 of the Plan shall apply to this Sub-Plan as if references to the Plan are references to the Sub-Plan.

(b) Articles 4.3 and 4.5 of the Plan will not apply to the Sub-Plan.

(c) The aggregate number of Shares which may be issued or transferred pursuant to Awards under the Sub-Plan, when taken together with the number of Shares which may be issued or transferred pursuant to Awards under the Plan or any other sub-plan shall not exceed the limits specified by Article 4 of the Plan, as amended from time to time.

5. Stock Options and Stock Appreciation Rights

(a) Except as set out below, the provisions of Article 5 of the Plan shall apply to this Sub-Plan as if references to the Plan are references to the Sub-Plan.

(b) Unless otherwise determined appropriate by the Administrator, any Option granted under this Sub-Plan shall be a Non-Qualified Stock Option.

(c) References to the phrase "Termination of Service" shall be interpreted as referring only to the date the Participant ceases to be an Employee when that phrase in the Plan is used in the context of the Sub-Plan and Awards granted to Employees based in the United Kingdom.

6. Restricted Stock; Restricted Stock Units

The provisions of Article 6 of the Plan shall apply to this Sub-Plan as if references to the Plan are references to the Sub-Plan. On request by the Company, Participants tax resident in the United Kingdom will be required to make an election under Section 431 of Chapter 2 Income Tax (Earnings and Pensions) Act 2003 pursuant to which, for the relevant tax purposes, the market value of the shares acquired will be

calculated as if the shares were not restricted. Participants tax resident in other jurisdictions may be required to make equivalent elections appropriate to their jurisdictions.

7. Other Stock or Cash Based Awards

The provisions of Article 7 of the Plan shall apply to this Sub-Plan as if references to the Plan are references to the Sub-Plan.

8. Adjustments For Changes In Common Stock And Certain Other Events

The provisions of Article 8 of the Plan shall apply to this Sub-Plan as if references to the Plan are references to the Sub-Plan.

9. General Provisions Applicable To Awards

(a) Except as set out below, the provisions of Article 9 of the Plan shall apply to this Sub-Plan as if references to the Plan are references to the Sub-Plan.

(b) Section 9.5 of the Plan shall be amended so that the term "taxes required by Applicable Laws to be withheld" and any similar phrases relating to tax obligations when used in Section 9.5 shall include income tax, employee's National Insurance contributions and (at the discretion of the Company) employer's National Insurance contributions or other similar taxes arising in any jurisdiction (any a "Tax Liability"). The Participant will indemnify and keep indemnified the Company and his/her employing company, if different, from and against any liability for or obligation to pay any Tax Liability arising in consequence of any Award.

10. Miscellaneous

(a) The provisions of Article 10 of the Plan shall apply to this Sub-Plan as if references to the Plan are references to the Sub-Plan.

(b) The following language set out below is in addition to the terms of Article 10:

"Neither the Sub-Plan nor any Award made under the Sub-Plan shall give the Participant any rights to compensation or damages including for any loss or potential loss that the Participant may suffer by reason of being unable to exercise any Option or forfeiting any Award or Common Stock as a result of the termination of the Sub-Plan, the lapsing or termination of an Award or the Participant's Termination of Service including where any Termination of Service is subsequently held to be wrongful or unfair."

(c) The Company will collect and process information relating to UK Employees in accordance with the privacy notice which is available on the Company's intranet site.

RAPID MICRO BIOSYSTEMS, INC.
2021 INCENTIVE AWARD PLAN

GLOBAL RESTRICTED STOCK UNIT GRANT NOTICE

Capitalized terms not specifically defined in this Global Restricted Stock Unit Grant Notice (the "***Grant Notice***") have the meanings given to them in the 2021 Incentive Award Plan (as amended from time to time, the "***Plan***") of Rapid Micro Biosystems, Inc. (the "***Company***").

The Company has granted to the participant listed below ("***Participant***") the Restricted Stock Units described in this Grant Notice (the "***RSUs***"), subject to the terms and conditions of the Plan and the Global Restricted Stock Unit Agreement attached as **Exhibit A**, including any additional terms and conditions set forth in any appendix for Participant's country (the "***Appendix***" and, together with the Global Restricted Stock Unit Agreement, the "***Agreement***"), both of which are incorporated into this Grant Notice by reference.

Participant:
Grant Date:
Number of RSUs:
Vesting Commencement Date:
Vesting Schedule:

By Participant's signature below, Participant agrees to be bound by the terms of this Grant Notice, the Plan and the Agreement. Participant has reviewed the Plan, this Grant Notice and the Agreement in their entirety, has had an opportunity to obtain the advice of counsel prior to executing this Grant Notice and fully understands all provisions of the Plan, this Grant Notice and the Agreement. Participant hereby agrees to accept as binding, conclusive and final all decisions or interpretations of the Administrator upon any questions arising under the Plan, this Grant Notice or the Agreement.

RAPID MICRO BIOSYSTEMS, INC.	**PARTICIPANT**
By: _____	_____
Name: _____	
Title: _____	

Exhibit A

GLOBAL RESTRICTED STOCK UNIT AGREEMENT

Capitalized terms not specifically defined in this Global Restricted Stock Unit Agreement, including any additional terms and conditions for Participant's country set forth in the Appendix hereto (together, this "Agreement") shall have the meanings specified in the Grant Notice or, if not defined in the Grant Notice, in the Plan.

ARTICLE I.
GENERAL

1.1 Award of RSUs and Dividend Equivalents.

(a) The Company has granted the RSUs to Participant effective as of the grant date set forth in the Grant Notice (the "***Grant Date***"). Each RSU represents the right to receive one Share or, at the option of the Company, an amount of cash, in either case, as set forth in this Agreement. Participant will have no right to the distribution of any Shares or payment of any cash until the time (if ever) the RSUs have vested.

(b) The Company hereby grants to Participant, with respect to each RSU, a Dividend Equivalent for ordinary cash dividends paid to substantially all holders of outstanding Shares with a record date after the Grant Date and prior to the date the applicable RSU is settled, forfeited or otherwise expires. Each Dividend Equivalent entitles Participant to receive the equivalent value of any such ordinary cash dividends paid on a single Share. The Company will establish a separate Dividend Equivalent bookkeeping account (a "***Dividend Equivalent Account***") for each Dividend Equivalent and credit the Dividend Equivalent Account (without interest) on the applicable dividend payment date with the amount of any such cash paid.

1.2 Incorporation of Terms of Plan. The RSUs are subject to the terms and conditions set forth in this Agreement and the Plan, which is incorporated herein by reference. In the event of any inconsistency between the Plan and this Agreement, the terms of the Plan will control.

1.3 Unsecured Promise. The RSUs and Dividend Equivalents will at all times prior to settlement represent an unsecured Company obligation payable only from the Company's general assets.

ARTICLE II.
VESTING; FORFEITURE AND SETTLEMENT

2.1 Vesting; Forfeiture. The RSUs will vest according to the vesting schedule in the Grant Notice except that any fraction of an RSU that would otherwise be vested will be accumulated and will vest only when a whole RSU has accumulated. In the event of Participant's Termination of Service for any reason, all unvested RSUs will immediately and automatically be cancelled and forfeited, except as otherwise determined by the Administrator or provided in a binding written agreement between Participant and the Company. Dividend Equivalents (including any Dividend Equivalent Account balance) will vest or be forfeited, as applicable, upon the vesting or forfeiture of the RSU with respect to which the Dividend Equivalent (including the Dividend Equivalent Account) relates. For the avoidance of doubt, employment or other service during only a portion of the vesting period, but where Termination of Service has occurred prior to a vesting date, shall not entitle Participant to vest in a pro-rata portion of the RSUs or Dividend Equivalents.

For purposes of the RSUs and Dividend Equivalents, the Administrator shall have the exclusive discretion to determine when Participant is no longer a Service Provider under the Plan, notwithstanding whether Participant may still be considered an Employee or Consultant under Applicable Laws. In particular, the Administrator may determine that Participant's Termination of Service is deemed to occur as of the date Participant is no longer actively providing services to the Company or any Subsidiary (regardless of the reason for the termination and whether or not later found to be invalid or in breach of Applicable Laws in the jurisdiction where Participant is rendering services or the terms of Participant's employment or other service agreement, if any), without regard to any contractual notice period or any period of "garden leave" or similar period mandated under the Applicable Laws of the jurisdiction where Participant is rendering services or the terms of Participant's employment or other service agreement, if any.

2.2 Settlement.

(a) RSUs and Dividend Equivalents (including any Dividend Equivalent Account balance) will be paid in Shares or cash at the Company's option as soon as administratively practicable after the vesting of the applicable RSU, but in no event more than sixty (60) days after the RSU's vesting date. Notwithstanding the foregoing, the Company may delay any payment under this Agreement that the Company reasonably determines would violate Applicable Laws until the earliest date the Company reasonably determines the making of the payment will not cause such a violation (in accordance with Treasury Regulation Section 1.409A-2(b)(7)(ii)), provided the Company reasonably believes the delay will not result in the imposition of excise taxes under Section 409A.

(b) If an RSU is paid in cash, the amount of cash paid with respect to the RSU will equal the Fair Market Value of a Share on the day immediately preceding the payment date. If a Dividend Equivalent is paid in Shares, the number of Shares paid with respect to the Dividend Equivalent will equal the quotient, rounded down to the nearest whole Share, of the Dividend Equivalent Account balance divided by the Fair Market Value of a Share on the day immediately preceding the payment date.

ARTICLE III.
TAXATION AND TAX WITHHOLDING

3.1 Representation. The Company is not providing any tax, legal or financial advice, nor is the Company making recommendations regarding participation in the Plan, or Participant's acquisition or sale of the underlying Shares. Participant represents to the Company that Participant has reviewed with Participant's own tax advisors the tax consequences of this Award and the transactions contemplated by the Grant Notice and this Agreement. Participant is relying solely on such advisors and not on any statements or representations of the Company or any of its agents.

3.2 Responsibility for Taxes.

(a) Participant acknowledges that, regardless of any action taken by the Company or, if different, the Subsidiary which employs Participant or to which Participant otherwise renders services (the "***Service Recipient***"), the ultimate liability for all income tax, social insurance, payroll tax, fringe benefits tax, payment on account or other tax-related items related to Participant's participation in the Plan and legally applicable or deemed applicable to Participant ("***Tax-Related Items***") is and remains Participant's responsibility and may exceed the amount (if any) actually withheld by the Company or the Service Recipient. Participant further acknowledges that the Company and/or the Service Recipient (i)

make no representations or undertakings regarding the treatment of any Tax-Related Items in connection with any aspect of the RSUs, including, but not limited to, the grant, vesting or settlement of the RSUs, the subsequent sale of Shares acquired pursuant to the settlement of any RSUs and the receipt of any dividends or Dividend Equivalents; and (ii) do not commit to and are under no obligation to structure the terms of the grant or any aspect of the RSUs to reduce or eliminate Participant's liability for Tax-Related Items or achieve any particular tax result. Further, if Participant is subject to Tax-Related Items in more than one jurisdiction, Participant acknowledges that the Company and/or the Service Recipient (or former Service Recipient, as applicable) may be required to withhold or account for Tax-Related Items in more than one jurisdiction.

(b) Unless otherwise determined by the Administrator, any applicable withholding obligations or rights for Tax-Related Items shall be satisfied in full by an arrangement whereby (i) the Company shall issue to a broker, designated by the Company and acting on behalf of the Participant, a number of Shares sufficient to satisfy the applicable withholding obligations or rights for Tax-Related Items, provided that the amount sold does not exceed the maximum statutory tax rate or such lesser amount as is necessary to avoid liability accounting treatment, along with any applicable third-party commission ("***Sale to Cover***"), and (ii) the proceeds of such Sale to Cover shall be remitted to the Company. In the event the proceeds from the Sale to Cover are insufficient to fully satisfy the applicable withholding obligations or rights for Tax-Related Items, Participant authorizes the Company or its respective agents to satisfy any applicable withholding obligations or rights with regard to all Tax-Related Items by withholding in Shares to be issued upon settlement of the RSUs, by withholding from Participant's wages or other cash compensation payable to Participant, requiring Participant to make cash payment in an amount equal to the withholding obligations or rights for Tax-Related Items, or any other method determined by the Company and to the extent required by Applicable Laws or the Plan, approved by the Administrator. Given that the Sale to Cover is both mandatory and non-discretionary, it is the intent of the parties that this Section 3.2(b) comply with the requirements of Rule 10b5-1(c)(1)(i)(B) under the Exchange Act, and this Agreement will be interpreted to comply with the requirements of Rule 10b5-1(c) under the Exchange Act.

(c) The Company may withhold or account for Tax-Related Items by considering statutory or other withholding rates, including minimum or maximum rates applicable in Participant's jurisdiction(s). In the event of over-withholding, Participant may receive a refund of any over-withheld amount in cash (with no entitlement to the equivalent in Shares), or if not refunded, Participant may be able to seek a refund from the local tax authorities. In the event of under-withholding, Participant may be required to pay any additional Tax-Related Items directly to the applicable tax authority. If the obligation for Tax-Related Items is satisfied by withholding in Shares, for tax purposes, Participant will be deemed to have been issued the full number of Shares subject to the vested RSUs and Dividend Equivalents, notwithstanding that a number of the Shares is held back solely for the purpose of satisfying withholding obligations for Tax-Related Items.

(d) The Company may refuse to issue or deliver the Shares or the proceeds of the sale of Shares, if Participant fails to comply with his or her obligations in connection with the Tax-Related Items.

ARTICLE IV.
OTHER PROVISIONS

4.1 Nature of Grant. By accepting the RSUs, Participant acknowledges, understands and agrees that:

(a) the Plan is established voluntarily by the Company, it is discretionary in nature and it may be modified, amended, suspended or terminated by the Company at any time, to the extent permitted by the Plan;

(b) the grant of the RSUs is exceptional, voluntary and occasional and does not create any contractual or other right to receive future grants of Restricted Stock Units, or benefits in lieu of Restricted Stock Units, even if Restricted Stock Units have been granted in the past;

(c) all decisions with respect to future Restricted Stock Units or other grants, if any, will be at the sole discretion of the Company;

(d) Participant is voluntarily participating in the Plan;

(e) the RSUs, the Dividend Equivalents and any Shares acquired under the Plan, and the income from and value of same, are not intended to replace any pension rights or compensation;

(f) the RSUs, the Dividend Equivalents and any Shares acquired under the Plan, and the income from and value of same, are not part of normal or expected compensation for purposes of calculating any severance, resignation, termination, redundancy, dismissal, end-of-service payments, bonuses, long-service awards, holiday pay, pension or retirement or welfare benefits or similar payments;

(g) the future value of the Shares underlying the RSUs and the Dividend Equivalents is unknown, indeterminable, and cannot be predicted with certainty;

(h) no claim or entitlement to compensation or damages shall arise from forfeiture of the RSUs and the Dividend Equivalents resulting from Participant's Termination of Service (for any reason whatsoever, whether or not later found to be invalid or in breach of Applicable Laws in the jurisdiction where Participant is providing service or the terms of Participant's employment or other service agreement, if any);

(i) unless otherwise agreed with the Company, the RSUs, the Dividend Equivalents and the Shares subject to the RSUs, and the income from and value of same, are not granted as consideration for, or in connection with, the service Participant may provide as a director of a Subsidiary;

(j) unless otherwise provided in the Plan or by the Company in its discretion, the RSUs, the Dividend Equivalents and the benefits evidenced by this Agreement do not create any entitlement to have the RSUs, the Dividend Equivalents or any such benefits transferred to, or assumed by, another company nor be exchanged, cashed out or substituted for, in connection with any corporate transaction affecting the Shares; and

(k) the following provisions apply only if Participant is providing services outside the United States:

(i) the RSUs, the Dividend Equivalents and the Shares subject to the RSUs are not part of normal or expected compensation or salary for any purpose; and

(ii) neither the Company, the Service Recipient nor any other Subsidiary shall be liable for any foreign exchange rate fluctuation between Participant's local currency and the U.S. dollar that may affect the value of the RSUs, the Dividend Equivalents or of any amounts due to Participant pursuant to the vesting of the RSUs or of the Dividend Equivalents or the subsequent sale of any Shares acquired upon settlement of the RSUs and the Dividend Equivalents.

4.2 Adjustments. Participant acknowledges that the RSUs, the Shares subject to the RSUs and the Dividend Equivalents are subject to adjustment, modification and termination in certain events as provided in this Agreement and the Plan.

4.3 Notices. Any notice to be given under the terms of this Agreement to the Company must be in writing and addressed to the Company in care of the Company's Secretary at the Company's principal office or the Secretary's then-current email address or facsimile number. Any notice to be given under the terms of this Agreement to Participant must be in writing and addressed to Participant at Participant's last known mailing address, email address or facsimile number in the Company's personnel files. By a notice given pursuant to this Section, either party may designate a different address for notices to be given to that party. Any notice will be deemed duly given when actually received, when sent by email, when sent by certified mail (return receipt requested) and deposited with postage prepaid in a post office or branch post office regularly maintained by the United States Postal Service, or comparable non-U.S. postal service, when delivered by a nationally recognized express shipping company or upon receipt of a facsimile transmission confirmation.

4.4 Titles. Titles are provided herein for convenience only and are not to serve as a basis for interpretation or construction of this Agreement.

4.5 Conformity to Applicable Laws. Participant acknowledges that the Plan, the Grant Notice and this Agreement are intended to conform to the extent necessary with all Applicable Laws and, to the extent Applicable Laws permit, will be deemed amended as necessary to conform to Applicable Laws. Notwithstanding any other provision of the Plan, the Grant Notice or this Agreement, unless there is an available exemption from any registration, qualification or other legal requirement applicable to the Shares, the Company shall not be required to deliver any Shares issuable upon settlement of the RSUs prior to the completion of any registration or qualification of the Shares under any U.S. or non-U.S. federal, state or local securities or exchange control law or under rulings or regulations of the U.S. Securities and Exchange Commission ("***SEC***") or of any other governmental regulatory body, or prior to obtaining any approval or other clearance from any U.S. or non-U.S. federal, state or local governmental agency, which registration, qualification or approval the Company shall, in its absolute discretion, deem necessary or advisable. Participant understands that the Company is under no obligation to register or qualify the Shares with the SEC or any other securities commission or to seek approval or clearance from any governmental authority for the issuance or sale of the Shares. Further, Participant agrees that the Company shall have unilateral authority to amend the Plan and this Agreement without his or her consent to the extent necessary to comply with Applicable Laws applicable to issuance of Shares.

4.6 Successors and Assigns. The Company may assign any of its rights under this Agreement to single or multiple assignees, and this Agreement will inure to the benefit of the successors and assigns

of the Company. Subject to the restrictions on transfer set forth in the Plan, this Agreement will be binding upon and inure to the benefit of the heirs, legatees, legal representatives, successors and assigns of the parties hereto.

4.7 Limitations Applicable to Section 16 Persons. Notwithstanding any other provision of the Plan or this Agreement, if Participant is subject to Section 16 of the Exchange Act, the Plan, the Grant Notice, this Agreement, the RSUs and the Dividend Equivalents will be subject to any additional limitations set forth in any applicable exemptive rule under Section 16 of the Exchange Act (including any amendment to Rule 16b-3) that are requirements for the application of such exemptive rule. To the extent Applicable Laws permit, this Agreement will be deemed amended as necessary to conform to such applicable exemptive rule.

4.8 Entire Agreement. The Plan, the Grant Notice and this Agreement (including any exhibit hereto) constitute the entire agreement of the parties and supersede in their entirety all prior undertakings and agreements of the Company and Participant with respect to the subject matter hereof.

4.9 Agreement Severable. In the event that any provision of the Grant Notice or this Agreement is held illegal or invalid, the provision will be severable from, and the illegality or invalidity of the provision will not be construed to have any effect on, the remaining provisions of the Grant Notice or this Agreement.

4.10 Limitation on Participant's Rights. Participation in the Plan confers no rights or interests other than as herein provided. This Agreement creates only a contractual obligation on the part of the Company as to amounts payable and may not be construed as creating a trust. Neither the Plan nor any underlying program, in and of itself, has any assets. Participant will have only the rights of a general unsecured creditor of the Company with respect to amounts credited and benefits payable, if any, with respect to the RSUs and Dividend Equivalents, and rights no greater than the right to receive cash or the Shares as a general unsecured creditor with respect to the RSUs and Dividend Equivalents, as and when settled pursuant to the terms of this Agreement.

4.11 Not a Contract of Employment. Nothing in the Plan, the Grant Notice or this Agreement confers upon Participant any right to continue in the employ or other service of the Company, the Service Recipient or any Subsidiary or interferes with or restricts in any way the rights of the Company, the Service Recipient and any other Subsidiary, which rights are hereby expressly reserved, to discharge or terminate the services of Participant at any time for any reason whatsoever, with or without Cause, except to the extent expressly provided otherwise in a written agreement between the Company, the Service Recipient or another Subsidiary and Participant.

4.12 Counterparts. The Grant Notice may be executed in one or more counterparts, including by way of any electronic signature, subject to Applicable Laws, each of which will be deemed an original and all of which together will constitute one instrument.

4.13 ***Data Privacy. In accepting the RSUs, Participant explicitly, voluntarily and unambiguously consents to the collection, use and transfer, in electronic or other form, of Participant's personal data as described in the Grant Notice and this Agreement and any other grant materials by an and among, as applicable, the Company, the Service Recipient and any other Subsidiary for the exclusive purpose of implementing, administering and managing Participant's participation in the Plan.***

Participant understands that the Company, the Service Recipient and other Subsidiaries hold certain personal information about Participant, including, but not limited to, Participant's name, home address, email address and telephone number, date of birth, social security number, passport or other identification number, salary, nationality, job title, or any shares of stock or directorships held in the Company, and details of all awards or other entitlement to shares awarded, canceled, exercised, vested, unvested, or outstanding in Participant's favor ("Data"), for the exclusive purpose of implementing, administering and managing Participant's participation in the Plan.

Participant further understands that the Company, the Service Recipient and/or other Subsidiaries will transfer Data among themselves as necessary for the exclusive purposes of implementation, administration and management of Participant's participation in the Plan, and that the Company, the Service Recipient and/or other Subsidiaries may each further transfer Data to Fidelity Stock Plan Services, LLC and certain of its affiliates ("Fidelity") or such other third party, which are assisting the Company (or may assist the Company in the future) with the implementation, administration, and management of the Plan.

Participant understands that the recipients of Data may be located in the United States or elsewhere, and that the United States may have different data privacy laws and protections than Participant's country. Participant understands that, if Participant resides outside the United States, Participant may request a list with the names and addresses of Data Recipients by contacting in writing Participant's local human resources representative. Participant authorizes the recipients of Data to receive, possess, use, retain and transfer Data, in electronic or other form, for the purposes of implementing, administering, and managing Participant's participation in the Plan. Participant understands that Data will be held only as long as is necessary to implement, administer and manage Participant's participation in the Plan.

Participant understands that, if Participant resides outside the United States, Participant may, at any time, view Data, request additional information about the storage and processing of Data, require any necessary amendments to Data to make the information contained therein factually accurate, or refuse or withdraw the consents herein, in any case without cost, by contacting in writing Participant's local human resources representative.

Further, Participant understands that Participant is providing the consents herein on a purely voluntary basis. If Participant does not consent, or if Participant later seeks to revoke the consents, Participant's employment status or career with the Service Recipient will not be affected; the only consequence of refusing or withdrawing the consents is that the Company would not be able to grant RSUs or other equity awards to Participant or administer or maintain such awards. Therefore, Participant understands that refusing or withdrawing the consents may affect Participant's ability to participate in the Plan. For more information on the consequences of Participant's refusal to consent or withdrawal of consent, Participant understands that Participant may contact in writing Participant's local human resources representative.

Upon request of the Company or the Service Recipient, Participant agrees to provide a separate executed data privacy consent form (or any other agreements or consents that may be required by the Company and/or the Service Recipient) that the Company and/or the Service Recipient may deem necessary to obtain from Participant for the purpose of administering Participant's participation in the Plan in compliance with the data privacy laws in Participant's jurisdiction(s), either now or in the future.

Participant understands and agrees that Participant will not be able to participate in the Plan if Participant fails to provide any such consent or agreement requested by the Company and/or the Service Recipient.

4.14 Electronic Delivery and Participation. The Company may, in its sole discretion, decide to deliver any documents related to current or future participation in the Plan by electronic means. Participant hereby consents to receive such documents by electronic delivery and agrees to participate in the Plan through an on-line or electronic system established and maintained by the Company or a third party designated by the Company.

4.15 Language. Participant acknowledges that Participant is sufficiently proficient in the English language or has consulted with an advisor who is sufficiently proficient in the English language, and understands the content of the Grant Notice or this Agreement and other Plan-related materials . If Participant has received the Grant Notice and this Agreement or any other document related to the Plan and/or the RSUs translated into a language other than English and if the meaning of the translated version is different than the English version, the English version will control.

4.16 Governing Law and Venue. The RSUs, the Grant Notice and this Agreement shall be governed by, and interpreted in accordance with, the laws of the State of Delaware, without regard to the conflict of laws principles thereof.

For purposes of any action, lawsuit or other proceedings that arises under this Award or the Grant Notice and this Agreement, the parties hereby submit to and consent to the sole and exclusive jurisdiction of the Commonwealth of Massachusetts and agree that such litigation shall be conducted in the courts of Middlesex County, Massachusetts, or the federal courts for the United States for the District of Massachusetts, where this Award is made and/or to be performed.

4.17 Appendix. Notwithstanding any provisions in this Global Restricted Stock Unit Agreement, the RSUs shall be subject to any additional terms and conditions set forth in any Appendix to this Global Restricted Stock Unit Agreement for Participant's country. Moreover, if Participant relocates to one of the countries included in the Appendix, the additional terms and conditions for such country will apply to Participant, to the extent the Company determines that the application of such terms and conditions is necessary or advisable for legal or administrative reasons. The Appendix constitutes part of this Agreement.

4.18 Imposition of Other Requirements. The Company reserves the right to impose other requirements on Participant's participation in the Plan, on the RSUs and on any Shares acquired under the Plan, to the extent the Company determines it is necessary or advisable for legal or administrative reasons, and to require Participant to sign any additional agreements or undertakings that may be necessary to accomplish the foregoing.

4.19 Insider Trading Restrictions/Market Abuse Laws. Participant acknowledges that, depending on Participant's country or broker's country, or the country in which Stock is listed, Participant may be subject to insider trading restrictions and/or market abuse laws in applicable jurisdictions, which may affect his or her ability to accept, acquire, sell or attempt to sell, or otherwise dispose of the Shares, rights to Shares (*e.g.*, the RSUs) or rights linked to the value of Stock, during such times as Participant is considered to have "inside information" regarding the Company (as defined by the laws or regulations in applicable jurisdictions, including the United States and Participant's country). Local insider trading laws

and regulations may prohibit the cancellation or amendment of orders Participant placed before possessing inside information. Furthermore, Participant may be prohibited from (i) disclosing insider information to any third party, including fellow employees (other than on a "need to know" basis) and (ii) "tipping" third parties or causing them to otherwise buy or sell Company securities. Any restrictions under these laws or regulations are separate from and in addition to any restrictions that may be imposed under any applicable Company insider trading policy. Participant acknowledges that it is Participant's responsibility to comply with any applicable restrictions, and Participant should speak to his or her personal advisor on this matter.

4.20 Exchange Control, Foreign Asset/Account Reporting Requirements. Participant acknowledges that Participant may be subject to foreign asset/account, exchange control and/or tax reporting requirements as a result of the acquisition, holding and/or transfer of Shares or cash (including dividends and the proceeds arising from the sale of Shares) derived from his or her participation in the Plan in, to and/or from a brokerage/bank account or legal entity located outside Participant's country. Applicable Laws may require that Participant report such accounts, assets, the balances therein, the value thereof and/or the transactions related thereto to the applicable authorities in such country. Participant also may be required to repatriate sale proceeds or other funds received as a result of Participant's participation in the Plan to his or her country through a designated bank or broker within a certain time after receipt. Participant acknowledges that he or she is responsible for ensuring compliance with any applicable foreign asset/account, exchange control and tax reporting requirements and should consult his or her personal legal advisor on this matter.

4.21 Waiver. Participant acknowledges that a waiver by the Company of breach of any provision of the Grant Notice and this Agreement shall not operate or be construed as a waiver of any other provision of the Grant Notice and this Agreement, or of any subsequent breach by Participant or any other Participant.

By electronically accepting the Grant Notice and this Agreement and participating in the Plan, Participant agrees to be bound by the terms and conditions in the Plan and the Grant Notice and this Agreement. Within six months of the Grant Date, if Participant has not electronically accepted the Grant Notice and this Agreement on Fidelity's website (or the website of any other stock plan service provider appointed by the Company), then this Award shall be deemed accepted, and Participant shall be bound by the terms and conditions in the Plan and the Grant Notice and this Agreement.

*** * * * ***

APPENDIX
TO
GLOBAL RESTRICTED STOCK UNIT AGREEMENT

Capitalized terms used but not defined herein shall have the meanings ascribed to them in the Grant Notice, the Global Restricted Stock Unit Agreement (the "***RSU Agreement***") and the Plan.

Terms and Conditions

This Appendix includes additional terms and conditions that govern the RSUs if Participant resides and/or works in one of the countries listed below.

If Participant is a citizen or resident (or is considered as such for local law purposes) of a country other than the country in which Participant is currently residing and/or working, or if Participant transfers to another country after the Grant Date, the Administrator shall, in its discretion, determine to what extent the terms and conditions contained herein shall be applicable to Participant.

Notifications

This Appendix also includes information regarding securities, exchange controls, tax and certain other issues of which Participant should be aware with respect to his or her participation in the Plan. The information is based on the securities, exchange control, tax and other laws in effect in the respective countries as of February 2022. Such laws are often complex and change frequently. As a result, the Company strongly recommends that Participant not rely on the information noted herein as the only source of information relating to the consequences of his or her participation in the Plan because the information may be out of date at the time the RSUs vest or Participant sells Shares acquired under the Plan.

In addition, the information contained herein is general in nature and may not apply to Participant's particular situation, and the Company is not in a position to assure Participant of any particular result. Accordingly, Participant should seek appropriate professional advice as to how the relevant laws in his or her country may apply to Participant's situation.

If Participant is a citizen or resident (or is considered as such for local law purposes) of a country other than the one in which he or she is currently residing and/or working, or if Participant transfers to another country after the Grant Date, the information contained herein may not be applicable to Participant in the same manner.

EUROPEAN UNION, EUROPEAN ECONOMIC AREA, SWITZERLAND AND UNITED KINGDOM

Data Privacy. The following provisions replace Section 4.13 of the RSU Agreement:

(a) ***Data Collection and Usage.*** ***The Company and the Service Recipient collect, process and use certain personal information about Participant, including, but not limited to, Participant's name, home address, telephone number, email address, date of birth, social insurance number, passport or other identification number, salary, nationality, job title, any Shares or directorships held in the Company, details of all equity awards granted under the Plan or any other entitlement to Shares awarded, canceled, exercised, vested, unvested or outstanding in Participant's favor ("Data"), for the legitimate purpose of implementing, administering and managing the Plan. Where required, the legal basis for the collection and processing of Data is Participant's consent.***

(b) ***Stock Plan Administration Service Providers.*** ***The Company transfers Data to Fidelity Stock Plan Services, LLC. and certain of its affiliated companies ("Fidelity"), an independent service provider based in the U.S., which is assisting the Company with the implementation, administration and management of the Plan. Where required, the legal basis for the transfer of Data to Fidelity is Participant's consent. The Company may select a different service provider or additional service providers and share Data with such other provider serving in a similar manner. Participant may be asked to agree on separate terms and data processing practices with Fidelity, with such agreement being a condition to the ability to participate in the Plan.***

(c) ***International Data Transfers.*** ***The Company and its service providers, including Fidelity are based in the U.S. Participant's country or jurisdiction may have different data privacy laws and protections than the U.S. Where required, the legal basis for the transfer of Data to these recipients is Participant's consent.***

(d) ***Data Retention.*** ***The Company will hold and use Data only as long as is necessary to implement, administer and manage Participant's participation in the Plan, or as required to comply with Applicable Laws, exercise or defense of legal rights, and archiving, back-up and deletion processes. This period may extend beyond Participant's period of employment or other service with the Service Recipient.***

(e) ***Voluntariness and Consequences of Consent Denial or Withdrawal.*** ***Participation in the Plan is voluntary and Participant is providing the consents herein on a voluntary basis. Participant understands that Participant may request to stop the transfer and processing of Participant's Data for purposes of Participant's participation in the Plan and that Participant's compensation from or employment relationship with the Service Recipient will not be affected. The only consequence of refusing or withdrawing consent is that the Company would not be able to allow Participant to participate in the Plan. Participant understands that Participant's Data will still be processed in relation to Participant's employment or service and for record-keeping purposes.***

(f) ***Data Subject Rights.*** ***Participant may have a number of rights under data privacy laws in Participant's jurisdiction. Depending on where Participant is based, such rights may include the right to (i) request access to or copies of Data the Company processes, (ii) rectify incorrect Data, (iii) delete Data, (iv) restrict the processing of Data, (v) restrict the portability of Data, (vi) lodge complaints with competent authorities in Participant's jurisdiction, and/or (vii) receive a list with the names and***

addresses of any potential recipients of Data. To receive clarification regarding these rights or to exercise these rights, Participant can contact Participant's local human resources representative.

AUSTRALIA

Terms and Conditions

Australia Offer Document. The Company is pleased to provide Participant with this offer to participate in the Plan. This offer sets out information regarding the grant of RSUs to Australian resident Service Providers. This information is provided by the Company to ensure compliance of the Plan with Australian Securities and Investments Commission ("***ASIC***") Class Order 14/1000 and relevant provisions of the Corporations Act 2001.

In addition to the information set out in the Grant Notice, the Agreement (including this Appendix), Participant is also being provided with copies of the following documents:

(a) the Plan;

(b) the Plan prospectus; and

(c) Employee Information Supplement (collectively, the "***Additional Documents***").

The Additional Documents provide further information to help Participant make an informed investment decision about participating in the Plan. Neither the Plan nor the Plan prospectus is a prospectus for the purposes of the Corporations Act 2001.

Participant should not rely upon any oral statements made in relation to this offer. Participant should rely only upon the statements contained in the Grant Notice, the Agreement (including this Appendix) and the Additional Documents when considering participation in the Plan.

Notifications

Tax Information. The Plan is a plan to which Subdivision 83A-C of the Income Tax Assessment Act 1997 (Cth) applies, subject to the conditions therein.

Securities Law Information. Investment in Shares involves a degree of risk. Eligible Service Providers who participate in the Plan should monitor their participation and consider all risk factors relevant to the acquisition of Shares under the Plan as set forth below and in the Additional Documents.

The information herein is general information only. It is not advice or information that takes into account Participant's objectives, financial situation and needs. Participant should consider obtaining his or her own financial product advice from a person who is licensed by ASIC to give such advice.

Additional Risk Factors for Australian Residents. Participant should have regard to risk factors relevant to investment in securities generally and, in particular, to holding Shares. For example, the price at which an individual Share is quoted on the Nasdaq Stock Market ("Nasdaq") may increase or decrease due to a number of factors. There is no guarantee that the price of a Share will increase. Factors that may affect the price of an individual Share include fluctuations in the domestic and international market for listed stocks, general economic conditions, including interest rates, inflation rates, commodity and oil prices,

changes to government fiscal, monetary or regulatory policies, legislation or regulation, the nature of the markets in which the Company operates and general operational and business risks.

More information about potential factors that could affect the Company's business and financial results will be included in the Company's most recent Annual Report on Form 10-K and the Company's Quarterly Report on Form 10-Q. Copies of these reports are available at www.sec.gov, on the Company's investor's page at https://investors.rapidmicrobio.com/, and upon request to the Company.

In addition, Participant should be aware that the Australian dollar ("***AUD***") value of any Shares acquired under the Plan will be affected by the USD/AUD exchange rate. Participation in the Plan involves certain risks related to fluctuations in this rate of exchange.

Common Stock in a U.S. Corporation. Common stock of a U.S. corporation is analogous to ordinary shares of an Australian corporation. Each holder of a Share is entitled to one vote. Dividends may be paid on the Shares out of any funds of the Company legally available for dividends at the discretion of the Board. Further, Shares are not liable to any further calls for payment of capital or for other assessment by the Company and have no sinking fund provisions, pre-emptive rights, conversion rights or redemption provisions.

Ascertaining the Market Price of Shares. Participant may ascertain the current market price of an individual Share as traded on the Nasdaq under the symbol "RPID" at https://www.nasdaq.com/market-activity/stocks/rpid. The AUD equivalent of that price can be obtained at www.rba.gov.au/statistics/frequency/exchange-rates.html. *Please note that this is not a prediction of what the market price of the Shares will be on any applicable vesting date or when Shares are issued to Participant (or at any other time), or of the applicable exchange rate at such time.*

CHINA

Terms and Conditions

*The following terms and conditions will apply to Participant to the extent that the Company, in its discretion, determines that Participant's participation in the Plan will be subject to exchange control restrictions in the People's Republic of China ("***PRC***"), as implemented by the State Administration of Foreign Exchange ("***SAFE***").*

Additional Vesting and Settlement Condition. The following provisions supplement the "Vesting Schedule" section of the Grant Notice and Section 2.2 of the RSU Agreement:

Notwithstanding anything to the contrary in the Grant Notice or the RSU Agreement, the RSUs shall not vest and no Shares will be issued to Participant, unless and until all necessary exchange control or other approvals with respect to the RSUs under the Plan have been obtained from SAFE or its local counterpart ("***SAFE Approval***"), and provided that such SAFE Approval is maintained through each vesting date. If or to the extent the Company is unable, or if the Company chooses not, to obtain the SAFE Approval, no Shares subject to the RSUs for which SAFE Approval is not completed or maintained shall be issued. If Participant's status as a Service Provider is terminated prior to the SAFE Approval, Participant shall not be entitled to vest in any portion of the RSUs and the RSUs shall be forfeited without any liability to the Company, the Service Recipient or any other Subsidiary.

Stock Must Remain With Company's Designated Broker. Participant agrees to hold any Shares received upon settlement of the RSUs with the Company's designated broker until the Shares are sold. The limitation shall apply to all Shares issued to Participant under the Plan, whether or not Participant continues to be a Service Provider with the Company, the Service Recipient or any other Subsidiary.

Forced Sale of Shares. The Company has the discretion to arrange for the sale of the Shares issued upon settlement of the RSUs, either immediately upon settlement or at any time thereafter. In any event, if Participant is terminated as a Service Provider, Participant will be required to sell all Shares acquired upon settlement of the RSUs within such time period as required by the Company in accordance with SAFE requirements. Any Shares remaining in the brokerage account at the end of this period shall be sold by the broker (on Participant's behalf pursuant to this authorization without further consent). Participant agrees to sign any additional agreements, forms and/or consents that reasonably may be requested by the Company (or the Company's designated broker) to effectuate the sale of Shares (including, without limitation, as to the transfer of the sale proceeds and other exchange control matters noted below) and shall otherwise cooperate with the Company with respect to such matters. Participant acknowledges that neither the Company nor the designated broker is under any obligation to arrange for the sale of Shares at any particular price (it being understood that the sale will occur in the market) and that broker's fees and similar expenses may be incurred in any such sale. In any event, when the Shares are sold, the sale proceeds, less any withholding for Tax-Related Items, any broker's fees or commissions, and any similar expenses of the sale will be remitted to Participant in accordance with applicable exchange control laws and regulations.

Exchange Control Restrictions. Participant understands and agrees that Participant will be required to immediately repatriate to China any proceeds from the sale of any Shares acquired under the Plan and any cash dividends paid on such Shares. Participant further understands that such repatriation of proceeds may need to be effected through a special bank account established by the Company (or a Subsidiary), and Participant hereby consents and agrees that any sale proceeds and cash dividends may be transferred to such special account by the Company (or a Subsidiary) on Participant's behalf prior to being delivered to Participant and that no interest shall be paid with respect to funds held in such account.

The proceeds may be paid to Participant in U.S. dollars or local currency at the Company's discretion. If the proceeds are paid to Participant in U.S. dollars, Participant understands that a U.S. dollar bank account in China must be established and maintained so that the proceeds may be deposited into such account. If the proceeds are paid to Participant in local currency, Participant acknowledges that the Company (or its Subsidiaries) are under no obligation to secure any particular exchange conversion rate and that the Company (or its Subsidiaries) may face delays in converting the proceeds to local currency due to exchange control restrictions. Participant agrees to bear any currency fluctuation risk between the time the Shares are sold and the net proceeds are converted into local currency and distributed to Participant. Participant further agrees to comply with any other requirements that may be imposed by the Company (or its Subsidiaries) in the future in order to facilitate compliance with exchange control requirements in China.

Administration. The Company (or its Subsidiaries) shall not be liable for any costs, fees, lost interest or dividends or other losses that Participant may incur or suffer resulting from the enforcement of the terms of the Agreement or otherwise from the Company's operation and enforcement of the Plan in accordance with any applicable laws, rules, regulations and requirements.

FRANCE

Terms and Conditions

Language Consent. In accepting the RSUs, Participant confirms that he or she has read and understood the documents relating to the RSUs (the Plan and the Agreement, including this Appendix), which were provided to Participant in the English language. Participant accepts the terms of these documents accordingly.

Consentement relatif à la Langue utilisée. En acceptant l'Attribution de Droits, Participant confirme avoir lu et compris les documents relatifs à cette Attribution de Droits sur l'augmentation de la valeur des Actions ("RSUs") qui lui ont été remis en langue anglaise (le Plan et le Contrat). Participant accepte les termes et conditions afférentes à ces documents en connaissance de cause.

Notifications

Tax Information. Participant understands and agrees that the RSUs are not intended to qualify for specific tax and social security treatment in France under Sections L. 225-197-1 to L. 225-197-6-1 and Sections L. 22-1059 to L. 22-10-60 of the French Commercial Code, as amended.

Foreign Asset/Account Reporting Information. Participant may hold Shares acquired under the Plan outside of France, provided that Participant declares all foreign accounts, whether open, current or closed, on Form N° 3916 and submit with Participant's annual income tax return. Failure to comply could trigger significant penalties.

GERMANY

Notifications

Exchange Control Information. Cross-border payments in excess of EUR 12,500 must be reported monthly to the German Federal Bank. If Participant receives cross-border payments in excess of EUR 12,500 in connection with the sale of securities (including Shares acquired under the Plan) or the receipt of dividends paid on such Shares, Participant must report by the fifth day of the month following the month in which the payment was received. The report must be filed electronically. The form of report can be accessed via the German Federal Bank's website at www.bundesbank.de and is available in both German and English.

Foreign Asset/Account Reporting Information. If Participant's acquisition of Shares leads to a so-called qualified participation at any point during the calendar year, Participant will need to report the acquisition when Participant files a tax return for the relevant year. A qualified participation occurs only if (i) Participant owns 1% or more of the Company and the value of the Shares exceeds EUR 150,000 or (ii) Participant holds Shares exceeding 10% of the Company's total common stock.

IRELAND

Terms and Conditions

Director Notification Requirement. If Participant is a director, shadow director, de facto director or secretary of an Irish Subsidiary, he or she must notify the Irish Subsidiary in writing if (i) Participant

receives or disposes of an interest exceeding 1% of the voting equity of the Company (*e.g.*, RSUs, Shares, etc.), (ii) Participant becomes aware of an event giving rise to a notification requirement, or (iii) Participant becomes a director (including a shadow director or a de facto director) or secretary if such an interest exists at that time. This notification requirement also applies with respect to the interests of Participant's spouse or children under the age of 18 (whose interests will be attributed to the director, shadow director, de facto director or secretary).

ITALY

Terms and Conditions

Plan Document Acknowledgement. Participant acknowledges that Participant has read and specifically and expressly acknowledges the Grant Notice, sections of the RSU Agreement (Section 1.1 (Award of RSUs and Dividend Equivalents), Section 2.1 (Vesting; Forfeiture), Section 3.1 (Representation), Section 3.2 (Responsibility for Taxes), Section 4.1 (Nature of Grant), Section 4.11 (Not a Contract of Employment), Section 4.14 (Electronic Delivery and Participation), Section 4.15 (Language), Section 4.16 (Governing Law and Venue), and Section 4.17 (Appendix)), and the "Data Privacy" provision of this Appendix.

Notifications

Foreign Asset/Account Reporting Information. Italian residents who, at any time during the fiscal year, hold foreign financial assets (including cash and Shares) which may generate income taxable in Italy are required to report these assets on their annual tax returns (UNICO Form, RW Schedule) for the year during which the assets are held, or on a special form if no tax return is due. These reporting obligations also will apply to Italian residents who are the beneficial owners of foreign financial assets under Italian money laundering provisions.

Foreign Asset Tax. The value of any Shares (and certain other foreign assets) an Italian resident holds outside Italy may be subject to a foreign financial assets tax. The taxable amount is equal to the fair market value of the Shares on December 31 or on the last day the Shares were held (the tax is levied in proportion to the number of days the Shares were held over the calendar year).

JAPAN

Notifications

Foreign Asset/Account Reporting Information. If Participant holds assets outside of Japan (*e.g.*, Shares acquired under the Plan) with a value exceeding JPY 50,000,000 (as of December 31 each year), Participant is required to comply with annual tax reporting obligations with respect to such assets. Participant should consult with his or her personal tax advisor to ensure that Participant is properly complying with applicable reporting requirements in Japan.

KOREA

Notifications

Foreign Asset/Account Reporting Information. Korean residents must declare all foreign financial accounts (*e.g.*, non-Korean bank accounts, brokerage accounts) to the Korean tax authority and file a

report with respect to such accounts if the monthly balance of such accounts exceeds KRW 500,000,000 (or an equivalent amount in foreign currency) on any month-end date during a calendar year. Participant should consult his or her personal tax advisor regarding reporting requirements in Korea.

NETHERLANDS

There are no country-specific provisions.

SINGAPORE

Terms and Conditions

Sale of Shares. For any RSUs that vest within six months of the Grant Date, Participant agrees that he or she will not sell or offer to sell the Shares acquired prior to the six-month anniversary of the Grant Date, unless such sale or offer to sell in Singapore is made pursuant to the exemptions under Part XIII Division (1) Subdivision (4) (other than section 280) of the Singapore Securities and Futures Act (Chapter 289, 2006 Ed.) ("***SFA***"), or any other applicable provisions of the SFA.

Notifications

Securities Law Information. The grant of RSUs is being made pursuant to the "Qualifying Person" exemption" under section 273(1)(f) of the SFA and not with a view to the underlying Shares being subsequently offered for sale to any other party. The Plan has not been and will not be lodged or registered as a prospectus with the Monetary Authority of Singapore.

Director Notification Obligation. If Participant is a director, associate director, or shadow director of a Singapore Subsidiary, Participant may be subject to certain notification requirements under the Singapore Companies Act. To the extent applicable to directors of a Singapore Subsidiary, these requirements include an obligation to notify the Singaporean Subsidiary in writing of an interest (*e.g.*, RSUs or Shares) in the Company or any related company within two business days of (i) its acquisition or disposal, (ii) any change in a previously disclosed interest, and (iii) becoming a director, associate director or shadow director.

UNITED KINGDOM

Terms and Conditions

Settlement Only in Stock. Notwithstanding anything to the contrary in Section 2.2 of the RSU Agreement or Sections 6.3(c) and 11.34 of the Plan, the RSUs shall be paid in Shares only and do not provide Participant with any right to receive a cash payment. This provision is without prejudice to the application of Section 3.2 of the RSU Agreement.

Responsibility for Taxes. The following provisions supplement Section 3.2 of the RSU Agreement:

Without limitation to Section 3.2 of the RSU Agreement, Participant agrees that he or she is liable for all Tax-Related Items and hereby covenants to pay all such Tax-Related Items, as and when requested by the Company or the Service Recipient or by HM Revenue and Customs ("***HMRC***") (or any other tax authority or any other relevant authority). Participant also agrees to indemnify and keep indemnified the Company and the Service Recipient against any Tax-Related Items that they are required to pay or withhold or have

paid or will pay to HMRC (or any other tax authority or any other relevant authority) on Participant's behalf.

Notwithstanding the foregoing, if Participant is a director or executive officer of the Company (within the meaning of Section 13(k) of the Exchange Act), the immediately foregoing provision will not apply. In such case, if the amount of any income tax due is not collected from or paid by Participant within 90 days of the end of the UK tax year in which an event giving rise to the indemnification described above occurs, the amount of any uncollected income taxes may constitute a benefit to Participant on which additional income tax and National Insurance contributions ("***NICs***") may be payable. Participant will be responsible for reporting and paying any income tax due on this additional benefit directly to HMRC under the self-assessment regime and for paying to the Company or the Service Recipient, as applicable, any employee NICs due on this additional benefit, which the Company or the Service Recipient may recover from Participant by any of the means referred to in Section 3.2 of the RSU Agreement.

Joint Election for Transfer of Employer NICs. As a condition of participation in the Plan and the vesting of the RSUs, Participant agrees to accept any liability for secondary Class 1 NICs which may be payable by the Company and/or the Service Recipient (or any successor to the Company or the Service Recipient) in connection with the RSUs and any event giving rise to Tax-Related Items (the "***Employer's NICs***"). Without limitation to the foregoing, Participant agrees to enter into a joint election with the Company and/or the Service Recipient (the "***Joint Election***"), which is attached to this Appendix, the form of such Joint Election being formally approved by HMRC, and to execute any other consents or elections required to accomplish the transfer of the Employer's NICs to Participant. Participant further agrees to execute such other joint elections as may be required between Participant and any successor to the Company and/or the Service Recipient. Participant further agrees that the Company and/or the Service Recipient may collect the Employer's NICs from Participant by any of the means set forth in Section 3.2 of the RSU Agreement.

If Participant does not enter into a Joint Election, if approval of the Joint Election has been withdrawn by HMRC, if the Joint Election is revoked by the Company or the Service Recipient (as applicable), or if the Joint Election is jointly revoked by Participant and the Company or the Service Recipient, as applicable, the Company, in its sole discretion and without any liability to the Company or the Service Recipient, may choose not to issue or deliver any Shares or proceeds from the sale of Shares to Participant upon vesting of the RSUs.

IMPORTANT NOTE: By accepting the RSUs (whether by signing the Grant Notice or via the Company's designated electronic acceptance procedures), Participant is agreeing to be bound by the terms of the Joint Election. Participant should read the terms of the Joint Election carefully before accepting the Agreement and the Joint Election. If requested by the Company, Participant agrees to execute the Joint Election in hard copy even if Participant has accepted the Agreement through the Company's electronic acceptance procedure. By entering into the Joint Election, Participant agrees that any employer's NICs liability that may arise in connection with participation in the Plan will be transferred to Participant, and Participant authorizes the Service Recipient to recover an amount sufficient to cover this liability by such methods, including but not limited to, deductions from Participant's salary or other payments due or the sale of sufficient Shares acquired pursuant to the RSUs.

RAPID MICRO BIOSYSTEMS, INC.

2021 INCENTIVE AWARD PLAN

(UK EMPLOYEES)

ELECTION TO TRANSFER THE EMPLOYER'S SECONDARY CLASS 1 NATIONAL INSURANCE LIABILITY TO THE EMPLOYEE

1. PARTIES

This Election is between:

(A) The individual who has gained access to this Election (the ***"Employee"***), who is employed by one of the employing companies listed in the attached schedule (the ***"Employer"***) and who is eligible to receive restricted stock units (***"RSUs")*** pursuant to the terms and conditions of the Rapid Micro Biosystems, Inc. 2021 Incentive Award Plan (the ***"Plan"***), and

(B) Rapid Micro Biosystems, Inc., 1001 Pawtucket Boulevard West, Suite 280, Lowell, Massachusetts 01854, USA (the ***"Company"***), which may grant RSUs under the Plan and is entering into this Form of Election on behalf of the Employer.

2. PURPOSE OF ELECTION

2.1 This Election relates to all RSUs granted to Employee under the Plan up to the termination date of the Plan.

2.2 In this Election the following words and phrases have the following meanings:

"**ITEPA**" means the Income Tax (Earnings and Pensions) Act 2003.

"Relevant Employment Income" from RSUs on which Employer's National Insurance Contributions becomes due is defined as:

(i) an amount that counts as employment income of the earner under section 426 ITEPA (restricted securities: charge on certain post-acquisition events);

(ii) an amount that counts as employment income of the earner under section 438 ITEPA (convertible securities: charge on certain post-acquisition events); or

(iii) any gain that is treated as remuneration derived from the earner's employment by virtue of section 4(4)(a) SSCBA, including without limitation:

(A) the acquisition of securities pursuant to the RSUs (within the meaning of section 477(3)(a) of ITEPA);

(B) the assignment (if applicable) or release of the RSUs in return for consideration (within the meaning of section 477(3)(b) of ITEPA);

(C) the receipt of a benefit in connection with the RSUs, other than a benefit within (i) or (ii) above (within the meaning of section 477(3)(c) of ITEPA).

"**SSCBA**" means the Social Security Contributions and Benefits Act 1992.

"Taxable Event" means any event giving rise to Relevant Employment Income.

2.3 This Election relates to the Employer's secondary Class 1 National Insurance Contributions (the "***Employer's Liability***") which may arise in respect of Relevant Employment Income in respect of the RSUs pursuant to section 4(4)(a) and/or paragraph 3B(1A) of Schedule 1 of the SSCBA.

2.4 This Election does not apply in relation to any liability, or any part of any liability, arising as a result of regulations being given retrospective effect by virtue of section 4B(2) of either the SSCBA or the Social Security Contributions and Benefits (Northern Ireland) Act 1992.

2.5 This Election does not apply to the extent that it relates to relevant employment income which is employment income of the earner by virtue of Chapter 3A of Part VII of ITEPA (employment income: securities with artificially depressed market value).

2.6 Any reference to the Company and/or the Employer shall include that entity's successors in title and assigns as permitted in accordance with the terms of the Plan and the Global Restricted Stock Unit Agreement. This Election will have effect in respect of the RSUs and any awards which replace or replaced the RSUs following their grant in circumstances where section 483 of ITEPA applies.

3. ELECTION

The Employee and the Company jointly elect that the entire liability of the Employer to pay the Employer's Liability that arises on any Relevant Employment Income is hereby transferred to the Employee. The Employee understands that, by accepting the RSUs (including by electronic means) or by separately signing or electronically accepting this Election, he or she will become personally liable for the Employer's Liability covered by this Election. This Election is made in accordance with paragraph 3B(1) of Schedule 1 to SSCBA.

4. PAYMENT OF THE EMPLOYER'S LIABILITY

4.1 The Employee hereby authorises the Company and/or the Employer to collect the Employer's Liability in respect of any Relevant Employment Income from the Employee at any time after the Taxable Event:

(i) by deduction from salary or any other payment payable to the Employee at any time on or after the date of the Taxable Event; and/or

(ii) directly from the Employee by payment in cash or cleared funds; and/or

(iii) by arranging, on behalf of the Employee, for the sale of some of the securities which the Employee is entitled to receive in respect of the RSUs, the proceeds from which must be delivered to the Employer in sufficient time for payment to be made to Her Majesty's Revenue & Customs ("***HMRC***") by the due date; and/or

(iv) where the proceeds of the gain are to be paid through a third party, the Employee will authorize that party to withhold an amount from the payment or to sell some of the securities which the Employee is entitled to receive in respect of the RSUs, such amount to be paid in sufficient time to enable the Company and/or the Employer to make payment to HMRC by the due date; and/or

(v) by any other means specified in the Global Restricted Stock Unit Agreement.

4.2 The Company hereby reserves for itself and the Employer the right to withhold the transfer of any securities in respect of the RSUs to the Employee until full payment of the Employer's Liability is received.

4.3 The Company agrees to procure the remittance by the Employer of the Employer's Liability to HMRC on behalf of the Employee within 14 days after the end of the UK tax month during which the Taxable Event occurs (or within 17 days after the end of the UK tax month during which the Taxable Event occurs, if payments are made electronically).

5. DURATION OF ELECTION

5.1 The Employee and the Company agree to be bound by the terms of this Election regardless of whether the Employee is transferred abroad or is not employed by the Employer on the date on which the Employer's Liability becomes due.

5.2 Any reference to the Company and/or the Employer shall include that entity's successors in title and assigns as permitted in accordance with the terms of the Plan and relevant award agreement. This Election will continue in effect in respect of any awards which replace the RSUs in circumstances where section 483 of ITEPA applies.

5.3 This Election will continue in effect until the earliest of the following:

(i) the Employee and the Company agree in writing that it should cease to have effect;

(ii) on the date the Company serves written notice on the Employee terminating its effect;

(iii) on the date HMRC withdraws approval of this Election; or

(iv) after due payment of the Employer's Liability in respect of the entirety of the RSUs to which this Election relates or could relate, such that the Election ceases to have effect in accordance with its terms.

5.4 This Election will continue in force regardless of whether the Employee ceases to be an employee of the Employer.

[Electronic Acceptance/Signature page follows]

Acceptance by the Employee

The Employee acknowledges that by accepting the RSUs, (whether by clicking on the "Accept" box where indicated in the Company's electronic acceptance procedure or by signing the Global Restricted Stock Unit Grant Notice in hard copy) or by separately signing or electronically accepting this Election, the Employee agrees to be bound by the terms of this Election.

Signed

_____

The Employee

Acceptance by the Company

The Company acknowledges that, by signing this Election or arranging for the scanned signature of an authorised representative to appear on this Election, the Company agrees to be bound by the terms of this Election.

Signed for and on behalf of the Company

_____

Name
Title

SCHEDULE OF EMPLOYER COMPANIES

The following are the employing companies to which this Joint Election may apply:

Name:	
Registered Office:	
Company Registration Number:	
Corporation Tax Reference:	
PAYE Reference:	

RAPID MICRO BIOSYSTEMS, INC.
2021 INCENTIVE AWARD PLAN

GLOBAL STOCK OPTION GRANT NOTICE

Capitalized terms not specifically defined in this Global Stock Option Grant Notice (the "***Grant Notice***") have the meanings given to them in the 2021 Incentive Award Plan (as amended from time to time, the "***Plan***") of Rapid Micro Biosystems, Inc. (the "***Company***").

The Company has granted to the participant listed below ("***Participant***") the stock option described in this Grant Notice (the "***Option***"), subject to the terms and conditions of the Plan and the Global Stock Option Agreement attached as **Exhibit A** including any additional terms and conditions set forth in any appendix for Participant's country (the "***Appendix***" and, together with the Global Stock Option Agreement, the "***Agreement***"), both of which are incorporated into this Grant Notice by reference.

Participant:
Grant Date:
Exercise Price per Share:
Shares Subject to the Option:
Final Expiration Date:
Vesting Commencement Date:
Vesting Schedule:
Type of Option

By Participant's signature below, Participant agrees to be bound by the terms of this Grant Notice, the Plan and the Agreement. Participant has reviewed the Plan, this Grant Notice and the Agreement in their entirety, has had an opportunity to obtain the advice of counsel prior to executing this Grant Notice and fully understands all provisions of the Plan, this Grant Notice and the Agreement. Participant hereby agrees to accept as binding, conclusive and final all decisions or interpretations of the Administrator upon any questions arising under the Plan, this Grant Notice or the Agreement.

RAPID MICRO BIOSYSTEMS, INC.	**PARTICIPANT**
By: _____	_____
Name: _____	
Title: _____	

Exhibit A

GLOBAL STOCK OPTION AGREEMENT

Capitalized terms not specifically defined in this Global Stock Option Agreement, including any additional terms and conditions for Participant's country set forth in the Appendix hereto (together, this "Agreement") shall have the meanings specified in the Grant Notice or, if not defined in the Grant Notice, in the Plan.

ARTICLE I.
GENERAL

1.1 Grant of Option. The Company has granted to Participant the Option effective as of the grant date set forth in the Grant Notice (the "***Grant Date***").

1.2 Incorporation of Terms of Plan. The Option is subject to the terms and conditions set forth in this Agreement and the Plan, which is incorporated herein by reference. In the event of any inconsistency between the Plan and this Agreement, the terms of the Plan will control.

ARTICLE II.
PERIOD OF EXERCISABILITY

2.1 Commencement of Exercisability. The Option will vest and become exercisable according to the vesting schedule in the Grant Notice (the "***Vesting Schedule***") except that any fraction of a Share as to which the Option would be vested or exercisable will be accumulated and will vest and become exercisable only when a whole Share has accumulated. Notwithstanding anything in the Grant Notice, the Plan or this Agreement to the contrary, unless the Administrator otherwise determines, the Option will immediately expire and be forfeited as to any portion that is not vested and exercisable as of Participant's Termination of Service for any reason. For the avoidance of doubt, employment or other service during only a portion of the vesting period, but where Termination of Service has occurred prior to a vesting date, shall not entitle Participant to vest in a pro-rata portion of the Option.

For purposes of the Option, the Administrator shall have the exclusive discretion to determine when Participant is no longer a Service Provider under the Plan, notwithstanding whether Participant may still be considered an Employee or Consultant under Applicable Laws. In particular, the Administrator may determine that Participant's Termination of Service is deemed to occur as of the date Participant is no longer actively providing services to the Company or any Subsidiary (regardless of the reason for the termination and whether or not later found to be invalid or in breach of Applicable Laws in the jurisdiction where Participant is rendering services or the terms of Participant's employment or other service agreement, if any), without regard to any contractual notice period or any period of "garden leave" or similar period mandated under the Applicable Laws of the jurisdiction where Participant is rendering services or the terms of Participant's employment or other service agreement, if any.

2.2 Duration of Exercisability. The Vesting Schedule is cumulative. Any portion of the Option which vests and becomes exercisable will remain vested and exercisable until the Option expires. The Option will be forfeited immediately upon its expiration.

2.3 Expiration of Option. The Option may not be exercised to any extent by anyone after, and will expire on, the first of the following to occur:

(a) The final expiration date in the Grant Notice;

(b) Except as the Administrator may otherwise approve, the expiration of three (3) months from the date of Participant's Termination of Service, unless Participant's Termination of Service is for Cause or by reason of Participant's death or Disability;

(c) Except as the Administrator may otherwise approve, the expiration of one (1) year from the date of Participant's Termination of Service by reason of Participant's death or Disability; and

(d) Except as the Administrator may otherwise approve, Participant's Termination of Service for Cause.

ARTICLE III.
EXERCISE OF OPTION

3.1 Person Eligible to Exercise. During Participant's lifetime, only Participant may exercise the Option. After Participant's death, any exercisable portion of the Option may, prior to the time the Option expires, be exercised by Participant's Designated Beneficiary as provided in the Plan.

3.2 Partial Exercise. Any exercisable portion of the Option or the entire Option, if then wholly exercisable, may be exercised, in whole or in part, according to the procedures in the Plan at any time prior to the time the Option or portion thereof expires, except that the Option may only be exercised for whole Shares.

3.3 Representation. The Company is not providing any tax, legal or financial advice, nor is the Company making any recommendations regarding participation in the Plan, or Participant's exercise of the Option or subsequent sale of Shares. Participant represents to the Company that Participant has reviewed with Participant's own tax advisors the tax consequences of the Option and the transactions contemplated by the Grant Notice and this Agreement. Participant is relying solely on such advisors and not on any statements or representations of the Company or any of its agents.

3.4 Responsibility for Taxes.

(a) Participant acknowledges that, regardless of any action taken by the Company or, if different, the Subsidiary which employs Participant or to which Participant otherwise renders services (the "***Service Recipient***"), the ultimate liability for all income tax, social insurance, payroll tax, fringe benefits tax, payment on account or other tax-related items related to Participant's participation in the Plan and legally applicable or deemed applicable to Participant ("***Tax-Related Items***") is and remains Participant's responsibility and may exceed the amount (if any) actually withheld by the Company or the Service Recipient. Participant further acknowledges that the Company and/or the Service Recipient (i) make no representations or undertakings regarding the treatment of any Tax-Related Items in connection with any aspect of the Option, including, but not limited to, the grant, vesting or exercise of the Option, the subsequent sale of Shares acquired pursuant to the exercise of the Option, or the receipt of any dividends; and (ii) do not commit to and are under no obligation to structure the terms of the grant or any aspect of the Option to reduce or eliminate Participant's liability for Tax-Related Items or achieve any particular tax result. Further, if Participant is subject to Tax-Related Items in more than one jurisdiction, Participant acknowledges that the Company and/or the Service Recipient (or former Service Recipient, as applicable) may be required to withhold or account for Tax-Related Items in more than one jurisdiction.

(b) In this regard, Participant authorizes the Company and/or the Service Recipient, or their respective agents, at their discretion, to satisfy any applicable withholding obligations or rights with regard to all Tax-Related Items by one or a combination of the following:

(i) requiring Participant to make a payment in a form acceptable to the Company;

(ii) withholding from wages or other cash compensation payable to Participant;

(iii) withholding from proceeds of the sale of Shares acquired upon exercise of the Option either through a voluntary sale or through a mandatory sale arranged by the Company (on Participant's behalf pursuant to this authorization without further consent);

(iv) withholding in Shares to be issued upon exercise of the Option, provided, however, that if Participant is a Section 16 officer of the Company under the Exchange Act, then the Committee (as constituted in accordance with Rule 16b-3 under the Exchange Act) shall establish the method of withholding from alternatives (i)-(iii) herein and, if the Committee does not exercise its discretion prior to the withholding event, then Participant shall be entitled to elect the method of withholding from the alternatives above; and

(v) any other method of withholding determined by the Company and to the extent required by Applicable Laws or the Plan, approved by the Committee.

(c) The Company may withhold or account for Tax-Related Items by considering statutory or other withholding rates, including minimum or maximum rates applicable in Participant's jurisdiction(s). In the event of over-withholding, Participant may receive a refund of any over-withheld amount in cash (with no entitlement to the equivalent in Shares), or if not refunded, Participant may be able to seek a refund from the local tax authorities. In the event of under-withholding, Participant may be required to pay any additional Tax-Related Items directly to the applicable tax authority. If the obligation for Tax-Related Items is satisfied by withholding in Shares, for tax purposes, Participant will be deemed to have been issued the full number of Shares subject to the exercised Option, notwithstanding that a number of the Shares is held back solely for the purpose of satisfying withholding obligations for Tax-Related Items.

(d) The Company may refuse to issue or deliver the Shares or the proceeds of the sale of Shares, if Participant fails to comply with his or her obligations in connection with the Tax-Related Items.

ARTICLE IV.
OTHER PROVISIONS

4.1 Nature of Grant. By accepting the Option, Participant acknowledges, understands and agrees that:

(a) the Plan is established voluntarily by the Company, it is discretionary in nature and it may be modified, amended, suspended or terminated by the Company at any time, to the extent permitted by the Plan;

(b) the grant of the Option is exceptional, voluntary and occasional and does not create any contractual or other right to receive future grants of options, or benefits in lieu of options, even if options have been granted in the past;

(c) all decisions with respect to future options or other grants, if any, will be at the sole discretion of the Company;

(d) Participant is voluntarily participating in the Plan;

(e) the Option and any Shares acquired under the Plan, and the income from and value of same, are not intended to replace any pension rights or compensation;

(f) the Option and any Shares acquired under the Plan, and the income from and value of same, are not part of normal or expected compensation for purposes of calculating any severance, resignation, termination, redundancy, dismissal, end-of-service payments, bonuses, long-service awards, holiday pay, pension or retirement or welfare benefits or similar payments;

(g) the future value of the Shares underlying the Option is unknown, indeterminable, and cannot be predicted with certainty;

(h) if the underlying Shares do not increase in value, the Option will have no value;

(i) if Participant exercises the Option and acquire Shares, the value of such Shares may increase or decrease in value, even below the Exercise Price;

(j) no claim or entitlement to compensation or damages shall arise from forfeiture of the Option resulting from Participant's Termination of Service (for any reason whatsoever, whether or not later found to be invalid or in breach of Applicable Laws in the jurisdiction where Participant is providing service or the terms of Participant's employment or other service agreement, if any);

(k) unless otherwise agreed with the Company, the Option and the Shares subject to the Option, and the income from and value of same, are not granted as consideration for, or in connection with, the service Participant may provide as a director of a Subsidiary;

(l) unless otherwise provided in the Plan or by the Company in its discretion, the Option and the benefits evidenced by this Agreement do not create any entitlement to have the Option or any such benefits transferred to, or assumed by, another company nor be exchanged, cashed out or substituted for, in connection with any corporate transaction affecting the Shares; and

(m) the following provisions apply only if Participant is providing services outside the United States:

(i) the Option and the Shares subject to the Option are not part of normal or expected compensation or salary for any purpose; and

(ii) neither the Company, the Service Recipient nor any other Subsidiary shall be liable for any foreign exchange rate fluctuation between Participant's local currency and the U.S. dollar that may affect the value of the Option or of any amounts due to Participant pursuant to the exercise of the Option or the subsequent sale of any Shares acquired upon exercise of the Option.

4.2 Adjustments. Participant acknowledges that the Option is subject to adjustment, modification and termination in certain events as provided in this Agreement and the Plan.

4.3 Notices. Any notice to be given under the terms of this Agreement to the Company must be in writing and addressed to the Company in care of the Company's Secretary at the Company's principal office or the Secretary's then-current email address or facsimile number. Any notice to be given under the terms of this Agreement to Participant must be in writing and addressed to Participant (or, if Participant is

then deceased, to the person entitled to exercise the Option) at Participant's last known mailing address, email address or facsimile number in the Company's personnel files. By a notice given pursuant to this Section, either party may designate a different address for notices to be given to that party. Any notice will be deemed duly given when actually received, when sent by email, when sent by certified mail (return receipt requested) and deposited with postage prepaid in a post office or branch post office regularly maintained by the United States Postal Service, or comparable non-U.S. postal service, when delivered by a nationally recognized express shipping company or upon receipt of a facsimile transmission confirmation.

4.4 Titles. Titles are provided herein for convenience only and are not to serve as a basis for interpretation or construction of this Agreement.

4.5 Conformity to Applicable Laws. Participant acknowledges that the Plan, the Grant Notice and this Agreement are intended to conform to the extent necessary with all Applicable Laws and, to the extent Applicable Laws permit, will be deemed amended as necessary to conform to Applicable Laws. Notwithstanding any other provision of the Plan, the Grant Notice or this Agreement, unless there is an available exemption from any registration, qualification or other legal requirement applicable to the Shares, the Company shall not be required to deliver any Shares issuable upon exercise of the Option prior to the completion of any registration or qualification of the Shares under any U.S. or non-U.S. federal, state or local securities or exchange control law or under rulings or regulations of the U.S. Securities and Exchange Commission ("***SEC***") or of any other governmental regulatory body, or prior to obtaining any approval or other clearance from any U.S. or non-U.S. federal, state or local governmental agency, which registration, qualification or approval the Company shall, in its absolute discretion, deem necessary or advisable. Participant understands that the Company is under no obligation to register or qualify the Shares with the SEC or any other securities commission or to seek approval or clearance from any governmental authority for the issuance or sale of the Shares. Further, Participant agrees that the Company shall have unilateral authority to amend the Plan and this Agreement without his or her consent to the extent necessary to comply with Applicable Laws applicable to issuance of Shares.

4.6 Successors and Assigns. The Company may assign any of its rights under this Agreement to single or multiple assignees, and this Agreement will inure to the benefit of the successors and assigns of the Company. Subject to the restrictions on transfer set forth in the Plan, this Agreement will be binding upon and inure to the benefit of the heirs, legatees, legal representatives, successors and assigns of the parties hereto.

4.7 Limitations Applicable to Section 16 Persons. Notwithstanding any other provision of the Plan or this Agreement, if Participant is subject to Section 16 of the Exchange Act, the Plan, the Grant Notice, this Agreement and the Option will be subject to any additional limitations set forth in any applicable exemptive rule under Section 16 of the Exchange Act (including any amendment to Rule 16b-3) that are requirements for the application of such exemptive rule. To the extent Applicable Laws permit, this Agreement will be deemed amended as necessary to conform to such applicable exemptive rule.

4.8 Entire Agreement. The Plan, the Grant Notice and this Agreement (including any exhibit hereto) constitute the entire agreement of the parties and supersede in their entirety all prior undertakings and agreements of the Company and Participant with respect to the subject matter hereof.

4.9 Agreement Severable. In the event that any provision of the Grant Notice or this Agreement is held illegal or invalid, the provision will be severable from, and the illegality or invalidity of the provision will not be construed to have any effect on, the remaining provisions of the Grant Notice or this Agreement.

4.10 Limitation on Participant's Rights. Participation in the Plan confers no rights or interests other than as herein provided. This Agreement creates only a contractual obligation on the part of the Company as to amounts payable and may not be construed as creating a trust. Neither the Plan nor any underlying program, in and of itself, has any assets. Participant will have only the rights of a general

unsecured creditor of the Company with respect to amounts credited and benefits payable, if any, with respect to the Option, and rights no greater than the right to receive the Shares as a general unsecured creditor with respect to the Option, as and when exercised pursuant to the terms hereof.

4.11 Not a Contract of Employment. Nothing in the Plan, the Grant Notice or this Agreement confers upon Participant any right to continue in the employ or other service of the Company, the Service Recipient or any Subsidiary or interferes with or restricts in any way the rights of the Company, the Service Recipient and any other Subsidiary, which rights are hereby expressly reserved, to discharge or terminate the services of Participant at any time for any reason whatsoever, with or without Cause, except to the extent expressly provided otherwise in a written agreement between the Company, the Service Recipient or another Subsidiary and Participant.

4.12 Counterparts. The Grant Notice may be executed in one or more counterparts, including by way of any electronic signature, subject to Applicable Laws, each of which will be deemed an original and all of which together will constitute one instrument.

4.13 Incentive Stock Options. If the Option is designated as an Incentive Stock Option:

(a) Participant acknowledges that to the extent the aggregate fair market value of shares (determined as of the time the option with respect to the shares is granted) with respect to which stock options intended to qualify as "incentive stock options" under Section 422 of the Code, including the Option, are exercisable for the first time by Participant during any calendar year exceeds $100,000 or if for any other reason such stock options do not qualify or cease to qualify for treatment as "incentive stock options" under Section 422 of the Code, such stock options (including the Option) will be treated as non-qualified stock options. Participant further acknowledges that the rule set forth in the preceding sentence will be applied by taking the Option and other stock options into account in the order in which they were granted, as determined under Section 422(d) of the Code. Participant acknowledges that amendments or modifications made to the Option pursuant to the Plan that would cause the Option to become a Non-Qualified Stock Option will not materially or adversely affect Participant's rights under the Option, and that any such amendment or modification shall not require Participant's consent. Participant also acknowledges that if the Option is exercised more than three (3) months after Participant's Termination of Service as an Employee, other than by reason of death or disability, the Option will be taxed as a Non-Qualified Stock Option.

(b) Participant will give prompt written notice to the Company of any disposition or other transfer of any Shares acquired under this Agreement if such disposition or other transfer is made (a) within two (2) years from the Grant Date or (b) within one (1) year after the transfer of such Shares to Participant. Such notice will specify the date of such disposition or other transfer and the amount realized, in cash, other property, assumption of indebtedness or other consideration, by Participant in such disposition or other transfer.

4.14 ***Data Privacy. In accepting the Option, Participant explicitly, voluntarily and unambiguously consents to the collection, use and transfer, in electronic or other form, of Participant's personal data as described in the Grant Notice and this Agreement and any other grant materials by an and among, as applicable, the Company, the Service Recipient and any other Subsidiary for the exclusive purpose of implementing, administering and managing Participant's participation in the Plan.***

Participant understands that the Company, the Service Recipient and other Subsidiaries hold certain personal information about Participant, including, but not limited to, Participant's name, home address, email address and telephone number, date of birth, social security number, passport or other identification number, salary, nationality, job title, or any shares of stock or directorships held in the

Company, and details of all awards or other entitlement to shares awarded, canceled, exercised, vested, unvested, or outstanding in Participant's favor ("Data"), for the exclusive purpose of implementing, administering and managing Participant's participation in the Plan.

Participant further understands that the Company, the Service Recipient and/or other Subsidiaries will transfer Data among themselves as necessary for the exclusive purposes of implementation, administration and management of Participant's participation in the Plan, and that the Company, the Service Recipient and/or other Subsidiaries may each further transfer Data to Fidelity Stock Plan Services, LLC and certain of its affiliates ("Fidelity") or such other third party, which are assisting the Company (or may assist the Company in the future) with the implementation, administration, and management of the Plan.

Participant understands that the recipients of Data may be located in the United States or elsewhere, and that the United States may have different data privacy laws and protections than Participant's country. Participant understands that, if Participant resides outside the United States, Participant may request a list with the names and addresses of Data Recipients by contacting in writing Participant's local human resources representative. Participant authorizes the recipients of Data to receive, possess, use, retain and transfer Data, in electronic or other form, for the purposes of implementing, administering, and managing Participant's participation in the Plan. Participant understands that Data will be held only as long as is necessary to implement, administer and manage Participant's participation in the Plan.

Participant understands that, if Participant resides outside the United States, Participant may, at any time, view Data, request additional information about the storage and processing of Data, require any necessary amendments to Data to make the information contained therein factually accurate, or refuse or withdraw the consents herein, in any case without cost, by contacting in writing Participant's local human resources representative.

Further, Participant understands that Participant is providing the consents herein on a purely voluntary basis. If Participant does not consent, or if Participant later seeks to revoke the consents, Participant's employment status or career with the Service Recipient will not be affected; the only consequence of refusing or withdrawing the consents is that the Company would not be able to grant the Option or other equity awards to Participant or administer or maintain such awards. Therefore, Participant understands that refusing or withdrawing the consents may affect Participant's ability to participate in the Plan. For more information on the consequences of Participant's refusal to consent or withdrawal of consent, Participant understands that Participant may contact in writing Participant's local human resources representative.

Upon request of the Company or the Service Recipient, Participant agrees to provide a separate executed data privacy consent form (or any other agreements or consents that may be required by the Company and/or the Service Recipient) that the Company and/or the Service Recipient may deem necessary to obtain from Participant for the purpose of administering Participant's participation in the Plan in compliance with the data privacy laws in Participant's jurisdiction(s), either now or in the future. Participant understands and agrees that Participant will not be able to participate in the Plan if Participant fails to provide any such consent or agreement requested by the Company and/or the Service Recipient.

4.15 Electronic Delivery and Participation. The Company may, in its sole discretion, decide to deliver any documents related to current or future participation in the Plan by electronic means. Participant hereby consents to receive such documents by electronic delivery and agrees to participate in the Plan through an on-line or electronic system established and maintained by the Company or a third party designated by the Company.

4.16 Language. Participant acknowledges that Participant is sufficiently proficient in the English language or has consulted with an advisor who is sufficiently proficient in the English language, and understands the content of the Grant Notice or this Agreement and other Plan-related materials . If Participant has received the Grant Notice and this Agreement or any other document related to the Plan and/or the Option translated into a language other than English and if the meaning of the translated version is different than the English version, the English version will control.

4.17 Governing Law and Venue. The Option, the Grant Notice and this Agreement shall be governed by, and interpreted in accordance with, the laws of the State of Delaware, without regard to the conflict of laws principles thereof.

For purposes of any action, lawsuit or other proceedings that arises under this Award or the Grant Notice and this Agreement, the parties hereby submit to and consent to the sole and exclusive jurisdiction of the Commonwealth of Massachusetts and agree that such litigation shall be conducted in the courts of Middlesex County, Massachusetts, or the federal courts for the United States for the District of Massachusetts, where this Award is made and/or to be performed.

4.18 Appendix. Notwithstanding any provisions in this Global Stock Option Agreement, the Option shall be subject to any additional terms and conditions set forth in any Appendix to this Global Stock Option Agreement for Participant's country. Moreover, if Participant relocates to one of the countries included in the Appendix, the additional terms and conditions for such country will apply to Participant, to the extent the Company determines that the application of such terms and conditions is necessary or advisable for legal or administrative reasons. The Appendix constitutes part of this Agreement.

4.19 Imposition of Other Requirements. The Company reserves the right to impose other requirements on Participant's participation in the Plan, on the Option and on any Shares acquired under the Plan, to the extent the Company determines it is necessary or advisable for legal or administrative reasons, and to require Participant to sign any additional agreements or undertakings that may be necessary to accomplish the foregoing.

4.20 Insider Trading Restrictions/Market Abuse Laws. Participant acknowledges that, depending on Participant's country or broker's country, or the country in which Stock is listed, Participant may be subject to insider trading restrictions and/or market abuse laws in applicable jurisdictions, which may affect his or her ability to accept, acquire, sell or attempt to sell, or otherwise dispose of the Shares, rights to Shares (*e.g.*, the Option) or rights linked to the value of Stock, during such times as Participant is considered to have "inside information" regarding the Company (as defined by the laws or regulations in applicable jurisdictions, including the United States and Participant's country). Local insider trading laws and regulations may prohibit the cancellation or amendment of orders Participant placed before possessing inside information. Furthermore, Participant may be prohibited from (i) disclosing insider information to any third party, including fellow employees (other than on a "need to know" basis) and (ii) "tipping" third parties or causing them to otherwise buy or sell Company securities. Any restrictions under these laws or regulations are separate from and in addition to any restrictions that may be imposed under any applicable Company insider trading policy. Participant acknowledges that it is Participant's responsibility to comply with any applicable restrictions, and Participant should speak to his or her personal advisor on this matter.

4.21 Exchange Control, Foreign Asset/Account Reporting Requirements. Participant acknowledges that Participant may be subject to foreign asset/account, exchange control and/or tax reporting requirements as a result of the acquisition, holding and/or transfer of Shares or cash (including dividends and the proceeds arising from the sale of Shares) derived from his or her participation in the Plan in, to and/or from a brokerage/bank account or legal entity located outside Participant's country. Applicable Laws may require that Participant report such accounts, assets, the balances therein, the value thereof and/or the transactions related thereto to the applicable authorities in such country. Participant also may be required to repatriate sale proceeds or other funds received as a result of Participant's participation in the Plan to his or her country through a designated bank or broker within a certain time after receipt. Participant acknowledges that he or she is responsible for ensuring compliance with any applicable foreign asset/account, exchange control and tax reporting requirements and should consult his or her personal legal advisor on this matter.

4.22 Waiver. Participant acknowledges that a waiver by the Company of breach of any provision of the Grant Notice and this Agreement shall not operate or be construed as a waiver of any other provision of the Grant Notice and this Agreement, or of any subsequent breach by Participant or any other Participant.

By electronically accepting the Grant Notice and this Agreement and participating in the Plan, Participant agrees to be bound by the terms and conditions in the Plan and the Grant Notice and this Agreement.

*** * * * ***

APPENDIX
TO
GLOBAL STOCK OPTION AGREEMENT

Capitalized terms used but not defined herein shall have the meanings ascribed to them in the Grant Notice, the Global Stock Option Agreement (the "***Option Agreement***") and the Plan.

Terms and Conditions

This Appendix includes additional terms and conditions that govern the Option if Participant resides and/or works in one of the countries listed below.

If Participant is a citizen or resident (or is considered as such for local law purposes) of a country other than the country in which Participant is currently residing and/or working, or if Participant transfers to another country after the Grant Date, the Administrator shall, in its discretion, determine to what extent the terms and conditions contained herein shall be applicable to Participant.

Notifications

This Appendix also includes information regarding securities, exchange controls, tax and certain other issues of which Participant should be aware with respect to his or her participation in the Plan. The information is based on the securities, exchange control, tax and other laws in effect in the respective countries as of February 2022. Such laws are often complex and change frequently. As a result, the Company strongly recommends that Participant not rely on the information noted herein as the only source of information relating to the consequences of his or her participation in the Plan because the information may be out of date at the time the Participant exercises the Option or sells Shares acquired under the Plan.

In addition, the information contained herein is general in nature and may not apply to Participant's particular situation, and the Company is not in a position to assure Participant of any particular result. Accordingly, Participant should seek appropriate professional advice as to how the relevant laws in his or her country may apply to Participant's situation.

If Participant is a citizen or resident (or is considered as such for local law purposes) of a country other than the one in which he or she is currently residing and/or working, or if Participant transfers to another country after the Grant Date, the information contained herein may not be applicable to Participant in the same manner.

EUROPEAN UNION, EUROPEAN ECONOMIC AREA, SWITZERLAND AND UNITED KINGDOM

Data Privacy. The following provisions replace Section 4.14 of the Option Agreement:

(a) ***Data Collection and Usage.*** ***The Company and the Service Recipient collect, process and use certain personal information about Participant, including, but not limited to, Participant's name, home address, telephone number, email address, date of birth, social insurance number, passport or other identification number, salary, nationality, job title, any Shares or directorships held in the Company, details of all equity awards granted under the Plan or any other entitlement to Shares awarded, canceled, exercised, vested, unvested or outstanding in Participant's favor ("Data"), for the legitimate purpose of implementing, administering and managing the Plan. Where required, the legal basis for the collection and processing of Data is Participant's consent.***

(b) ***Stock Plan Administration Service Providers.*** ***The Company transfers Data to Fidelity Stock Plan Services, LLC. and certain of its affiliated companies ("Fidelity"), an independent service provider based in the U.S., which is assisting the Company with the implementation, administration and management of the Plan. Where required, the legal basis for the transfer of Data to Fidelity is Participant's consent. The Company may select a different service provider or additional service providers and share Data with such other provider serving in a similar manner. Participant may be asked to agree on separate terms and data processing practices with Fidelity, with such agreement being a condition to the ability to participate in the Plan.***

(c) ***International Data Transfers.*** ***The Company and its service providers, including Fidelity are based in the U.S. Participant's country or jurisdiction may have different data privacy laws and protections than the U.S. Where required, the legal basis for the transfer of Data to these recipients is Participant's consent.***

(d) ***Data Retention.*** ***The Company will hold and use Data only as long as is necessary to implement, administer and manage Participant's participation in the Plan, or as required to comply with Applicable Laws, exercise or defense of legal rights, and archiving, back-up and deletion processes. This period may extend beyond Participant's period of employment or other service with the Service Recipient.***

(e) ***Voluntariness and Consequences of Consent Denial or Withdrawal.*** ***Participation in the Plan is voluntary and Participant is providing the consents herein on a voluntary basis. Participant understands that Participant may request to stop the transfer and processing of Participant's Data for purposes of Participant's participation in the Plan and that Participant's compensation from or employment relationship with the Service Recipient will not be affected. The only consequence of refusing or withdrawing consent is that the Company would not be able to allow Participant to participate in the Plan. Participant understands that Participant's Data will still be processed in relation to Participant's employment or service and for record-keeping purposes.***

(f) ***Data Subject Rights.*** ***Participant may have a number of rights under data privacy laws in Participant's jurisdiction. Depending on where Participant is based, such rights may include the right to (i) request access to or copies of Data the Company processes, (ii) rectify incorrect Data, (iii) delete Data, (iv) restrict the processing of Data, (v) restrict the portability of Data, (vi) lodge complaints with competent authorities in Participant's jurisdiction, and/or (vii) receive a list with the names and addresses of any potential recipients of Data. To receive clarification regarding these rights or to exercise these rights, Participant can contact Participant's local human resources representative.***

AUSTRALIA

Notifications

Tax Information. The Plan is a plan to which Subdivision 83A-C of the Income Tax Assessment Act 1997 (Cth) applies, subject to the conditions therein.

Securities Law Information. If Participant acquires Shares pursuant to the Option and offers his or her Shares for sale to a person or entity resident in Australia, Participant's offer may be subject to disclosure requirements under Australian law. Participant should obtain legal advice on his or her disclosure obligations prior to making any such offer.

CHINA

Terms and Conditions

*The following terms and conditions will apply to Participant to the extent that the Company, in its discretion, determines that Participant's participation in the Plan will be subject to exchange control restrictions in the People's Republic of China ("***PRC***"), as implemented by the State Administration of Foreign Exchange ("***SAFE***").*

Expiration of Option. Notwithstanding Section 2.3(c) of the Option Agreement, if the event of Participant's Termination of Service for any reason (even if by reason of Participant's death or Disability), the Option, to the extent vested as of the Termination of Service, will expire at the close of business at Company headquarters on the date six months after the Termination of Service.

Payment Upon Exercise. Notwithstanding Section 5.5 of the Plan, Participant may pay the Exercise Price only by using the cashless exercise method described in Section 5.5(b) of the Plan. The Company reserves the right to provide Participant with additional methods of payment depending on the development of local law.

Additional Vesting and Exercise Condition. The following provisions supplement the "Vesting Schedule" section of the Grant Notice and Section 2.1 of the Option Agreement:

Notwithstanding anything to the contrary in the Grant Notice or the Option Agreement, the Option shall not vest or become exercisable, unless and until all necessary exchange control or other approvals with respect to the Option under the Plan have been obtained from SAFE or its local counterpart ("***SAFE Approval***"), and provided that such SAFE Approval is maintained through the date of exercise. If or to the extent the Company is unable, or if the Company chooses not, to obtain the SAFE Approval, no Shares subject to the Option for which SAFE Approval is not completed or maintained shall be issued. If Participant's status as a Service Provider is terminated prior to the SAFE Approval, Participant shall not be entitled to vest in any portion of the Option and the Option shall be forfeited without any liability to the Company, the Service Recipient or any other Subsidiary.

Stock Must Remain With Company's Designated Broker. Participant agrees to hold any Shares received upon exercise of the Option with the Company's designated broker until the Shares are sold. The limitation shall apply to all Shares issued to Participant under the Plan, whether or not Participant continues to be a Service Provider with the Company, the Service Recipient or any other Subsidiary.

Forced Sale of Shares. The Company has the discretion to arrange for the sale of the Shares issued upon exercise of the Option, either immediately upon exercise or at any time thereafter. In any event, if

Participant is terminated as a Service Provider, Participant will be required to sell all Shares acquired upon exercise of the Option within such time period as required by the Company in accordance with SAFE requirements. Any Shares remaining in the brokerage account at the end of this period shall be sold by the broker (on Participant's behalf pursuant to this authorization without further consent). Participant agrees to sign any additional agreements, forms and/or consents that reasonably may be requested by the Company (or the Company's designated broker) to effectuate the sale of Shares (including, without limitation, as to the transfer of the sale proceeds and other exchange control matters noted below) and shall otherwise cooperate with the Company with respect to such matters. Participant acknowledges that neither the Company nor the designated broker is under any obligation to arrange for the sale of Shares at any particular price (it being understood that the sale will occur in the market) and that broker's fees and similar expenses may be incurred in any such sale. In any event, when the Shares are sold, the sale proceeds, less any withholding for Tax-Related Items, any broker's fees or commissions, and any similar expenses of the sale will be remitted to Participant in accordance with applicable exchange control laws and regulations.

Exchange Control Restrictions. Participant understands and agrees that Participant will be required to immediately repatriate to China any proceeds from the sale of any Shares acquired under the Plan and any cash dividends paid on such Shares. Participant further understands that such repatriation of proceeds may need to be effected through a special bank account established by the Company (or a Subsidiary), and Participant hereby consents and agrees that any sale proceeds and cash dividends may be transferred to such special account by the Company (or a Subsidiary) on Participant's behalf prior to being delivered to Participant and that no interest shall be paid with respect to funds held in such account.

The proceeds may be paid to Participant in U.S. dollars or local currency at the Company's discretion. If the proceeds are paid to Participant in U.S. dollars, Participant understands that a U.S. dollar bank account in China must be established and maintained so that the proceeds may be deposited into such account. If the proceeds are paid to Participant in local currency, Participant acknowledges that the Company (or its Subsidiaries) are under no obligation to secure any particular exchange conversion rate and that the Company (or its Subsidiaries) may face delays in converting the proceeds to local currency due to exchange control restrictions. Participant agrees to bear any currency fluctuation risk between the time the Shares are sold and the net proceeds are converted into local currency and distributed to Participant. Participant further agrees to comply with any other requirements that may be imposed by the Company (or its Subsidiaries) in the future in order to facilitate compliance with exchange control requirements in China.

Administration. The Company (or its Subsidiaries) shall not be liable for any costs, fees, lost interest or dividends or other losses that Participant may incur or suffer resulting from the enforcement of the terms of the Agreement or otherwise from the Company's operation and enforcement of the Plan in accordance with any applicable laws, rules, regulations and requirements.

FRANCE

Terms and Conditions

Language Consent. In accepting the Option, Participant confirms that he or she has read and understood the documents relating to the Option (the Plan and the Agreement, including this Appendix), which were provided to Participant in the English language. Participant accepts the terms of these documents accordingly.

Consentement relatif à la Langue utilisée. En acceptant l'attribution de l'Option, le Participant confirme avoir lu et compris les documents relatifs à l'attribution (le Contrat et le Plan), qui ont été remis en langue anglaise. Le Participant accepte les termes de ces documents en connaissance de cause.

Notifications

Tax Information. Participant understands and agrees that the Option are not intended to qualify for specific tax and social security treatment in France under Sections L. 225-177 to L. 225-186 and Sections L. 22-10-56 to L. 22-10-58 of the French Commercial Code, as amended.

Foreign Asset/Account Reporting Information. Participant may hold Shares acquired under the Plan outside of France, provided that Participant declares all foreign accounts, whether open, current or closed, on Form N° 3916 and submit with Participant's annual income tax return. Failure to comply could trigger significant penalties.

GERMANY

Notifications

Exchange Control Information. Cross-border payments in excess of EUR 12,500 must be reported monthly to the German Federal Bank. If Participant receives cross-border payments in excess of EUR 12,500 in connection with the sale of securities (including Shares acquired under the Plan) or the receipt of dividends paid on such Shares, Participant must report by the fifth day of the month following the month in which the payment was received. The report must be filed electronically. The form of report can be accessed via the German Federal Bank's website at www.bundesbank.de and is available in both German and English.

Foreign Asset/Account Reporting Information. If Participant's acquisition of Shares leads to a so-called qualified participation at any point during the calendar year, Participant will need to report the acquisition when Participant files a tax return for the relevant year. A qualified participation occurs only if (i) Participant owns 1% or more of the Company and the value of the Shares exceeds EUR 150,000 or (ii) Participant holds Shares exceeding 10% of the Company's total common stock.

IRELAND

Terms and Conditions

Director Notification Requirement. If Participant is a director, shadow director, de facto director or secretary of an Irish Subsidiary, he or she must notify the Irish Subsidiary in writing if (i) Participant receives or disposes of an interest exceeding 1% of the voting equity of the Company (*e.g.*, the Option, Shares, etc.), (ii) Participant becomes aware of an event giving rise to a notification requirement, or (iii) Participant becomes a director (including a shadow director or a de facto director) or secretary if such an interest exists at that time. This notification requirement also applies with respect to the interests of Participant's spouse or children under the age of 18 (whose interests will be attributed to the director, shadow director, de facto director or secretary).

ITALY

Terms and Conditions

Plan Document Acknowledgement. Participant acknowledges that Participant has read and specifically and expressly acknowledges the Grant Notice, sections of the Option Agreement (Section 1.1 (Grant of Option), Section 2.1 (Commencement of Exercisability), Section 3.3 (Representation), Section 3.4 (Responsibility for Taxes), Section 4.1 (Nature of Grant), Section 4.11 (Not a Contract of Employment), Section 4.15 (Electronic Delivery and Participation), Section 4.16 (Language), Section 4.17 (Governing Law and Venue), and Section 4.18 (Appendix)), and the "Data Privacy" provision of this Appendix.

Notifications

Foreign Asset/Account Reporting Information. Italian residents who, at any time during the fiscal year, hold foreign financial assets (including cash and Shares) which may generate income taxable in Italy are required to report these assets on their annual tax returns (UNICO Form, RW Schedule) for the year during which the assets are held, or on a special form if no tax return is due. These reporting obligations also will apply to Italian residents who are the beneficial owners of foreign financial assets under Italian money laundering provisions.

Foreign Asset Tax. The value of any Shares (and certain other foreign assets) an Italian resident holds outside Italy may be subject to a foreign financial assets tax. The taxable amount is equal to the fair market value of the Shares on December 31 or on the last day the Shares were held (the tax is levied in proportion to the number of days the Shares were held over the calendar year).

JAPAN

Notifications

Exchange Control Information. If Participant acquires Shares valued at more than JPY 100 million in a single transaction, Participant must file a Securities Acquisition Report with the Ministry of Finance through the Bank of Japan within 20 days after the acquisition of the Shares.

Foreign Asset/Account Reporting Information. If Participant holds assets outside of Japan (*e.g.*, Shares acquired under the Plan) with a value exceeding JPY 50,000,000 (as of December 31 each year), Participant is required to comply with annual tax reporting obligations with respect to such assets. Participant should consult with his or her personal tax advisor to ensure that Participant is properly complying with applicable reporting requirements in Japan.

KOREA

Notifications

Foreign Asset/Account Reporting Information. Korean residents must declare all foreign financial accounts (*e.g.*, non-Korean bank accounts, brokerage accounts) to the Korean tax authority and file a report with respect to such accounts if the monthly balance of such accounts exceeds KRW 500,000,000 (or an equivalent amount in foreign currency) on any month-end date during a calendar year. Participant should consult his or her personal tax advisor regarding reporting requirements in Korea.

NETHERLANDS

There are no country-specific provisions.

SINGAPORE

Terms and Conditions

Sale of Shares. If Participant exercises the Option within six months of the Grant Date, Participant agrees that he or she will not sell or offer to sell the Shares acquired prior to the six-month anniversary of the Grant Date, unless such sale or offer to sell in Singapore is made pursuant to the exemptions under Part XIII Division (1) Subdivision (4) (other than section 280) of the Singapore Securities and Futures Act (Chapter 289, 2006 Ed.) ("***SFA***"), or any other applicable provisions of the SFA.

Notifications

Securities Law Information. The grant of the Option is being made pursuant to the "Qualifying Person" exemption" under section 273(1)(f) of the SFA and not with a view to the underlying Shares being subsequently offered for sale to any other party. The Plan has not been and will not be lodged or registered as a prospectus with the Monetary Authority of Singapore.

Director Notification Obligation. If Participant is a director, associate director, or shadow director of a Singapore Subsidiary, Participant may be subject to certain notification requirements under the Singapore Companies Act. To the extent applicable to directors of a Singapore Subsidiary, these requirements include an obligation to notify the Singaporean Subsidiary in writing of an interest (*e.g.*, the Option or Shares) in the Company or any related company within two business days of (i) its acquisition or disposal, (ii) any change in a previously disclosed interest, and (iii) becoming a director, associate director or shadow director.

UNITED KINGDOM

Terms and Conditions

Responsibility for Taxes. The following provisions supplement Section 3.4 of the Option Agreement:

Without limitation to Section 3.4 of the Option Agreement, Participant agrees that he or she is liable for all Tax-Related Items and hereby covenants to pay all such Tax-Related Items, as and when requested by the Company or the Service Recipient or by HM Revenue and Customs ("***HMRC***") (or any other tax authority or any other relevant authority). Participant also agrees to indemnify and keep indemnified the Company and the Service Recipient against any Tax-Related Items that they are required to pay or withhold or have paid or will pay to HMRC (or any other tax authority or any other relevant authority) on Participant's behalf.

Notwithstanding the foregoing, if Participant is a director or executive officer of the Company (within the meaning of Section 13(k) of the Exchange Act), the immediately foregoing provision will not apply. In such case, if the amount of any income tax due is not collected from or paid by Participant within 90 days of the end of the UK tax year in which an event giving rise to the indemnification described above occurs, the amount of any uncollected income taxes may constitute a benefit to Participant on which additional income tax and National Insurance contributions ("***NICs***") may be payable. Participant will be responsible for reporting and paying any income tax due on this additional benefit directly to HMRC under the self-assessment regime and for paying to the Company or the Service Recipient, as applicable, any employee NICs due on this additional benefit, which the Company or the Service Recipient may recover from Participant by any of the means referred to in Section 3.4 of the Option Agreement.

Joint Election for Transfer of Employer NICs. As a condition of participation in the Plan and the vesting or exercise of the Option, Participant agrees to accept any liability for secondary Class 1 NICs which may be payable by the Company and/or the Service Recipient (or any successor to the Company or the Service Recipient) in connection with the Option and any event giving rise to Tax-Related Items (the "***Employer's NICs***"). Without limitation to the foregoing, Participant agrees to enter into a joint election with the Company and/or the Service Recipient (the "***Joint Election***"), which is attached to this Appendix, the form of such Joint Election being formally approved by HMRC, and to execute any other consents or elections required to accomplish the transfer of the Employer's NICs to Participant. Participant further agrees to execute such other joint elections as may be required between Participant and any successor to the Company and/or the Service Recipient. Participant further agrees that the Company and/or the Service Recipient may collect the Employer's NICs from Participant by any of the means set forth in Section 3.4 of the Option Agreement.

If Participant does not enter into a Joint Election, if approval of the Joint Election has been withdrawn by HMRC, if the Joint Election is revoked by the Company or the Service Recipient (as applicable), or if the Joint Election is jointly revoked by Participant and the Company or the Service Recipient, as applicable, the Company, in its sole discretion and without any liability to the Company or the Service Recipient, may choose not to issue or deliver any Shares or proceeds from the sale of Shares to Participant upon exercise of the Option.

IMPORTANT NOTE: By accepting the Option (whether by signing the Grant Notice or via the Company's designated electronic acceptance procedures), Participant is agreeing to be bound by the terms of the Joint Election. Participant should read the terms of the Joint Election carefully before accepting the Agreement and the Joint Election. If requested by the Company, Participant agrees to execute the Joint Election in hard copy even if Participant has accepted the Agreement through the Company's electronic acceptance procedure. By entering into the Joint Election, Participant agrees that any employer's NICs liability that may arise in connection with participation in the Plan will be transferred to Participant, and Participant authorizes the Service Recipient to recover an amount sufficient to cover this liability by such methods, including but not limited to, deductions from Participant's salary or other payments due or the sale of sufficient Shares acquired pursuant to the Option.

RAPID MICRO BIOSYSTEMS, INC.

2021 INCENTIVE AWARD PLAN

(UK EMPLOYEES)

ELECTION TO TRANSFER THE EMPLOYER'S SECONDARY CLASS 1 NATIONAL INSURANCE LIABILITY TO THE EMPLOYEE

1. **PARTIES**

This Election is between:

(A) The individual who has gained access to this Election (the ***"Employee"***), who is employed by one of the employing companies listed in the attached schedule (the ***"Employer"***) and who is eligible to receive options (***"Options")*** pursuant to the terms and conditions of the Rapid Micro Biosystems, Inc. 2021 Incentive Award Plan (the ***"Plan"***), and

(B) Rapid Micro Biosystems, Inc., 1001 Pawtucket Boulevard West, Suite 280, Lowell, Massachusetts 01854, USA (the ***"Company"***), which may grant Options under the Plan and is entering into this Form of Election on behalf of the Employer.

2. **PURPOSE OF ELECTION**

2.1 This Election relates to all Options granted to Employee under the Plan up to the termination date of the Plan.

2.2 In this Election the following words and phrases have the following meanings:

"**ITEPA**" means the Income Tax (Earnings and Pensions) Act 2003.

"Relevant Employment Income" from Options on which Employer's National Insurance Contributions becomes due is defined as:

(i) an amount that counts as employment income of the earner under section 426 ITEPA (restricted securities: charge on certain post-acquisition events);

(ii) an amount that counts as employment income of the earner under section 438 ITEPA (convertible securities: charge on certain post-acquisition events); or

(iii) any gain that is treated as remuneration derived from the earner's employment by virtue of section 4(4)(a) SSCBA, including without limitation:

(A) the acquisition of securities pursuant to the Options (within the meaning of section 477(3)(a) of ITEPA);

(B) the assignment (if applicable) or release of the Options in return for consideration (within the meaning of section 477(3)(b) of ITEPA);

(C) the receipt of a benefit in connection with the Options, other than a benefit within (i) or (ii) above (within the meaning of section 477(3)(c) of ITEPA).

"**SSCBA**" means the Social Security Contributions and Benefits Act 1992.

"Taxable Event" means any event giving rise to Relevant Employment Income.

2.3 This Election relates to the Employer's secondary Class 1 National Insurance Contributions (the *"**Employer's Liability**"*) which may arise in respect of Relevant Employment Income in respect of the Options pursuant to section 4(4)(a) and/or paragraph 3B(1A) of Schedule 1 of the SSCBA.

2.4 This Election does not apply in relation to any liability, or any part of any liability, arising as a result of regulations being given retrospective effect by virtue of section 4B(2) of either the SSCBA or the Social Security Contributions and Benefits (Northern Ireland) Act 1992.

2.5 This Election does not apply to the extent that it relates to relevant employment income which is employment income of the earner by virtue of Chapter 3A of Part VII of ITEPA (employment income: securities with artificially depressed market value).

2.6 Any reference to the Company and/or the Employer shall include that entity's successors in title and assigns as permitted in accordance with the terms of the Plan and the Global Stock Option Agreement. This Election will have effect in respect of the Options and any awards which replace or replaced the Options following their grant in circumstances where section 483 of ITEPA applies.

3. **ELECTION**

The Employee and the Company jointly elect that the entire liability of the Employer to pay the Employer's Liability that arises on any Relevant Employment Income is hereby transferred to the Employee. The Employee understands that, by accepting the Option (including by electronic means) or by separately signing or electronically accepting this Election, he or she will become personally liable for the Employer's Liability covered by this Election. This Election is made in accordance with paragraph 3B(1) of Schedule 1 to SSCBA.

4. **PAYMENT OF THE EMPLOYER'S LIABILITY**

4.1 The Employee hereby authorises the Company and/or the Employer to collect the Employer's Liability in respect of any Relevant Employment Income from the Employee at any time after the Taxable Event:

(i) by deduction from salary or any other payment payable to the Employee at any time on or after the date of the Taxable Event; and/or

(ii) directly from the Employee by payment in cash or cleared funds; and/or

(iii) by arranging, on behalf of the Employee, for the sale of some of the securities which the Employee is entitled to receive in respect of the Options, the proceeds from which must be delivered to the Employer in sufficient time for payment to be made to Her Majesty's Revenue & Customs ("***HMRC***") by the due date; and/or

(iv) where the proceeds of the gain are to be paid through a third party, the Employee will authorize that party to withhold an amount from the payment or to sell some of the securities which the Employee is entitled to receive in respect of the Options, such amount to be paid in sufficient time to enable the Company and/or the Employer to make

payment to HMRC by the due date; and/or

(v) by any other means specified in the Global Stock Option Agreement.

4.2 The Company hereby reserves for itself and the Employer the right to withhold the transfer of any securities in respect of the Options to the Employee until full payment of the Employer's Liability is received.

4.3 The Company agrees to procure the remittance by the Employer of the Employer's Liability to HMRC on behalf of the Employee within 14 days after the end of the UK tax month during which the Taxable Event occurs (or within 17 days after the end of the UK tax month during which the Taxable Event occurs, if payments are made electronically).

5. **DURATION OF ELECTION**

5.1 The Employee and the Company agree to be bound by the terms of this Election regardless of whether the Employee is transferred abroad or is not employed by the Employer on the date on which the Employer's Liability becomes due.

5.2 Any reference to the Company and/or the Employer shall include that entity's successors in title and assigns as permitted in accordance with the terms of the Plan and relevant award agreement. This Election will continue in effect in respect of any awards which replace the Options in circumstances where section 483 of ITEPA applies.

5.3 This Election will continue in effect until the earliest of the following:

(i) the Employee and the Company agree in writing that it should cease to have effect;

(ii) on the date the Company serves written notice on the Employee terminating its effect;

(iii) on the date HMRC withdraws approval of this Election; or

(iv) after due payment of the Employer's Liability in respect of the entirety of the Options to which this Election relates or could relate, such that the Election ceases to have effect in accordance with its terms.

5.4 This Election will continue in force regardless of whether the Employee ceases to be an employee of the Employer.

[Electronic Acceptance/Signature page follows]

Acceptance by the Employee

The Employee acknowledges that by accepting the Option, (whether by clicking on the "Accept" box where indicated in the Company's electronic acceptance procedure or by signing the Global Stock Option Grant Notice in hard copy) or by separately signing or electronically accepting this Election, the Employee agrees to be bound by the terms of this Election.

Signed

The Employee

Acceptance by the Company

The Company acknowledges that, by signing this Election or arranging for the scanned signature of an authorised representative to appear on this Election, the Company agrees to be bound by the terms of this Election.

Signed for and on behalf of the Company

Name

Title

SCHEDULE OF EMPLOYER COMPANIES

The following are the employing companies to which this Joint Election may apply:

Name:	
Registered Office:	
Company Registration Number:	
Corporation Tax Reference:	
PAYE Reference:	

SEVENTH AMENDMENT TO LEASE

THIS SEVENTH AMENDMENT TO LEASE ("Amendment") dated as of March 18, 2022 between **Farley White Pawtucket, LLC**, a Massachusetts limited liability company having an address c/o Farley White Management Company, LLC, 155 Federal Street, Suite 1800, Boston, MA 02110 ("Landlord"), and **Rapid Micro Biosystems, Inc.**, a Delaware corporation having an address of 1001 Pawtucket Boulevard, Lowell, MA 01854 ("Tenant").

Preliminary Statement

Landlord's predecessor in interest, 1001 Pawtucket, LLC, and Tenant entered into that certain Lease dated October 21, 2013 (the "Original Lease"), as amended by a (i) First Amendment of Lease dated July 10, 2014, (ii) Second Amendment of Lease dated December 30, 2014, (iii) Third Amendment of Lease dated January 9, 2015, (iv) Fourth Amendment of Lease dated June 18, 2015, (v) Fifth Amendment of Lease dated March 1l, 2016, and (vi) Sixth Amendment of Lease dated August 29, 2018 (the "Sixth Amendment"; collectively, the "Lease") pertaining to premises now containing approximately 52,802 rentable square feet in Pod L2/A6, L2/A7 and L2/A8, in the Building known as Cross River Center and located at 1001 Pawtucket Boulevard in Lowell, Massachusetts ("Original Premises"), which is more particularly described in the Lease. Landlord and Tenant desire to expand the Original Premises to include approximately 14,861 rentable square feet in Pod L2/A7 as shown on the floor plan attached hereto as **Exhibit A** ("Expansion Premises") and to extend the Term of the Lease, all upon the terms and conditions hereinafter set forth.

Landlord will tender possession of the Expansion Premises to Tenant in two phases. The initial portion of the Expansion Premises that will be delivered consists of approximately 11,748 rentable square feet and is shown as the Phase I Premises on **Exhibit A** (the "Phase I Premises"), and the remaining portion of the Expansion Premises consists of approximately 3,113 rentable square feet and is shown as the Remaining Space on **Exhibit A** (the "Remaining Space").

NOW, THEREFORE, in consideration of the premises and the mutual agreements contained herein and in the Lease, Landlord and Tenant hereby agree as follows:

1. Premises. Effective as of the Phase I Commencement Date (defined below), the Phase I Premises shall be added to the Original Premises and together shall be the Premises under the Lease. Effective as of the Remaining Space Commencement Date (defined below), the Remaining Space shall be added to the Premises, and the Expansion Premises, together with the Original Premises, shall be the Premises under the Lease.

2. Expansion Premises Commencement Dates. The "Phase I Commencement Date" shall be the date Landlord delivers possession of the Phase I Premises to Tenant free and clear of any tenancies or encumbrances. The "Remaining Space Commencement Date" shall be the date (i) Landlord has tendered possession of the Remaining Space to Tenant free and clear of any tenancies or encumbrances, and (ii) the Expansion Premises is in the condition required by this Amendment, including without limitation the Demising Work set forth in and subject to Section 6 hereof, and the current tenant thereof shall have vacated the same. Upon the Remaining Space Commencement Date, the Premises will contain a total of approximately 67,663 rentable square

feet. Landlord shall use diligent efforts to cause the Phase I Commencement Date to occur on or before May 1, 2022 (the "Scheduled Delivery Date"). Without limiting Landlord's obligation to use diligent efforts as set forth in the prior sentence, if for any reason Landlord fails to tender possession to Tenant of the Phase I Premises and to perform the Phase I Demising Work by August 31, 2022 (the "Penalty Date"), then Tenant shall receive a credit of one day of Basic Rent payable for the Expansion Premises for every two days that occur after August 31, 2022, to the actual date on which Tenant has possession of the Phase I Premises with the Phase I Demising Work completed. The free rent credit shall be applied beginning with the Remaining Space Commencement Date. If Landlord's failure to complete the Phase I Demising Work is caused by the occupant of the Expansion Premises as of the date of this Amendment holding over in the Expansion Premises (the "Occupant Holdover"), then the Penalty Date shall be delayed on a day-for-day basis to the extent caused by such Occupant Holdover.

3. Term. The Term of the Lease is hereby extended to July 31, 2029, and the "Termination Date" (as defined in the Lease) is July 31, 2029. Landlord and Tenant acknowledge and agree that Tenant has an option to extend the Term for the Extension Term under the terms and conditions of Section 4 of the Original Lease.

4. Basic Rent.

Upon the Phase I Commencement Date and continuing until July 31, 2022, the Basic Rent for the Phase I Premises shall be payable at the rate of $8,321.50, and from August 1, 2022 through the day before the Remaining Premises Commencement Date, the Basic Rent for the Phase I Premises shall be $8,556.25.

Upon the Remaining Premises Commencement Date, the Basic Rent for the entire Premises shall be as follows (and all other Basic Rent amounts and Basic Rent charts set forth in the Lease and the Basic Rent amount for the Phase I Premises set forth above in this Section 4 shall be deleted):

	PER RSF	ANNUAL	MONTHLY
Remaining Premises Commencement Date – July 31, 2022*	$8.50	N/A	$47,927.96
August 1, 2022 – July 31, 2023	$8.75	$592,051.25	$49,337.60
August 1, 2023 – July 31, 2024	$9.00	$608,967.00	$50,747.25
August 1, 2024 – July 31, 2025	$9.25	$625,882.75	$52,156.90
August 1, 2025 – July 31, 2026	$9.50	$642,798.50	$53,566.54
August 1, 2026 – July 31, 2027	$9.75	$659,714.25	$54,976.19
August 1, 2027 – July 31, 2028	$10.00	$676,630.00	$56,385.83
August 1, 2028 – July 31, 2029	$10.25	$693,545.75	$57,795.48

*If the Remaining Premises Commencement Date occurs after July 31, 2022, then the references to any specific dates in the above Basic Rent chart that occur before the actual Remaining Premises Commencement Date shall be disregarded.

5. Tenant's Pro Rata Share. Tenant's Pro Rata Share, as defined in Section 1 of the

Original Lease, shall be (i) 7.73% as of the Phase I Commencement Date and continuing until the date before the Remaining Premises Commencement Date, and (i) 8.10% as of the Expansion Space Commencement Date.

6. Construction; Landlord's Work. Tenant shall accept the Expansion Premises in its "as is" condition, and Landlord shall have no obligation to construct any improvements or perform any work therein except that Landlord, at its expense, (i) shall perform all of the necessary demising work to include the Expansion Premises in the Premises, which work shall be performed in accordance with the plan attached as **Exhibit B** and shall include all building standard wall installation, insulation, taping, painting and balancing of systems (the "Demising Work"); and (ii) shall ensure that all building systems are in good working order and free of defects including, without limitation, that (a) the interior mechanical systems and all necessary plumbing, electrical and other utilities are installed and in proper working condition; and (b) the HVAC serving the Expansion Premises is in good working order and condition. The "Phase I Demising Work" shall mean completion of a building standard demising wall separating the Phase I Premises from the adjoining space provided that the Phase I Premises shall be separated from the Remaining Space by temporary demising barriers. Notwithstanding the foregoing, at the time Landlord shall deliver the Phase I Premises, Landlord shall not be required to have performed any Demising Work, and upon such delivery the Phase I Commencement Date shall have occurred notwithstanding that such space shall not have been demised. Upon delivery of the Phase I Space to Tenant, Landlord will promptly commence the Demising Work and complete the same as soon as reasonably possibly.

7. Allowance; Tenant's Improvement Work. Landlord will provide to Tenant an allowance in the amount of $270,652.00 (the "Construction Allowance") for the purposes of reimbursing Tenant for the cost of any improvements that Tenant makes in the Premises within eighteen (18) months from the Phase I Commencement Date. The Construction Allowance can be used for the costs of design, preparation, renovation, improvement and construction of the Premises, including without limitation, hard costs, space plans and architectural and engineering costs. All such improvements shall be made in accordance with Section 3 of the Original Lease, except that (i) the combined single limit for the comprehensive general liability insurance and umbrella excess liability insurance shall be $5,000,000; and (ii) Tenant has no obligation to provide a lien and completion bond, bank letter of credit or other security. Tenant has the right to select its preferred contractors, subcontractors, architects, engineers and consultants, subject to Landlord's approval of the general contractor, which approval shall not be unreasonably withheld or delayed. Landlord is not entitled to, and Tenant has no obligation to pay, any management, supervision or review fees in connection with any improvement work. After Tenant has expended an amount equal to the estimated cost of the work in excess of the Construction Allowance, Landlord will disburse the Construction Allowance to Tenant in multiple payments within 30 days upon Tenant's submission of a written request for payment, which request cannot be delivered more frequently than once every 30 days. The payment request shall be for work completed and shall include (i) Tenant's certificate that the requisite portion of work covered by the payment request has been completed, (ii) copies of invoices, receipts and bills evidencing the costs and expenses covered by the payment request, and (iii) lien waivers from the contractor or contractors performing the work. If Landlord fails timely to disburse a payment of the Construction Allowance, then Tenant has the right to offset such unpaid amount against Basic Rent.

8. Right of First Offer. If any space on the on the west side of Level 2 of the Building contiguous to the Premises shall become available for leasing during the Term (any such space, the "**Expansion Space**"), prior to offering such space to any party other than the then occupant of the Expansion Space or Cobham Advanced Electronics (which has rights thereto as of the date of this Amendment), then Landlord shall notify Tenant in writing of the terms and conditions on which Landlord in good faith intends to market the Expansion Space and offer to lease the Expansion Space to Tenant on such terms and conditions as shall be specified by Landlord (the "**Offer Notice**"), which Offer Notice shall: (a) describe the portion of the Expansion Space that at such time is available for leasing, (b) state the Basic Rent and other terms and conditions for the Expansion Space and the delivery date for such Expansion Space, and (c) state that the expiration of the Lease of such offered Expansion Space shall be coterminous with the Term of the Lease. Tenant may not exercise its right hereunder unless at least two (2) years remain in the Term of the Lease or, if two (2) years shall not remain in the Term, it simultaneously exercises an available option to extend the Term. Space shall be deemed available for leasing when such space is vacant or is scheduled to become vacant within nine (9) months or Landlord determines otherwise to market the space. Tenant may elect to lease the Expansion Space on the terms and conditions of the Offer Notice by giving Landlord notice of Tenant's election to do so within fifteen (15) days after delivery of the Offer Notice, and, if Tenant timely gives such notice, the parties shall execute and deliver an amendment of this Lease incorporating the terms and conditions set forth in the Offer Notice. If Tenant shall fail to give notice of such election within such fifteen (15) day period, then Landlord may lease the Expansion Space to any party on any terms. If an Offer Notice is delivered for less than all of the Expansion Space, then the remaining portion of the Expansion Space shall continue to be subject to the terms of this right of first offer. This right of first offer is a one-time right only and shall be of no further force or effect after Landlord has made an offer to Tenant for the applicable space.

9. Termination Right. Section 12 of the Sixth Amendment to the Lease is hereby deleted. Landlord hereby grants to Tenant a right to terminate the Lease (the "Termination Right") before the scheduled expiration date of the Term, which termination, if the Termination Right is exercised, will be effective on July 31, 2026 (the "Termination Date"). If Tenant desires to exercise the Termination Right, then Tenant must give written notice thereof to Landlord no later than July 31, 2025. As a condition to such Termination Right (i) at the time of Tenant giving such notice exercising the Termination Right, there must be no default by Tenant (continuing uncured beyond the expiration of all applicable notice and grace periods); and (ii) at least 90 days before the Termination Date, Tenant shall pay to Landlord a termination fee equal to the Construction Allowance and the brokerage commission payable in connection with this Seventh Amendment, with interest thereon at the rate of six percent (6%) per annum from the Remaining Space Commencement Date. Upon request from Tenant, Landlord agrees to provide its calculation of the termination fee.

10. Electricity. Landlord shall, at Landlord's expense, either install an electrical checkmeter to measure Tenant's consumption of electricity in the Expansion Premises or rearrange the electric metering to include the entire Premises (the "Separate Meter"). If the Phase I Commencement Date occurs before Landlord shall install the Separate Meter, then Landlord shall make a reasonable estimate of Tenant's and the adjoining tenant's respective shares of electrical usage periodically, and bill Tenant on a monthly basis for its proportionate share accordingly (the "Alternative Billing"). Notwithstanding the foregoing, Landlord shall install the Separate Meter

within 90 days after the Remaining Space Commencement Date, provided that with respect to the air handler that serves both the Premises and the adjacent space, Tenant understands it may be impractical for Landlord to install the Separate Meter, in which case the Alternative Billing will continue for the payment of electricity related to such air handler. From and after the later of the Phase I Commencement Date and the install of the Separate Meter, Tenant shall pay to Landlord monthly as Additional Rent an amount equal to the actual number of kilowatt hours of electrical service provided to the Premises, multiplied by the average rate per kilowatt hour paid by Landlord for the Building plus any Alternative Billing for the aforementioned air handler; and there shall be no markup or additional amounts charged to Tenant.

11. Parking Allotment. As of the Phase I Premises Commencement Date, Tenant is entitled to Tenant's Pro Rata Share of all parking spaces on the Property, which is 136 parking spaces, including 5 Reserved Parking Spaces. All such parking shall be provided to Tenant at no charge.

12. Ratification. Except only as expressly amended hereby, the Lease shall continue in full force and effect as heretofore. The Lease and this Amendment set forth the entire agreement of the parties with respect to the subject matter as of the date hereof and no prior agreement, letters, representations, warranties, promises or understandings pertaining to any such matters shall be effective for any such purpose.

13. Estoppel. As of the date hereof, to Tenant's actual knowledge: (a) Landlord is not in default of its obligations under the Lease, and no state of facts exists which, but for the giving of notice and/or the passage of time, would be a default by Landlord under the Lease; and (b) except as expressly set forth herein, Tenant is not currently entitled to any credit, offset, or reduction in rent or other charges due or to become due under the Lease for any reason whatsoever. As of the date hereof, to Landlord's actual knowledge, Tenant is not in default of its monetary obligations under the Lease.

14. Defined Terms. All capitalized terms not otherwise defined in this Amendment shall have the meaning used in the Lease.

15. Brokerage. Landlord and Tenant represent and warrant to each other that they have not dealt with any real estate broker in connection with this Amendment other than CRESA and that no other broker (claiming through such representing party) is entitled to any commission on account of this Amendment. Tenant will defend, hold harmless and indemnify Landlord from any loss, damage or expense, including reasonable attorneys' fees, arising from a breach by Tenant of such representation and a claim arising under Tenant in connection with this Amendment. Landlord will defend, hold harmless and indemnify Tenant from any loss, damage or expense, including reasonable attorneys' fees, arising from a breach by Landlord of such representation and a claim arising under Landlord in connection with this Amendment. Landlord shall pay all commissions owed to CRESA in connection with this Amendment.

16. Bind and Inure. This document shall become effective and binding only upon the execution and delivery of this Amendment by Landlord and Tenant. This Amendment shall be binding upon and inure to the benefit of the successors and assigns of the parties hereto.

17. Counterparts. This Amendment may be executed in any number of counterparts, provided each of the parties hereto executes at least one counterpart; each such counterpart hereof shall be deemed to be an original instrument, but all such counterparts together shall constitute but one agreement. This Amendment may be executed and delivered by (i) facsimile, (ii) scanned image (e.g., pdf or .tiff file extension name) as an attachment to electronic mail (email), or (iii) electronic signature technology (e.g. DocuSign), and such signatures shall have the same force and effect as originals. Landlord and Tenant each warrant to the other that the person or persons executing this Amendment on its behalf has or have authority to do so and that such execution has fully obligated and bound such party to all terms and provisions of this document.

(SIGNATURES APPEAR ON NEXT PAGE)

WITNESS the execution hereof as an instrument under seal as of the day first above written.

LANDLORD:

Farley White Pawtucket, LLC,
a Massachusetts Limited Liability Company

By: /s/ John F. Power
John F. Power, Manager

TENANT:

Rapid Micro Biosystems, Inc.,
a Delaware Corporation

By: /s/ Robert Spignesi
Name: Robert Spignesi
Title: President and CEO

EXHIBIT A

Expansion Premises

EXHIBIT B

Space Plan

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We hereby consent to the incorporation by reference in the Registration Statement on Form S-8 (No. 333-257981) of Rapid Micro Biosystems, Inc. of our report dated March 24, 2022 relating to the financial statements, which appears in this Form 10-K.

/s/ PricewaterhouseCoopers LLP
Boston, Massachusetts

March 24, 2022

Exhibit 31.1

CERTIFICATION OF PRINCIPAL EXECUTIVE OFFICER
PURSUANT TO RULES 13a-14(a) OR 15d-14(a) UNDER THE SECURITIES EXCHANGE ACT OF 1934,
AS ADOPTED PURSUANT TO SECTION 302 OF THE SARBANES-OXLEY ACT OF 2002

I, Robert Spignesi, certify that:

1. I have reviewed this Annual Report on Form 10-K of Rapid Micro Biosystems, Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) for the registrant and have:

   (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

   (b) (Paragraph omitted pursuant to SEC Release Nos. 33-8238/34-47986 and 33-8392/34-49313);

   (c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

   (d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

   (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

   (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: March 24, 2022

By: /s/ Robert Spignesi
Name: Robert Spignesi
Title: Chief Executive Officer
(principal executive officer)

Exhibit 31.2

CERTIFICATION OF PRINCIPAL FINANCIAL OFFICER
PURSUANT TO RULES 13a-14(a) OR 15d-14(a) UNDER THE SECURITIES EXCHANGE ACT OF 1934, AS ADOPTED PURSUANT TO SECTION 302 OF THE SARBANES-OXLEY ACT OF 2002

I, Sean Wirtjes, certify that:

1. I have reviewed this Annual Report on Form 10-K of Rapid Micro Biosystems, Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) for the registrant and have:

   (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

   (b) (Paragraph omitted pursuant to SEC Release Nos. 33-8238/34-47986 and 33-8392/34-49313);

   (c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

   (d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

   (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

   (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: March 24, 2022

By: /s/ Sean Wirtjes
Name: Sean Wirtjes
Title: Chief Financial Officer
(principal financial officer and principal accounting officer)

Exhibit 32.1

CERTIFICATION OF PRINCIPAL EXECUTIVE OFFICER PURSUANT TO 18 U.S.C. SECTION 1350, AS ADOPTED PURSUANT TO SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

In connection with the Annual Report of Rapid Micro Biosystems, Inc. (the "Company") on Form 10-K for the period ended December 31, 2021 (the "Report"), as filed with the Securities and Exchange Commission on the date hereof, I, the undersigned, certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, to the best of my knowledge, that:

(1) The Report fully complies with the requirements of Section 13(a) or Section 15(d) of the Securities Exchange Act of 1934; and

(2) The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Date: March 24, 2022

By: /s/ Robert Spignesi
Name: Robert Spignesi
Title: Chief Executive Officer
(principal executive officer)

Exhibit 32.2

CERTIFICATION OF PRINCIPAL ACCOUNTING OFFICER PURSUANT TO 18 U.S.C. SECTION 1350, AS ADOPTED PURSUANT TO SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

In connection with the Annual Report of Rapid Micro Biosystems, Inc. (the "Company") on Form 10-K for the period ended December 31, 2021 (the "Report"), as filed with the Securities and Exchange Commission on the date hereof, I, the undersigned, certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, to the best of my knowledge, that:

(1) The Report fully complies with the requirements of Section 13(a) or Section 15(d) of the Securities Exchange Act of 1934; and

(2) The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Date: March 24, 2022

By: /s/ Sean Wirtjes
Name: Sean Wirtjes
Title: Chief Financial Officer
(principal financial officer and principal accounting officer)