UNITED STATES
SECURITIES AND EXCHANGE COMMISSION

Washington, D.C. 20549

FORM 10-Q

(Mark One)

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

For the quarterly period ended March 31, 2022

OR

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

For transition period from to

Commission File Number 001-40354

Zymergen Inc.

(Exact name of registrant as specified in its charter)

Delaware	**46-2942439**
(State or other jurisdiction of incorporation or organization)	(I.R.S. Employer Identification Number)

5980 Horton Street, Suite 105
Emeryville, California 94608
(415) 801-8073
(Address, including zip code, and telephone number, including area code, of registrant's principal executive offices)

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

Title of each class	Trading Symbol	Name of each exchange on which registered
Common stock, $0.001 par value per share	ZY	The Nasdaq Global Select Market

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 7(a)(2)(B) of the Securities Act. ☐

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

As of April 29, 2022, there were approximately 103,140,755 shares of the registrant's common stock, par value $0.001 per share, outstanding.

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SPECIAL NOTE REGARDING FORWARD-LOOKING STATEMENTS

This Quarterly Report on Form 10-Q contains forward-looking statements within the meaning of 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"), which statements involve substantial risk and uncertainties. In some cases, you can identify forward-looking statements by the following words: "anticipate," "believe," "can," "continue," "could," "estimate," "expect," "intend," "may," "might," "ongoing," "plan," "potential," "positioned," "predict," "project," "should," "target," "will," "would," or the negative of these terms or other comparable terminology, although not all forward-looking statements contain these words.

These statements involve risks, uncertainties and other factors that may cause actual results, levels of activity, performance or achievements to be materially different from the information expressed or implied by these forward-looking statements. Although we believe we have a reasonable basis for each forward-looking statement contained in this Quarterly Report on Form 10-Q, we caution you that these statements are based on a combination of facts and factors currently known by us and our projections of the future, about which we cannot be certain. Forward-looking statements in this Quarterly Report on Form 10-Q include, but are not limited to, statements about:

- our ability to successfully commercialize our products;
- our ability to execute on our new strategic plan;
- our ability to reduce our operating costs and fund our operations to the middle of 2023;
- the scope and timing of restructuring activities and the effects of restructuring activities on our business;
- our ability to focus on a smaller number of programs that capitalize on our capabilities;
- the potential applications of our technologies and the commercial opportunities and market sizes for the programs on which we are focused, including in advanced materials, drug discovery and automation;
- the differentiation and capabilities of our platform, including with respect to our collection of accessible biomolecules, our software and data science technology, and our data driven microbe optimization processes;
- our ability to identify candidates for drug development;
- our ability to generate revenues from our products and the timelines for our products;
- our plans for the development, launch and commercialization of the products in our pipeline;
- our ability to successfully produce products through fermentation that we initially launch using non-fermentation or non-bio-based molecules;
- the implementation of our business model and our ability to transition from revenues that are substantially all derived from research and development ("R&D") service contracts and collaboration agreements to revenues derived from the commercialization of our products;
- our ability to find and qualify sources of manufacturing;
- the potential benefits of our existing and potential future R&D collaborations and other partner relationships;
- our ability to accurately anticipate and address the market opportunity in our target markets, as well as the total market opportunity across numerous sectors;
- our ability to accurately anticipate the size and growth potential of the markets for our products and our ability to develop and commercialize products that gain customer acceptance in those markets;
- our expectations regarding our ability to obtain and maintain intellectual property protection for our platform, products and related technologies;
- our ability to obtain and maintain regulatory approval for certain of our products;
- regulatory developments in the United States and foreign countries;

- the ability of incumbent chemical companies and synthetic biology companies to address the needs of our existing and potential customers;
- developments relating to our competitors and our industry;
- the success of competing products that are or may become available;
- our goals for producing bio-based products that contribute to a more sustainable future;
- our ability to successfully enter new markets and manage any international expansion;
- our financial performance;
- our ability to obtain funding for our operations, including funding necessary to complete further development of our current and future products;
- our estimates regarding margins, future revenue, our ability to manage our expenses, capital requirements and needs for additional financing;
- our preliminary allocation of the purchase price of acquisitions;
- the success of our significant investments in our continued R&D of new products;
- the impact of COVID-19 on our business; and
- our ability to attract, train, and retain key personnel, including a permanent Chief Executive Officer.

You should refer to the "*Risk Factors*" section of this Quarterly Report on Form 10-Q for a discussion of important factors that may cause actual results to differ materially from those expressed or implied by the forward-looking statements. As a result of these factors, we cannot assure you that the forward-looking statements in this Quarterly Report on Form 10-Q will prove to be accurate. Furthermore, if the forward-looking statements prove to be inaccurate, the inaccuracy may be material. In light of the significant uncertainties in these forward-looking statements, you should not regard these statements as a representation or warranty by us or any other person that we will achieve our objectives and plans in any specified time frame, or at all. The forward-looking statements in this Quarterly Report on Form 10-Q represent our views as of the date of this Quarterly Report on Form 10-Q. We anticipate that subsequent events and developments will cause our views to change. However, while we may elect to update these forward-looking statements at some point in the future, we have no current intention of doing so except to the extent required by applicable law. You should, therefore, not rely on these forward-looking statements as representing our views as of any date subsequent to the date of this Quarterly Report on Form 10-Q.

PART I - FINANCIAL INFORMATION

Item 1. Financial Statements

ZYMERGEN INC.
CONDENSED CONSOLIDATED BALANCE SHEETS
(Unaudited)
(in thousands, except share and per share data)

	As of March 31, 2022	As of December 31, 2021 (1)
ASSETS		
Current assets:		
Cash and cash equivalents	$ 336,980	$ 386,105
Accounts receivable	374	520
Accounts receivable, unbilled	2,025	2,565
Prepaid expenses	5,764	7,818
Inventories	5,995	6,035
Restricted cash, current	1,686	2,105
Other current assets	791	2,201
Total current assets	353,615	407,349
Restricted cash	9,849	9,849
Property and equipment, net	56,004	53,799
Operating lease right-of-use assets	147,960	—
Goodwill	40,645	40,645
Intangible assets, net	7,929	8,529
Other long-term assets	2,187	2,225
Total assets	$ 618,189	$ 522,396
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current liabilities:		
Accounts payable	$ 6,371	$ 5,418
Accrued and other liabilities	21,383	17,496
Short-term operating lease liabilities	7,285	—
Short-term debt, net	50,560	43,953
Short-term deferred rent	—	2,218
Deferred revenue	2,862	4,468
Total current liabilities	88,461	73,553
Long-term operating lease liabilities	181,168	—
Long-term deferred rent	—	35,390
Other long-term liabilities	4,496	4,967
Total liabilities	274,125	113,910
Commitments and contingencies		
Stockholders' equity		
Preferred stock, $0.001 par value, 170,000,000 authorized as of March 31, 2022 and December 31, 2021, respectively; no shares issued and outstanding as of March 31, 2022 and December 31, 2021, respectively	—	—
Common stock, $0.001 par value, 1,500,000,000 shares authorized as of March 31, 2022 and December 31, 2021, respectively; 103,123,308 and 103,045,299 shares issued and outstanding as of March 31, 2022 and December 31, 2021, respectively	103	103
Additional paid-in capital	1,551,602	1,543,908
Accumulated deficit	(1,207,641)	(1,135,525)
Total stockholders' equity	344,064	408,486
Total liabilities and stockholders' equity	$ 618,189	$ 522,396

(1) The balance sheet as of December 31, 2021 is derived from the audited financial statements as of that date.

The accompanying notes are an integral part of these Condensed Consolidated Financial Statements.

ZYMERGEN INC.
CONDENSED CONSOLIDATED STATEMENTS OF OPERATIONS AND COMPREHENSIVE LOSS
(Unaudited)
(in thousands, except share and per share data)

	Three Months Ended March 31,	
	2022	2021
Revenues from research and development service agreements	$ 3,221	$ 2,614
Collaboration and other revenue	1,333	1,121
Grant revenue	237	—
Total revenues	4,791	3,735
Cost and operating expenses:		
Cost of service revenue	12,455	21,130
Research and development	28,739	39,811
Sales and marketing	3,638	6,872
General and administrative	23,705	19,331
Restructuring charges (benefit)	(130)	—
Total cost and operating expenses	68,407	87,144
Operating loss	(63,616)	(83,409)
Other income (expense):		
Interest income	51	43
Interest expense	(8,045)	(2,727)
Gain (loss) on change in fair value of warrant liabilities	—	2,279
Other expense, net	(532)	(763)
Total other expense	(8,526)	(1,168)
Loss before income taxes	(72,142)	(84,577)
Benefit from (provision for) income taxes	26	(8)
Net loss and comprehensive loss	$ (72,116)	$ (84,585)
Net loss per share attributable to common stockholders, basic	$ (0.70)	$ (6.51)
Net loss per share attributable to common stockholders, diluted	$ (0.70)	$ (6.51)
Weighted average shares used in computing net loss per share to common stockholders, basic	103,109,168	12,996,344
Weighted average shares used in computing net loss per share to common stockholders, diluted	103,109,168	13,340,457

The accompanying notes are an integral part of these Condensed Consolidated Financial Statements.

ZYMERGEN INC.
CONDENSED CONSOLIDATED STATEMENTS OF CHANGES IN CONVERTIBLE PREFERRED STOCK AND STOCKHOLDERS' EQUITY (DEFICIT)
(Unaudited)
(in thousands, except share data)

	Convertible Preferred Stock		Common Stock		Additional Paid-in Capital	Accumulated Deficit	Total Stockholders' Equity (Deficit)
	Shares	Amount	Shares	Amount			
Balance, December 31, 2021	—	$ —	103,045,299	$ 103	$ 1,543,908	$ (1,135,525)	$ 408,486
Vesting of restricted stock units, net	—	—	916	—	—	—	—
Issuance of common stock upon exercise of options	—	—	77,093	—	303	—	303
Stock-based compensation expense	—	—	—	—	7,391	—	7,391
Net loss	—	—	—	—	—	(72,116)	(72,116)
Balance, March 31, 2022	—	$ —	103,123,308	$ 103	$ 1,551,602	$ (1,207,641)	$ 344,064

	Convertible Preferred Stock		Common Stock		Additional Paid-in Capital	Accumulated Deficit	Total Stockholders' Equity (Deficit)
	Shares	Amount	Shares	Amount			
Balance, December 31, 2020	68,093,280	$ 900,798	12,812,109	$ 13	$ 29,991	$ (773,740)	$ (743,736)
Vesting of restricted common stock	—	—	16,810	—	—	—	—
Issuance of common stock upon exercise of options	—	—	711,963	—	3,189	—	3,189
Stock-based compensation expense	—	—	—	—	2,253	—	2,253
Share settlement of non-recourse loan to employee	—	—	(67,050)	—	—	—	—
Cash settlement of non-recourse loan to employee	—	—	—	—	1,946	—	1,946
Net loss	—	—	—	—	—	(84,585)	(84,585)
Balance, March 31, 2021	68,093,280	900,798	13,473,832	$ 13	$ 37,379	$ (858,325)	$ (820,933)

The accompanying notes are an integral part of these Condensed Consolidated Financial Statements.

ZYMERGEN INC.
CONDENSED CONSOLIDATED STATEMENTS OF CASH FLOWS
(Unaudited)
(in thousands)

	Three Months Ended March 31,	
	2022	2021
Operating activities		
Net loss	$ (72,116)	$ (84,585)
Adjustments to reconcile net loss to net cash used in operating activities:		
Depreciation and amortization expense	5,492	4,412
Stock-based compensation expense	7,391	2,253
Non-cash lease expense	3,043	—
Non-cash interest expense	6,607	283
(Gain) loss on change in fair value of warrant liabilities	—	(2,279)
Unrealized foreign exchange loss	432	661
Other	10	(2)
Changes in operating assets and liabilities:		
Accounts receivable	146	94
Accounts receivable, unbilled	540	(35)
Prepaid expenses	318	1,037
Inventories	40	(714)
Other current assets	1,410	(685)
Other long-term assets	38	3
Accounts payable	2,806	1,223
Accrued and other liabilities	(401)	(7,682)
Deferred revenue	(2,037)	(348)
Operating lease liabilities	1,578	—
Deferred rent	—	3,144
Other long-term liabilities	(40)	172
Net cash used in operating activities	(44,743)	(83,048)
Investing activities		
Purchases of property and equipment	(4,764)	(8,639)
Proceeds from sale of property and equipment	86	—
Net cash used in investing activities	(4,678)	(8,639)
Financing activities		
Proceeds from exercise of common stock options	303	3,189
Proceeds from repayment of non-recourse loan to employee	—	1,946
Payment of deferred offering costs	—	(806)
Net cash provided by financing activities	303	4,329
Effect of exchange rate changes on cash	(426)	(620)
Change in cash and cash equivalents	(49,544)	(87,978)
Cash, cash equivalents, and restricted cash at beginning of the period	398,059	219,810
Cash, cash equivalents, and restricted cash at end of the period	$ 348,515	$ 131,832
Cash and cash equivalents	$ 336,980	$ 121,035
Restricted cash, current	1,686	20
Restricted cash, non-current	9,849	10,777
Total cash, cash equivalents, and restricted cash shown in the statement of cash flows	$ 348,515	$ 131,832

The accompanying notes are an integral part of these Condensed Consolidated Financial Statements.

ZYMERGEN INC.
CONDENSED CONSOLIDATED STATEMENTS OF CASH FLOWS
(Unaudited)
(in thousands)

	Three Months Ended March 31,	
	2022	2021
Supplemental disclosure of cash flow information:		
Cash paid during the period for interest	$ 1,438	$ 3,285
Supplemental disclosure of non-cash investing and financing activities:		
Acquisitions of property and equipment under accounts payable and accrued and other liabilities	$ 6,794	$ 6,095
Operating lease right-of-use assets obtained in the exchange for new operating lease liabilities, net	$ (2,821)	$ —
Offering costs related to initial public offering under accounts payable and accrued and other liabilities	$ —	$ 2,843
Share settlement of non-recourse loan to employee	$ —	$ 1,946

The accompanying notes are an integral part of these Condensed Consolidated Financial Statements.

ZYMERGEN INC.
NOTES TO CONDENSED CONSOLIDATED FINANCIAL STATEMENTS
(Unaudited)

1. Nature of Operations

Zymergen (the "Company") integrates computational and manufacturing technologies to design, develop, and commercialize bio-based breakthrough products in a broad range of industries. The Company has developed a platform based on its collection of accessible biomolecules, its software and data science technology, and its data driven microbe optimization processes. In addition, the Company's platform is used to discover novel molecules used to enable unique material properties. Utilizing its platform Zymergen is building three businesses focused on advanced materials, drug discovery and automation. The Company was incorporated in Delaware on April 24, 2013.

Need for Additional Capital

The Company has sustained operating losses and expects to continue to generate operating losses for the foreseeable future. The Company had unrestricted cash and cash equivalents of $337.0 million as of March 31, 2022. Since inception through March 31, 2022, the Company has incurred cumulative net losses of $1.2 billion.

While the Company has signed a number of initial customer R&D services and collaboration contracts, revenues have been insufficient to fund operations. Accordingly, the Company has funded the portion of operating costs exceeding revenues through a combination of proceeds raised from equity and debt issuances. The Company's operating costs include the cost of developing and commercializing products, costs associated with restructuring (Note 4), as well as providing research and development services. As a consequence, the Company expects it will need to raise additional equity or debt financing to fund future operations. The Company's ability to obtain additional funding will depend on a variety of factors, many of which are unpredictable and beyond the Company's control, including general conditions in the global economy and in the global financial markets, which may be impacted by interruptions, delays and/or cost increases resulting from the ongoing COVID-19 pandemic, political instability or geopolitical tensions, such as the current war in Ukraine (the "Ukraine War"), economic weakness or inflationary pressures. As a result of these, or any other circumstances, if the equity and credit markets deteriorate, it may make any necessary equity or debt financing more difficult to obtain in a timely manner and on favorable terms, if at all, and if obtained, it may be more costly or more dilutive. The Company expects that its cash and cash equivalents will be sufficient to fund its operations for a period of at least one year from the date the accompanying Condensed Consolidated Financial Statements are filed with the Securities and Exchange Commission ("SEC").

Impact of COVID-19

The Company cannot at this time predict the specific extent, duration, or full impact that the ongoing COVID-19 pandemic will have on its financial condition and operations. The impact of the COVID-19 pandemic on the financial performance of the Company will depend on future developments, including the duration and spread of the pandemic and related governmental advisories and restrictions. These developments and the continuing impact of the COVID-19 pandemic on the financial markets and the overall economy are highly uncertain. If business conditions, financial markets and/or the overall economy continue to be impacted, the Company's results may be adversely affected.

2. Summary of Significant Accounting Policies

There were no significant changes to the accounting policies during the three months ended March 31, 2022, from the significant accounting policies described in Note 2 of the "Notes to Consolidated Financial Statements" in the Company's 2021 Form 10-K, filed with the SEC on March 30, 2022, except as described below.

Basis of Preparation

The accompanying unaudited Condensed Consolidated Financial Statements have been prepared in accordance with accounting principles generally accepted in the United States of America ("U.S. GAAP") and applicable rules and regulations of the SEC regarding interim financial reporting. As permitted under those rules, certain footnotes or other financial information that are normally required by U.S. GAAP have been condensed or omitted, and accordingly the balance sheet as of December 31, 2021 has been derived from audited financial statements at that date but does not include all of the information required by U.S. GAAP for complete financial statements. These unaudited interim Condensed Consolidated Financial Statements have been prepared on the same basis as the annual financial statements and, in the opinion of management, reflect all adjustments (consisting only of normal recurring adjustments) that are necessary for a fair presentation of the financial information. The results of operations for the three months ended March 31, 2022 are not necessarily indicative of the results to be expected for the year ending December 31, 2022 or for any other interim period or for any other future year.

The accompanying unaudited Condensed Consolidated Financial Statements and related financial information should be read in conjunction with the audited financial statements and the related notes thereto for the year ended December 31, 2021 included in the Company's 2021 Form 10-K.

Principles of Consolidation

These Condensed Consolidated Financial Statements include the accounts of the Company and its wholly-owned subsidiaries. All intercompany balances and transactions have been eliminated upon consolidation.

Fiscal Year

The Company's fiscal year ends on December 31. References to fiscal 2022, for example, refer to the fiscal year ended December 31, 2022. The period end for the Company covered by this report is March 31, 2022.

Use of Estimates

The presentation of financial statements in conformity with U.S. GAAP requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the financial statements and the reported amounts of revenue and expenses during the reporting period. These estimates include, but are not limited to, standalone selling price of performance obligations for contracts with multiple performance obligations, estimate of variable consideration from revenue contracts, useful life of property and equipment, fair value of property and equipment of which the carrying value may not be recoverable, allowance for doubtful accounts, net realizable value of inventories, the valuation of intangible assets, the valuation of common and preferred stock used in the valuation of options to purchase common stock and warrants to purchase common stock or preferred stock, prior to being a publicly traded company, and the incremental borrowing rate used in determining operating lease liabilities. Actual results could differ from those estimates.

Segment Information

Operating segments are identified as components of an enterprise about which discrete financial information is available for evaluation by the chief operating decision-maker ("CODM") in deciding resource allocation and assessing performance. The Company's Acting Chief Executive Officer is its CODM. The Company's CODM reviews financial information presented on a consolidated basis for the purposes of making operating decisions, allocating resources and evaluating financial performance. Consequently, the Company has determined it operates and manages its business in one operating and one reportable segment.

Foreign Currency

For the Company and its subsidiaries, the functional currency has been determined to be the U.S. Dollar (USD). Monetary assets and liabilities denominated in foreign currency are remeasured at period-end exchange rates. Non-monetary assets and liabilities denominated in foreign currencies are remeasured at historical rates. Foreign currency transaction gains and losses resulting from remeasurement are recognized in Other expense, net in the Condensed Consolidated Statements of Operations and Comprehensive Loss.

Contingencies

The Company is subject to various litigation and arbitration claims that arise in the ordinary course of business, including but not limited to those related to employee and shareholder matters. Some of these proceedings involve claims that are subject to substantial uncertainties and unascertainable damages. The Company makes a provision for a liability when it is both probable that a liability has been incurred and the amount of the loss can be reasonably estimated. The Company has determined that no provision for liability nor disclosure is required related to any claim against the Company when: (a) there is not a reasonable possibility that a loss exceeding amounts already recognized (if any) may be incurred with respect to such claim; (b) a reasonably possible loss or range of loss cannot be estimated; or (c) such estimate is immaterial.

CARES Act

On March 27, 2020, the U.S. government enacted the Coronavirus Aid, Relief and Economic Security (CARES) Act which, among other things, permits the deferral of the employer's portion of social security tax payments between March 27, 2020 and December 31, 2020. As of March 31, 2022 and December 31, 2021, approximately $1.8 million and $3.7 million, respectively, of employer payroll tax payments were deferred. The $1.8 million deferred as of March 31, 2022 is due by December 31, 2022.

Leases

Leases (Topic 842) Effective January 1, 2022

The Company determines if an arrangement is or contains a lease at inception by assessing whether the arrangement contains an identified asset and whether the Company has the right to control the identified asset. Lease assets represent the Company's right to use an underlying asset for the lease term and lease liabilities represent the Company's obligation to make lease payments arising from the lease.

The Company has a variety of different types of operating leases, the specific terms and conditions of which vary from lease to lease. Certain operating lease agreements include terms such as: (i) renewal and early termination options; (ii) tenant improvement allowances; and (iii) rent escalation clauses. The lease agreements also include provisions for the maintenance of the leased asset and payment of lease related costs. The Company reviews the specific terms and conditions of each lease and, as appropriate, renewal or termination options reasonably certain to be exercised are included in the Company’s lease terms. The Company’s leases do not contain any residual value guarantees.

Certain of the Company’s lease agreements include rental payments that may be adjusted in the future based on economic conditions and others include rental payments adjusted periodically for inflation. Variable lease expense is disclosed for the adjusted portion of such payments. Lease income, attributable to subleases, is recognized in Cost and operating expenses on the Condensed Consolidated Statements of Operations and Comprehensive Loss, as the sublease activity is outside Company’s normal business operations.

Currently, the Company's sole underlying asset class is real estate.

Lease liabilities are recognized at the lease commencement date based on the present value of lease payments over the non-cancelable lease term. Right-of-use assets are recognized for the amount of the lease liability, adjusted for any lease payments made prior to or on lease commencement, lease incentives received and initial direct costs incurred, as applicable. As most of the Company’s operating leases do not provide an implicit rate, the Company uses an estimated incremental borrowing rate based on information available at the date of adoption and subsequent lease commencement dates in calculating the present value of its operating lease liabilities. The incremental borrowing rate is determined using the Company’s synthetic credit rating, adjusted for a credit premium, historical recovery rates of secured debt, and the respective tenor’s risk-free rates determined using U.S. Treasury rates.

Grant Revenue

Grants received are assessed to determine if the agreement should be accounted for as an exchange transaction or a contribution. An agreement is accounted for as a contribution if the resource provider does not receive commensurate value in return for the assets transferred. Contributions are recognized as grant revenue when all donor-imposed conditions have been met.

Accounting Pronouncements Adopted

In February 2016, the FASB issued ASU 2016-02, Leases (Topic 842) (“ASU 2016-02”). Under ASU 2016-02, a lessee is required to recognize assets and liabilities for leases with lease terms of more than twelve months. Recognition, measurement, and presentation of expenses and cash flows arising from a lease by a lessee primarily will depend on its classification as a finance or operating lease. ASU 2016-02 requires both types of leases to be recognized on the balance sheet. The ASU also requires disclosures to help investors and other financial statement users better understand the amount, timing, and uncertainty of cash flows arising from leases. These disclosures include qualitative and quantitative requirements, providing additional information about the amounts recorded in the financial statements.

The Company adopted Topic 842 on January 1, 2022 using the modified retrospective approach with the cumulative effect of adoption recognized to retained earnings on January 1, 2022. Under this method, the Company is allowed to record a cumulative-effect adjustment to the opening balance of retained earnings in the period of adoption and not restate prior periods. Additionally, the Company elected the transitional practical expedients such that the Company will not reassess whether contracts are leases and will retain lease classification and initial direct costs for leases existing prior to the adoption of the new standard. The Company also made the following elections: (1) elect the short term lease exception, (2) not elect hindsight and (3) elect to not separate its nonlease components for its real estate leases. Significant assumptions and judgments made in applying the new lease accounting standard include determining the Company's incremental borrowing rate and evaluating the probability of exercising lease options. On January 1, 2022 the Company recorded total assets and total liabilities on the Condensed Consolidated Balance Sheets of $152.3 million and $189.9 million, respectively, due to the recognition of right-of-use assets and lease liabilities upon adoption, net of the impact of eliminating existing deferred rent liabilities related to its leasing arrangements. The adoption of ASU 2016-02, as amended, did not have a material impact to the Company's Condensed Consolidated Statements of Operations and Comprehensive Loss or Condensed Consolidated Statements of Cash Flows.

In December 2019, the FASB issued ASU 2019-12, *Income Taxes (Topic 740): Simplifying the Accounting for Income Taxes*, which is intended to simplify various aspects related to accounting for income taxes. ASU 2019-12 removes certain exceptions to the general principles in Topic 740 and clarifies and amends existing guidance to improve consistent application. This pronouncement is effective for the Company for fiscal years beginning after December 15, 2021, and for interim periods within fiscal years beginning after December 15, 2022, with early adoption permitted. The Company adopted the new standard on January 1, 2022 using a modified retrospective transition method. The adoption did not have a material impact on the Condensed Consolidated Financial Statements.

Recent Accounting Pronouncements Not Yet Adopted

In June 2016, the FASB issued ASU 2016-13, *Credit losses (Topic 326)*, subsequently amended by ASU 2019-10, which sets forth a "current expected credit loss" model which requires the Company to measure all expected credit losses for financial instruments held at the reporting date based on historical experience, current conditions, and reasonable supportable forecasts. This replaces the existing incurred loss model and is applicable to the measurement of credit losses on financial assets measured at amortized cost. The standard will become effective for the Company for fiscal years beginning after December 15, 2022. Early adoption is permitted. The Company is evaluating the impact the adoption of this standard will have on its financial statements and related disclosures.

In March 2020, the FASB issued ASU 2020-04, *Reference Rate Reform (Topic 848): Facilitation of the Effects of Reference Rate Reform on Financial Reporting*, which provides optional expedients and exceptions for applying U.S. GAAP to contracts, hedging relationships, and other transactions that reference LIBOR or another reference rate expected to be discontinued because of reference rate reform. The amendments of ASU 2020-04 are effective for all entities as of March 12, 2020 through December 31, 2022 and do not apply to contract modifications made after December 31, 2022. The Company is evaluating the effect of this guidance and has not yet determined the impact to its financial statements and related disclosures.

3. Business Combination

Lodo Therapeutics Corporation

On May 16, 2021, the Company completed a nontaxable acquisition of 100% of the equity interests of Lodo Therapeutics Corporation ("Lodo"), a privately-held company which uses its proprietary bacterial metagenomics discovery platform to develop novel therapeutics from nature. The acquisition was accounted for as a business combination. The purchase price for the acquisition was $25.3 million, substantially all of which was non-cash consideration. The non-cash consideration consisted of 774,402 shares of the Company's common stock. The intangible assets acquired consisted primarily of $29.0 million of goodwill and Lodo's developed technology of $5.4 million. Goodwill recognized is primarily a measure of the expected synergies from combining the operations of Lodo and the Company's developed technologies.

The Company granted restricted stock units ("RSUs") to certain employees and consultants of Lodo in connection with the acquisition that generally vest in three installments over a period of up to two years, subject to their continued service with the Company.

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The following table represents the allocation of the purchase consideration, including the non-cash consideration, based on fair value (in thousands):

Cash and cash equivalents	$	1,778
Other current assets		464
Property, plant and equipment		948
Other non-current assets		305
Developed technology		5,400
Customer relationship intangible asset		420
Total identifiable assets acquired	$	9,315
Accounts payable and accrued expenses	$	4,683
Other liabilities		8,353
Deferred tax liability		11
Total liabilities assumed	$	13,047
Net identifiable assets acquired	$	(3,732)
Goodwill		29,041
Net assets acquired	$	25,309

The Company's purchase price allocation for the acquisition is preliminary and subject to revision as additional information about the fair value of the assets and liabilities becomes available. The fair values assigned to tangible and intangible assets acquired and liabilities assumed are based on management’s estimates and assumptions and may be subject to change as additional information is received. Primary areas that are not yet finalized are related to acquired intangible assets including goodwill. Additional information that existed as of the closing date but not known at the time of this filing may become known to the Company during the remainder of the measurement period, a period not to exceed 12 months from the closing date.

As a result of the business combination the Company incurred $0.9 million of acquisition related costs for its benefit which are not accounted for as part of consideration transferred. Acquisition related costs related primarily to legal services, accounting, tax, valuation, and due diligence and are recognized in General and administrative expenses on the Condensed Consolidated Statements of Operations and Comprehensive Loss. Pro forma results of operations will not be presented because the effects of this acquisition were not material to the Company’s Condensed Consolidated Financial Statements under applicable SEC rules.

4. Restructuring

Refer to Note 4 of the “Notes to Consolidated Financial Statements” in the Company's 2021 Form 10-K for additional information related to the Company's 2021 Restructuring. The 2021 Restructuring was substantially complete as of December 31, 2021. The Company expects to incur additional restructuring costs which are currently estimable of approximately $0.5 million in 2022.

The Company expects the 2021 Restructuring to result in total pre-tax charges of approximately $29.2 million and approximately $17.4 million of these charges are estimated to result in cash outlays, of which the Company has made payments of $15.3 million through March 31, 2022. The Company has recorded costs of $28.7 million from the inception of the initiative through March 31, 2022.

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The following table provides a summary of our costs incurred from the inception of the initiative through March 31, 2022, and cost estimates associated with the 2021 Restructuring, by major type of cost (in thousands):

	Total amount incurred since inception through March 31, 2022	Total estimated amount expected to be incurred
Restructuring charges:		
Termination benefits	$ 8,585	$ 8,585
Impairment of long-lived assets	11,815	11,815
Contract terminations	3,687	4,200
Other [(1)]	4,591	4,591
Total	$ 28,678	$ 29,191

(1) Comprised of other costs directly related to the 2021 Restructuring, including consulting fees in relation to portfolio review, realignment of organizational resources to strategic priorities and organization redesign in order to achieve reduced operating costs.

The following table provides a reconciliation of the beginning and ending balances for the restructuring liabilities, which are reported as components of Accounts payable and Accrued and other liabilities in the accompanying Condensed Consolidated Balance Sheets (in thousands):

	Termination Benefits	Contract Terminations	Other	Total
Balance at January 1, 2022	$ 948	$ 1,450	$ —	$ 2,398
Charges	—	44	—	44
Adjustments	(69)	(105)	—	(174)
Cash Payments, net	(733)	85	—	(648)
Balance at March 31, 2022	$ 146	$ 1,474	$ —	$ 1,620

5. Goodwill and Intangible Assets

The following table summarizes goodwill as of March 31, 2022 and December 31, 2021 (in thousands):

	March 31, 2022	December 31, 2021
Goodwill	$ 40,645	$ 40,645

The following table summarizes the net book value of the finite-lived intangible assets as of March 31, 2022 and December 31, 2021 (in thousands):

	Cost		Accumulated Amortization		Intangible Assets, Net	
	March 31, 2022	December 31, 2021	March 31, 2022	December 31, 2021	March 31, 2022	December 31, 2021
Developed technology	$ 12,300	$ 12,300	$ (4,607)	$ (4,110)	$ 7,693	$ 8,190
Customer relationships	1,400	1,400	(1,164)	(1,061)	236	339
Net carrying value	$ 13,700	$ 13,700	$ (5,771)	$ (5,171)	$ 7,929	$ 8,529

The Company recognized $0.6 million and $0.3 million in amortization expense for the three months ended March 31, 2022 and 2021, respectively.

Future amortization of intangible assets is as follows (in thousands):

Remainder of 2022	$ 1,649
2023	2,067
2024	1,271
2025	1,271
2026	1,271
Thereafter	400
Total	$ 7,929

6. Fair Value Measurements of Financial Instruments

GAAP defines fair value, establishes a framework for measuring fair value, and requires certain disclosures about fair value measurements. GAAP permits an entity to choose to measure many financial instruments and certain other items at fair value and contains financial statement presentation and disclosure requirements for assets and liabilities for which the fair value option is elected.

The hierarchy of fair value valuation techniques under GAAP provides for three levels: Level 1 provides the most reliable measure of fair value, whereas Level 3, if applicable, generally would require significant management judgment. The three levels for categorizing assets and liabilities under GAAP's fair value measurement requirements are as follows:

Level 1 – Fair value of the asset or liability is determined using unadjusted quoted prices in active markets for identical assets or liabilities.

Level 2 – Fair value of the asset or liability is determined using inputs other than quoted prices that are observable for the applicable asset or liability, either directly or indirectly, such as quoted prices for similar (as opposed to identical) assets or liabilities in active markets and quoted prices for identical or similar assets or liabilities in markets that are not active.

Level 3 – Fair value of the asset or liability is determined using unobservable inputs that are significant to the fair value measurement and reflect management's own assumptions regarding the applicable asset or liability.

There were no transfers between the levels during the periods presented. As of March 31, 2022 and December 31, 2021, the Company's financial assets and financial liabilities measured at fair value on a recurring basis were classified within the fair value hierarchy as follows (in thousands):

	Level 1	Level 2	Level 3	Balance as of March 31, 2022
Financial Assets				
Cash equivalents	$ 1,667	$ —	$ —	$ 1,667
Total financial assets	$ 1,667	$ —	$ —	$ 1,667

	Level 1	Level 2	Level 3	Balance as of December 31, 2021
Financial Assets				
Cash equivalents	$ 1,667	$ —	$ —	$ 1,667
Total financial assets	$ 1,667	$ —	$ —	$ 1,667

Financial instruments consist principally of cash equivalents, accounts receivables, accounts payable, accrued liabilities, debt, and warrant derivative liability.

The following methods and assumptions were used by the Company in estimating the fair value of financial instruments:

Accounts receivable, accounts payable, and accrued liabilities: The amounts reported in the accompanying balance sheets approximate fair value due to the short maturity of these instruments.

Debt: The gross amounts reported approximate fair value due to the debt being a variable interest rate debt and its relatively short-term maturity.

7. Balance Sheet Components

Property and equipment consist of the following as of March 31, 2022 and December 31, 2021 (in thousands):

	March 31, 2022	December 31, 2021
Machinery and equipment	$ 76,305	$ 74,548
Leasehold improvements	27,345	31,488
Furniture and office equipment	3,191	3,189
Computers and software	2,775	2,764
	109,616	111,989
Less accumulated depreciation and amortization	(78,818)	(78,132)
	30,798	33,857
Construction in progress	25,206	19,942
Total property and equipment, net	$ 56,004	$ 53,799

Depreciation and amortization expense was $4.9 million and $4.1 million for the three months ended March 31, 2022 and 2021, respectively.

Accrued and other current liabilities consist of the following as of March 31, 2022 and December 31, 2021 (in thousands):

	March 31, 2022	December 31, 2021
Accrued compensation and compensation-related costs	$ 6,797	$ 6,027
Other accrued liabilities	11,101	7,045
Accrued restructuring costs	1,576	2,398
Accrued legal service fees	1,814	1,940
Accrued tax liabilities	95	86
Accrued and other current liabilities	$ 21,383	$ 17,496

8. Term Loan

Except as described below, the Company’s debt is described in Note 8 of the “Notes to Consolidated Financial Statements” in the Company's 2021 Form 10-K.

The Company was in compliance with all covenants of the credit and guaranty agreement with Perceptive Credit Holdings II, LP and PCOF EQ AIV II, LP, as amended and restated in February 2021 and further amended in October 2021 (the “Perceptive Credit Agreement”), as of March 31, 2022.

Debt consists of the following as of March 31, 2022 and December 31, 2021 (in thousands):

	March 31, 2022	December 31, 2021
Senior secured delayed draw term loan facility bearing interest equal to 11.5% as of March 31, 2022 and December 31, 2021	$ 50,000	$ 50,000
Unamortized discount and offering costs	(4,669)	(8,310)
Accrued end-of-term payment	5,229	2,263
Senior secured delayed draw term loan facility, net	50,560	43,953
Less current portion	50,560	43,953
Long-term debt, net	$ —	$ —

Interest expense on the Company's term loan consisted of the following (in thousands):

	Three Months Ended March 31,	
	2022	2021
Coupon interest	$ 1,438	$ 2,444
Amortization of debt discount and offering costs	3,641	283
Accretion of end-of-term payment	2,966	—
Total interest expense on term loan	$ 8,045	$ 2,727

9. Leases

The Company adopted FASB ASC 842 on January 1, 2022 (Note 2). The Company did not have any finance leases during the three months ended March 31, 2022.

In July 2019, the Company entered into an operating lease agreement to rent approximately 58,000 square feet of warehouse and office space in Emeryville, California. In February 2021 the lease was amended to include an additional approximately 10,000 square feet of space. The lease, as amended, features escalating rent with fixed annual increases of approximately 3% from January 2022 and terminates in January 2033 for all leased spaces. The Company has two options to extend the lease by 5 years at the prevailing market rent at the time of extension. The Company did not consider it reasonably certain that it would exercise these options.

In July 2019, the Company entered into an operating lease agreement to sublease approximately 76,000 square feet of laboratory and office space in Emeryville, California. The lease features escalating rent with fixed annual increases of approximately 3% starting August 2020 and terminates in March 2031. The Company has no options to extend the sublease beyond its initial term.

In October 2019, the Company entered into an operating lease agreement, which was subsequently amended, for a building containing approximately 303,000 square feet of office and laboratory space in Emeryville, California. The lease commenced in February 2021 and terminates in August 2033. The lease provides for two options to extend the term for 5 years at the prevailing market rent at the time of extension. The Company did not consider it reasonably certain that it would exercise these options. Lease payments are subject to a fixed annual escalation of approximately 3%. The lease contains free and reduced rent periods during the initial 1.5 years of the term from the commencement date. Additionally, the lease provides for tenant improvement allowances up to a total of $46.9 million.

Components of lease cost recorded in Cost and operating expenses in the Company's Condensed Consolidated Statement of Operations and Comprehensive Loss for the three months ended March 31, 2022 consisted of the following (in thousands):

	Three Months Ended March 31,
	2022
Operating lease cost	$ 8,809
Operating variable lease cost	1,619
Operating sublease income	(172)
Total lease costs	$ 10,256

Rent expense under operating leases, net of sublease income, was $6.3 million for the three months ended March 31, 2021.

Other information related to the Company's operating leases for the three months ended March 31, 2022 is as follows (in thousands, except lease term and discount rate):

	Three Months Ended March 31,
	2022
Cash paid for amounts included in operating lease liabilities	$ 4,347
Weighted-average remaining operating lease term	10.50
Weighted-average incremental borrowing rate	12.59 %

Maturities of operating lease liabilities at March 31, 2022 are as follows (in thousands):

Remainder of 2022	$	22,836
2023		30,972
2024		31,336
2025		30,253
2026		31,091
Thereafter		208,243
Total		354,731
Less: Interest		(166,278)
Present value of operating lease liabilities	$	188,453

Maturities of operating sublease payments at March 31, 2022 are as follows (in thousands):

Remainder of 2022	$	515
2023		686
2024		686
2025		114
2026		—
Thereafter		—
Total	$	2,001

At December 31, 2021, total future minimum rental commitments under long-term leases, net of sublease income, with an initial term of more than one year were estimated as follows (in thousands):

2022	$	26,387
2023		30,450
2024		30,630
2025		29,459
2026		30,350
Thereafter		206,587
Total	$	353,863

10. Common Stock

Equity Incentive Plans

The Company has three stock-based compensation plans – the 2021 Incentive Award Plan (the “2021 Plan”), the 2014 Stock Plan (the “2014 Plan”) and the Employee Stock Purchase Plan (the “ESPP”). As of March 31, 2022, there were 5,435,987 shares available for the Company to grant under the 2021 Plan and 3,035,656 shares available for the Company to grant under the ESPP. The shares available for grant as of March 31, 2022 included 5,152,264 and 1,030,452 shares, respectively, for the 2021 Plan and the ESPP, which represent the annual increases of shares available for grant under those plans. Upon adoption of the 2021 Plan in April 2021, no new awards or grants are permitted under the 2014 Plan. Refer to Note 10 of the “Notes to Consolidated Financial Statements” in the Company's 2021 Form 10-K for additional information related to these stock-based compensation plans.

Stock Options with Service-based Vesting Conditions

The following table summarizes option activity under the 2021 Plan and the 2014 Plan:

	Number of Options	Weighted Average Exercise Price	Weighted Average Remaining Contractual Life	Aggregate Intrinsic Value
				(in thousands)
Outstanding - December 31, 2021	7,555,966	$12.55	8.15	$3,668
Options granted	—	—		
Options exercised	(77,093)	$3.94		
Options cancelled	(392,330)	$10.55		
Outstanding - March 31, 2022	7,086,543	$12.76	7.57	$117
Unvested - March 31, 2022	4,184,738	$15.39	9.10	—
Exercisable - March 31, 2022	2,901,805	$8.96	6.02	$117

No options were granted during the three months ended March 31, 2022. The weighted average grant-date fair value of options granted was $17.42 per share, during the three months ended March 31, 2021.

The aggregate intrinsic value of stock option awards exercised, determined at the date of option exercise, was $0.1 million and $17.8 million, during the three months ended March 31, 2022, and 2021, respectively. The aggregate intrinsic value was calculated as the difference between the exercise prices of the underlying stock option awards and the estimated fair value of the Company's common stock on the date of exercise.

Stock-based compensation expense for stock options is estimated at the grant date based on the fair-value calculated using the Black-Scholes option pricing model. The fair value of employee stock options is recognized as an expense ratably over the requisite service period of the awards. The fair value of employee stock options was estimated using the following assumptions, in periods for which options were granted:

	Three Months Ended March 31,
	2021
Expected dividend yield	— %
Risk-free interest rate	0.77% - 1.04%
Expected term (in years)	6.08
Expected volatility	73.43% - 74.67%

As of March 31, 2022 the Company had employee stock-based compensation expense of $35.9 million related to unvested stock options not yet recognized, which is expected to be recognized over an estimated weighted average period of approximately 2.60 years.

Stock Options with Market-based Vesting Conditions

Except as described below, the Company's stock options with market-based vesting conditions debt is described in Note 10 of the "Notes to Consolidated Financial Statements" in the Company's 2021 Form 10-K.

As of March 31, 2022, 458,333 options remain outstanding and unvested. As of March 31, 2022, the Company has $6.1 million of stock based compensation related to these unvested stock options not yet recognized, which is expected to be recognized over an estimated weighted average period of approximately 2.27 years.

Restricted Stock Units with Service-based Vesting Conditions

The following table summarizes RSU activity (in thousands, except share and per share amounts and term):

	Shares	Weighted Average Grant Date Fair Value
Non-vested Restricted Stock Units as of December 31, 2021	2,475,983	$13.47
Granted	6,222,827	$3.14
Vested	(916)	$35.00
Forfeited	(253,362)	$10.37
Non-vested Restricted Stock Units as of March 31, 2022	8,444,532	$5.95

RSUs granted are valued at the market price of our common stock on the date of grant. The Company recognizes compensation expense for the fair value of RSUs ratably over the requisite service period of the awards. The total intrinsic value of RSUs vested was nominal during the three months ended March 31, 2022. As of March 31, 2022 there was $44.3 million of total unrecognized compensation cost related to RSUs, which is expected to be recognized over a weighted average period of 2.12 years.

Compensation Expense

Compensation expense related to stock-based awards was included in the following categories in the accompanying Condensed Consolidated Statements of Operations and Comprehensive Loss in accordance with the accounting guidance for share-based payments for the three months ended March 31, 2022 and 2021 (in thousands):

	Three Months Ended March 31,	
	2022	2021
Cost of service revenue	$ 801	$ 424
Research and development	2,347	753
Sales and marketing	438	195
General and administrative	3,805	881
Total stock-based compensation	$ 7,391	$ 2,253

Compensation expense by stock-based award was as follows for the three months ended March 31, 2022 and 2021 (in thousands):

	Three Months Ended March 31,	
	2022	2021
Stock options with service based vesting conditions	$ 3,992	$ 2,170
Stock options with market based vesting conditions	677	—
RSUs with service based vesting conditions	2,508	—
Non-vested stock	—	83
ESPP	214	—
Total stock-based compensation	$ 7,391	$ 2,253

11. Net Loss Per Share

Basic net loss per share is determined by dividing net loss by the weighted average shares outstanding for the period. The Company analyzes the potential dilutive effect of stock options, non-vested stock, RSUs, stock issuable under the ESPP, and warrants under the treasury stock method (as applicable), during periods of income, or during periods in which income is recognized related to changes in fair value of its liability-classified securities.

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The following table presents the calculation of basic and diluted net loss per share (in thousands, except share and per share data) applicable to common stockholders for the three months ended March 31, 2022 and 2021:

	Three Months Ended March 31,	
	2022	2021
Numerator:		
Net loss, basic	$ (72,116)	$ (84,585)
Less: Gain on change in fair value of warrant liabilities	—	2,279
Net loss, diluted	$ (72,116)	$ (86,864)
Denominator:		
Weighted average shares used in calculating net loss per share, basic	103,109,168	12,996,344
Effect of dilutive securities:		
Warrants to purchase Series C convertible preferred stock	—	344,113
Weighted average shares used in calculating net loss per share, diluted	103,109,168	13,340,457
Net loss per share, basic	$ (0.70)	$ (6.51)
Net loss per share, diluted	$ (0.70)	$ (6.51)

The following potentially dilutive shares as of the periods ended March 31, 2022, and 2021, were excluded from the calculation of diluted net loss per share applicable to common stockholders because their effect would have been anti-dilutive for the periods presented:

	March 31, 2022	March 31, 2021
Shares issuable under convertible preferred stock	—	68,115,459
Options to purchase common stock	7,086,543	6,429,610
Restricted stock units	8,444,532	—
Non-vested stock	—	50,430
Warrants to purchase common stock	—	242,322
Total	15,531,075	74,837,821

12. Revenue, Credit Concentrations and Geographic Information

Revenues from research and development service agreements

The Company has primarily earned revenue by engaging in R&D service contracts. The Company also earns revenue through collaborative arrangements with partners to develop novel materials to be commercialized by the collaborative partner and the Company.

The Company's R&D service contracts generally consist of fixed-fee multi-phase research terms with concurrent value-share and/or performance bonus payments based on developing an improved microbial strain. The research term of the contracts typically spans several quarters and the contract term for revenue recognition purposes is determined based on the customer's rights to terminate the contract for convenience. Other payment types, typically consisting of performance bonuses or value share payments, are constrained until those payments become probable or are earned. The Company recognized performance bonuses of $0.3 million for the three months ended March 31, 2021. For the three months ended March 31, 2022, performance bonuses the Company recognized were insignificant. For the three months ended March 31, 2022 and 2021, the Company has not recognized any royalty or value share payments.

When acceptance clauses are present in an agreement, the Company recognizes the R&D service revenue at a point in time when the R&D services provided have been accepted by the customer and the Company has a present right for payment and no refunds are permitted. The Company recognized revenue at a point in time due to customer acceptance clauses of $0.5 million and $0.8 million for the three months ended March 31, 2022 and 2021, respectively.

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The following table represents changes in the balances of our contract liabilities during the periods ended March 31, 2022, and 2021 (in thousands):

	December 31, 2021	Additions	Deletions	March 31, 2022
Contract liabilities:				
Deferred revenue	$ 8,195	$ 600	$ (2,400)	$ 6,395

	December 31, 2020	Additions	Deletions	March 31, 2021
Contract liabilities:				
Deferred revenue	$ 3,014	$ 1,256	$ (1,604)	$ 2,666

Long-term deferred revenue is included in Other long-term liabilities on the Condensed Consolidated Balance Sheets.

Transaction price allocated to the remaining performance obligation represents contracted revenue that has not yet been recognized, which includes unearned revenue and unbilled amounts that will be recognized as revenue in future periods. Remaining performance obligations consisted of the following (in thousands):

	Current	Noncurrent	Total
As of March 31, 2022	$ 2,165	$ 4,324	$ 6,489

The Company's noncurrent remaining performance obligation is expected to be recognized in the next 1.1 to 3.1 years.

Grant Revenue

On October 10, 2021, the Company entered into a grant agreement with the Bill & Melinda Gates Foundation under which it was awarded a grant totaling up to $2.9 million to discover potential natural product hits for malaria, tuberculosis, and COVID-19 targets. This grant agreement will remain in effect until February 28, 2023, unless earlier terminated by the Bill & Melinda Gates Foundation for the Company's breach of the terms of the grant agreement, failure to progress the funded project, in the event of the Company's change of control, change in the Company's tax status, or significant changes in the Company's leadership that the Bill & Melinda Gates Foundation reasonably believes may threaten the success of the project.

Payments received in advance that are related to future research activities are deferred and recognized as revenue when the donor-imposed conditions are met, which is as the research and development activities are performed. The Company recognized grant revenue of $0.2 million for the three months ended March 31, 2022. As of March 31, 2022, the Company has deferred revenue of $0.8 million under this grant agreement.

Credit Concentrations

Customers representing 10% or greater of revenue were as follows for the three months ended March 31, 2022 and 2021:

	Three Months Ended March 31,	
	2022	2021
Customer A	35 %	11 %
Customer B	26 %	30 %
Customer C	13 %	16 %
Customer D	11 %	— %
Customer E	— %	18 %

Customers representing 10% or greater of billed accounts receivable were as follows as of March 31, 2022 and December 31, 2021:

	March 31, 2022	December 31, 2021
Customer D	68 %	— %
Customer F	25 %	68 %
Customer G	— %	29 %

Geographic Information

The Company's revenues by geographic region are presented in the table below for the three months ended March 31, 2022 and 2021 (in thousands):

	Three Months Ended March 31,	
	2022	2021
United States of America	$ 1,869	$ 1,232
Asia	1,252	1,421
Europe	1,670	1,082
Total revenue	$ 4,791	$ 3,735

13. Commitments and Contingencies

The Company is subject to various litigation and arbitration claims that arise in the ordinary course of business, including but not limited to those related to employee matters. Unless otherwise specifically disclosed, we have determined that no provision for liability is required related to any claim against the Company.

On August 4, 2021, a putative securities class action was filed on behalf of purchasers of the Company's common stock pursuant to or traceable to the registration statement for its IPO. The action is pending in the United States District Court for the Northern District of California, and is captioned *Shankar v. Zymergen Inc. et al.*, Case No. 3:21-cv-06028-JCS. The action alleges violations of Sections 11 and 15 of the Securities Act of 1933, as amended, in connection with the Company's IPO, names the Company, certain of our current and former officers and directors, our IPO underwriters, and certain stockholders as defendants and seeks damages in an unspecified amount, attorneys' fees, and other remedies. The Company intends to defend vigorously against such allegations.

On November 9, 2021, a purported shareholder of Zymergen filed a putative derivative lawsuit in the United States District Court for the Northern District of California that is captioned *Mellor v. Hoffman, et al.*, Case No. 4:21-cv-08723. The complaint names certain of the Company's current and former officers and directors and the Company as nominal defendants based on allegations substantially similar to those in the securities class action. The complaint purports to assert claims on the Company's behalf for breach of fiduciary duty, unjust enrichment, abuse of control, gross mismanagement, corporate waste, and contribution under the federal securities laws and seeks corporate reforms, unspecified damages and restitution, and fees and costs.

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In addition, certain government agencies, including the SEC, have requested information related to the Company's August 3, 2021 disclosure. The Company is cooperating fully.

Item 2. 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 in conjunction with our unaudited Condensed Consolidated Financial Statements and related notes included in Part I, Item 1 of this Quarterly Report on Form 10-Q and with our audited Consolidated Financial Statements and related notes thereto for the year ended December 31, 2021, included in our Annual Report on Form 10-K for the year ended December 31, 2021.

In this section, the terms "we," "our," "ours," "us," and "the Company" refer collectively to Zymergen Inc. and its consolidated direct and indirect subsidiaries. This discussion contains forward-looking statements that involve risks and uncertainties reflecting our current expectations, estimates and assumptions concerning events and financial trends that may affect our future operating results or financial position. Factors that could cause or contribute to such difference include, but are not limited to, those identified below and those discussed in the section of this Quarterly Report on Form 10-Q titled "Risk Factors". Forward-looking statements speak only as of the date they are made, and the Company assumes no duty to and does not undertake any obligation to update forward-looking statements. Actual results could differ materially from those anticipated in forward-looking statements and future results could differ materially from historical performance.

Overview

We partner with Nature to design, develop and commercialize microbes, molecules, and materials for diverse end markets. Our goal is to create new products with our proprietary platform that unlocks the design and manufacturing efficiency of biological processes with technology's ability to rapidly iterate and control diverse functions. We believe our process will create better products, a better way, for a better world.

Our platform revolves around three key capabilities: our collection of accessible biomolecules, our software and data science technology and our data driven microbe optimization processes. We have one of the world's largest collections of accessible biomolecules. This physical and DNA sequence database has within it the potential to create hundreds of thousands of small molecules, millions of natural products and hundreds of millions of proteins. This provides novel starting points for the creation of interesting molecules, materials, enzymes, and potential therapeutics. Our software and data science platform informs, guides, and records our experiments forming the infrastructure for the virtuous learning cycle that continually enriches our processes. Once a promising biomolecule is selected, using our strain engineering capabilities we can work across organisms and employ numerous strategies to optimize performance, cost, and scalability to meet an unmet market need. Throughout our work, we power and scale the science with high-throughput automation.

Using our platform we are building three businesses focused on multiple markets:

1. **Advanced Materials**. Our advanced materials business seeks to employ bio-advantaged molecules or microbes to develop and deliver high performance products and is currently focused on four markets: agriculture, water repellency, advanced polymers, and healthcare. In agriculture, our most advanced product aims to improve crop nutrient uptake for significant markets, including corn, wheat, and sorghum. In the water repellency program, we are developing a family of molecules that improve the water repellency characteristics of cellulosic substrates. Our advanced polymers products include our Z1 electronics film, which is being developed in partnership with Sumitomo, and use of our Z2 polymer (the basis for Hyaline, which we have discontinued) for 3D printing applications. Finally, in healthcare materials, our first products are two enzymes that are critical to produce mRNA vaccines, namely 2'-O'-Methyltransferase ("2'-O-MT") and Vaccinia Capping Enzyme ("VCE").
2. **Drug Discovery**. Our drug discovery business leverages our differentiated access to natural products as a source of diverse chemical matter provided by our unified metagenomics database ("UMDB").
3. **Automation**. Our automation business offers proven automation technology to organizations interested in improving the throughput, efficiency, and reliability of their lab operations.

Our products are in various stages of development ranging from concept to pilot stage. We have not yet generated revenue from product sales (except for nominal revenue related to the sale of samples). However, most of these programs leverage data and learnings from our earlier work, which we believe enables our teams to move more quickly and precisely with each new program, and ultimately helps power our platform and make it more robust over time. For example, as part of our review of our product pipeline we researched market adjacencies for molecules we have already developed, including molecules that were the basis for Hyaline. Stemming from those efforts, we identified opportunities for using Z2 polymer in high-performance 3D printing applications.

With our platform and building blocks derived from Nature, we believe we can design, develop, and manufacture high-performance products more cleanly and with less waste than traditional chemicals and materials companies. Our goal is to utilize our proprietary platform to make products that will not clog our waterways or pollute our oceans. Consumers, regulators and customers are all demanding solutions to these problems. We believe that by partnering with Nature we can make better products, a better way, for a better world.

Components of Results of Operations

Revenue

Research and Development Service Agreements Revenue. To date, we have earned revenue by engaging in R&D services primarily to help our customers develop bio-based products. In addition, the R&D services provided to our customers test and validate our platform. We account for R&D service contracts when we have approval and commitment from both parties, the rights of the parties are identified, payment terms are identified, the contract has commercial substance and collectability of consideration is probable. The research term of the contracts spans typically over several quarters and the contract term for revenue recognition purposes is determined based on the customer's rights to terminate the contract for convenience. Over the longer-term, as and to the extent we grow our product sales and commercialize products, we expect revenue from R&D services to represent a smaller component of our total revenue.

Collaboration and Other Revenue. Our collaboration and other revenue relates primarily to our collaboration agreement with Sumitomo Chemical. Our agreement with Sumitomo Chemical includes provision of R&D services by us through the joint innovation of certain materials and applications of strategic interest to Sumitomo Chemical. Under this arrangement R&D costs are shared equally between the parties with settlement of such amounts on a quarterly basis. Amounts received for those services are classified as collaboration revenue as those services are being rendered because those services are considered to be part of our ongoing major operations.

Grant Revenue. Our grant revenue represents research and development activities performed under our grant agreement with the Bill & Melinda Gates Foundation to endeavor to discover potential natural product hits for malaria, tuberculosis, and COVID-19 targets. Revenue is recognized when the donor-imposed conditions are met, which is as the research and development activities are performed.

Cost of Service Revenue

Cost of service revenue represents costs we incur to service our contract research efforts pursuant to our R&D service contracts, as well as certain costs allocable to our Sumitomo Chemical collaboration arrangement. Costs include both internal and third party fixed and variable costs including labor, materials and supplies, facilities and other overhead costs.

Operating Expenses

Our operating expenses are classified in the following categories: research and development, sales and marketing and general and administrative. For each of these categories, the largest component is personnel costs, which includes salaries, employee benefit costs, bonuses and stock-based compensation expenses. We have recently implemented several measures designed to reduce our cost structure with a goal to extend our cash runway.

Research and development. Uncertainties inherent in the research and development of customer products preclude us from capitalizing such costs. Research and development expenses include personnel costs, the cost of consultants, materials and supplies associated with research and development projects as well as various laboratory studies. Indirect research and development costs include depreciation, amortization and other indirect overhead expenses.

Sales and marketing. Sales and marketing expenses consist primarily of personnel costs, costs of general marketing activities and promotional activities, travel-related expenses and other indirect overhead costs.

General and administrative. Our general and administrative expenses consist primarily of personnel costs for our executive, finance, corporate and other administrative functions, intellectual property and patent costs, facilities and other allocated expenses, other expenses for outside professional services, including legal, human resources, audit and accounting services and insurance costs.

Restructuring charges. Our restructuring charges consist primarily of costs associated with employee termination benefits, contract terminations, restructuring-related consulting fees and long-lived asset impairments.

Interest income

Interest income consists of income earned from our cash, cash equivalents and short-term investments.

Interest expense

Interest expense consists of interest incurred from our term loan along with the amortization of loan initiation fees, accretion of end-of-term payment and lender warrant expense.

Change in fair value of warrant liability

The change in the fair value of the warrant liability is due to the change in the value of the underlying shares of Series C Preferred Stock. The change in value reflects the change in fair value of the underlying shares of Series C Preferred Stock during the applicable period.

Other expense, net

Other expense, net relates to miscellaneous other income and expense and foreign currency gains and losses.

Provision for Income Taxes

Provision for income taxes consists primarily of minimum tax payments at the state level and income taxes paid outside of the United States for our overseas subsidiaries. The factors that most significantly impact our effective tax rate include realizability of deferred tax assets, changes in tax laws, variability in the allocation of our taxable earnings among multiple jurisdictions, the amount and characterization of our research and development expenses, the levels of certain deductions and credits, acquisitions and licensing transactions.

We have various federal and state net operating loss carryforwards as well as federal and state research and development tax credit carryforwards. Utilization of some of the federal and state net operating loss and research and development tax credit carryforwards are subject to annual limitations due to the “change in ownership” provisions of the Internal Revenue Code of 1986 and similar state provisions. The annual limitations may result in the expiration of net operating losses and credits before utilization.

Results of Operations for the Three Months Ended March 31, 2022 and 2021

The following table sets forth our results of operations for the periods (in thousands):

	Three Months Ended March 31,		Change	
	2022	2021	$	%
Revenues from research and development service agreements	$ 3,221	$ 2,614	$ 607	23.2 %
Collaboration and other revenue	1,333	1,121	212	18.9 %
Grant revenue	237	—	237	n.m.
Total revenues	4,791	3,735	1,056	28.3 %
Cost and operating expenses:				
Cost of service revenue	12,455	21,130	(8,675)	(41.1)%
Research and development	28,739	39,811	(11,072)	(27.8)%
Sales and marketing	3,638	6,872	(3,234)	(47.1)%
General and administrative	23,705	19,331	4,374	22.6 %
Restructuring charges (benefit)	(130)	—	(130)	n.m.
Total cost and operating expenses	68,407	87,144	(18,737)	(21.5)%
Operating loss	(63,616)	(83,409)	19,793	(23.7)%
Other income (expense):				
Interest income	51	43	8	18.6 %
Interest expense	(8,045)	(2,727)	(5,318)	195.0 %
Gain (loss) on change in fair value of warrant liabilities	—	2,279	(2,279)	(100.0)%
Other expense, net	(532)	(763)	231	(30.3)%
Total other expense	(8,526)	(1,168)	(7,358)	630.0 %
Loss before income taxes	(72,142)	(84,577)	12,435	(14.7)%
Benefit from (provision for) income taxes	26	(8)	34	(425.0)%
Net loss	$ (72,116)	$ (84,585)	$ 12,469	(14.7)%

n.m.: Not meaningful

Revenue

Revenue from research and development service agreements increased by $0.6 million, or 23%, for the quarter ended March 31, 2022 compared to the same period of the prior year. This increase was primarily due to the following:

- a $1.3 million increase due to recognition of previously received consideration that was not yet recognized as revenue as well as termination consideration upon the termination of a customer contract;
- a $0.5 million increase due to the timing of deliverables under fixed fee contracts; and
- a $0.4 million increase from new and acquired contracts

This was offset by:

- a $1.6 million decrease from contracts ending in 2021.

Collaboration and other revenue increased by $0.2 million, or 19%, for the quarter ended March 31, 2022 compared to the same period of the prior year. This increase was mainly due to the increased research activity under the collaboration agreement with Sumitomo Chemical.

Grant revenue of $0.2 million was recognized in the quarter ended March 31, 2022, all of which was related to the Bill & Melinda Gates Foundation grant agreement. No grant revenue was recognized in the same period of the prior year

Cost of Revenue

Cost of service revenue decreased by $8.7 million, or 41%, for the quarter ended March 31, 2022 compared to the same period of the prior year. This decrease was primarily due to:

- a decrease of $5.9 million in labor cost associated with the impact of the restructuring initiative implemented in 2021 and a shift of resources from performing research and development activities for third parties to performing research and development activities on our own products following the termination of certain customer contracts, net of the impact of salary increases that went into effect in 2022 to reflect current market trends;
- a decrease of approximately $1.2 million in consumables, $0.7 million in depreciation and $0.6 million in allocated rent, all due to a shift of resources from performing research and development activities for third parties to performing research and development activities on our own products and cessation of certain customer agreements. The decrease in depreciation was offset by a modest increase due to investment in both lab equipment and facilities throughout 2021 resulting in higher overall depreciation and amortization expenses. The decrease in allocated rent was partially offset by an increase in overall rent due to the expansion of our real estate footprint, including the addition of a new company headquarters, which is currently under development; and
- a decrease in the use of contract research resources of $0.6 million due mainly to the decreased external resource need of an early stage customer development work which we pursued in 2021.

This was offset by:

- an increase of approximately $0.4 million in stock-based compensation, partly due to RSUs awarded in connection with a retention program and the impact of the issuance of options with market-based vesting conditions in 2021.

Operating Expenses

Research and development

Research and development expense decreased by $11.1 million, or 28%, in the quarter ended March 31, 2022 compared to the same period of the prior year. The overall decrease was primarily due to:

- a decrease of approximately $3.5 million in labor costs associated with the impact of the restructuring initiative implemented in 2021 which was offset by an expansion of resources focused on research and development activities, and the impact of salary increases that went into effect in 2022 to reflect current market trends; and
- a $13.3 million decrease in manufacturing and lab consumables and subcontractors expenses, largely attributable to discontinued development of Hyaline and our insect repellent products during 2021. The decrease was partially offset by increased spend on other internally developed programs in our drug discovery pipeline as well as our water repellency programs and the application of our Z2 polymer for 3D printing.

This was offset by:

- a $1.9 million increase in allocated rent due to the expansion of our real estate footprint, including the addition of a new company headquarters, which is currently under development, and a higher allocation of rent costs as a result of a shift in focus of employees to research and development activities for our own products following the termination of some customer contracts;
- an increase of approximately $1.6 million in stock-based compensation expense, partly due to the increase in resources allocated to our own product development from customer research and development activities, the impact of the issuance of options with market-based vesting conditions and RSUs awarded in connection with a retention program in 2021, and the vesting of awards under the ESPP; and
- a $2.0 million increase in depreciation attributable to the investment in both lab equipment and facilities, the increased amortization from developed technology intangibles after the acquisition of Lodo Therapeutics in the second quarter of 2021, as well as a higher allocation of depreciation and amortization costs as a result of the shift in focus of employees to the development of our own products following the termination of certain customer contracts; and
- a $0.2 million increase in other expenses.

Sales and marketing

Sales and marketing expense decreased by $3.2 million, or 47%, in the quarter ended March 31, 2022 compared to the same period of the prior year. This decrease was primarily due to:

- a decrease of approximately $1.8 million in labor costs attributable to the impact of the restructuring initiative and personnel attrition, which was partially offset by the impact of salary increases that went into effect in 2022 to reflect current market trends; and

- a $1.9 million decrease in expense related to subcontractors. This was largely due to reduced public relations and marketing spend compared to 2021 which was driven by high customer and brand marketing activities, including brand marketing activities leading up to our initial public offering in April 2021.

This was offset by:

- an increase of approximately $0.2 million in stock-based compensation expense, partly due awards issued in relation to a retention program and options with service-based vesting conditions issued to executives hired in 2021;
- a $0.1 million increase in allocated rent due to the expansion of our real estate footprint, including the addition of a new company headquarters, which is currently under development; and
- a $0.1 million increase in each of depreciation and other expenses.

General and administrative

General and administrative expense increased by $4.4 million, or 23%, in the quarter ended March 31, 2022 compared to the same period of the prior year. The increase in general and administrative expenses was primarily attributable to the following:

- an increase of approximately $2.9 million in stock compensation expense due to RSUs granted in a retention program and options with service-based vesting and RSUs granted to executives hired in 2021, including awards granted to our Acting CEO; and
- an increase of approximately $1.4 million in allocated rent due to an increase in our overall real estate cost mainly due to the addition of a new company headquarters, which is currently under development; and
- a $0.1 million increase in depreciation and software costs associated with investment in our facilities and resulting higher depreciation; and
- a $0.5 million increase in other expenses mainly related to an increase in insurance costs.

This was offset by:

- a $0.5 million decrease in labor costs attributable to the impact of the restructuring initiative and personnel attrition, which was partially offset by the impact of salary increases that went into effect in 2022 to reflect current market trends.

Restructuring charges

We recorded a benefit of $0.1 million in restructuring charges in the quarter ended March 31, 2022, and we did not record any restructuring charges in the corresponding prior year period. The benefit mainly resulted from a vendor refund on a terminated contract manufacturing contract previously included in restructuring charges.

Interest income (expense)

Interest income was flat in the quarter ended March 31, 2022 compared to the same period of the prior year.

Interest expense increased by $5.3 million, or 195%, in the quarter ended March 31, 2022 compared to the same period of the prior year. This increase was primarily due to the October 2021 amendment of our term loan, which resulted in the accretion of an end-of-term payment, additional discount amortization and acceleration of debt discount amortization.

Gain (loss) on change in fair value of warrant liability

No change in fair value of warrant liability was recorded in the quarter ended March 31, 2022, as all warrants were exercised effective with our initial public offering (“IPO”) in April 2021. The gain of $2.3 million in the same period of the prior year was primarily due to the assumption used in the valuation of the warrants which, as of March 31, 2021, used a weighted average value derived from a Black-Scholes-Merton (“BSM”) option model with a term consistent with the time to the expected IPO date as of March 31, 2021 based on the expectation that the warrant would be exercised at the IPO (conditioned upon the consummation of a public offering of our common stock on or prior to June 30, 2021) and the value derived from the option pricing model with a term consistent with the remaining term until a future liquidity event, other than the IPO scenario described above.

Liquidity, Capital Resources and Plan of Operations

From our inception through March 31, 2022 we have incurred significant operating losses and negative cash flows from our operations as we developed our platform and products.

We have not yet generated revenue from product sales (except for nominal revenue related to the sale of samples) and expect product revenue to be immaterial in 2022. We have implemented measures to reduce our costs to extend our cash runway, including conducting two reductions in force eliminating approximately 220 positions during 2021 and restructuring some of our expenses. As a result of these activities we believe that we will have sufficient cash to continue to fund our operations to the middle of 2023. We expect we will need additional funds to meet operational needs and capital requirements for product development and commercialization.

To date, we have financed our operations primarily with proceeds from the sale of shares through our initial public offering, the sale of convertible preferred stock, proceeds from debt arrangements and revenue from R&D service and collaboration and other arrangements. We had unrestricted cash and cash equivalents as of March 31, 2022 of $337.0 million.

Capital expenditures were $4.8 million in the quarter ended March 31, 2022 and were related primarily to the purchases of laboratory equipment and facilities improvements. We expect capital expenditures to increase on an absolute dollar basis in the short term as we continue to build out our new headquarters in Emeryville, CA.

Our primary uses of capital are, and we expect will continue to be for the near future, personnel costs, product pipeline development and commercialization costs, platform development costs, laboratory and related supplies, legal, patent and other regulatory expenses and general overhead costs. We may also pursue acquisitions, investments, joint ventures and other strategic transactions.

We expect to need substantial additional funding to pursue our growth strategy and support continuing operations. Until such time as we can generate significant revenue from product sales or other customer or collaboration arrangements to fund operations, we expect to require additional capital to fund our operations, which may include capital from the issuance of additional equity, debt financings or other capital-raising transactions. We may be unable to increase our revenue, raise additional funds or enter into such other agreements or arrangements when needed on favorable terms, or at all. Our ability to obtain additional funding will depend on a variety of factors, many of which are unpredictable and beyond our control, including general conditions in the global economy and in the global financial markets, which may be impacted by interruptions, delays and/or cost increases resulting from the ongoing COVID-19 pandemic, political instability or geopolitical tensions, such as the Ukraine War, economic weakness, inflationary pressures, or other factors. If the equity and credit markets deteriorate, including as a result of economic weakness, a resurgence of COVID-19, political unrest or war, including the Ukraine War, or any other reason, such deterioration may make any necessary equity or debt financing more difficult to obtain in a timely manner and on favorable terms, if at all, and, if obtained, such financing may be more costly or more dilutive. If we are unable to raise capital when needed, we will need to delay, reduce or terminate planned activities to reduce costs. Doing so will likely harm our ability to execute our business plans.

We are party to a credit and guaranty agreement with Perceptive Credit Holdings II, LP and PCOF EQ AIV II, LP (the “Perceptive Credit Agreement”), which was amended and restated in February 2021 and further amended in October 2021 (the “October 2021 Amendment”), pursuant to which the secured lender agreed to provide us with a $100 million credit facility. As of December 31, 2021, our debt under this credit facility totaled $50.0 million in principal amount outstanding. The Perceptive Credit Agreement carries a variable interest rate which is the sum of 9.25% plus the greater of the one-month LIBOR and 2.25%. Pursuant to the terms of the October 2021 Amendment: (i) upon execution, we paid $41.0 million, which included $35.0 million in principal and $6.0 million of accrued interest and the applicable prepayment premium, (ii) we placed $63.0 million into an account at the sole control of the lender that represents the remaining obligations under the credit agreement, including any further prepayment premium, which was released in November 2021 upon the lender's approval of our planned cash usage through final maturity, (iii) eliminated the minimum revenue covenant and increased the minimum liquidity covenant and (iv) modified the final maturity to be June 30, 2022. Upon final maturity the remaining outstanding principal and applicable prepayment premium will be due. We will be required to utilize cash that would otherwise be available to support our operations to repay this indebtedness when it becomes due, and any required repayment of our indebtedness as a result of acceleration or otherwise would lower our current cash on hand such that we would not have those funds available for use in our business or for payment of other outstanding indebtedness.

We are subject to various affirmative and negative covenants pursuant to the Perceptive Credit Agreement, and our borrowings are secured by liens on substantially all of our assets. See “*Risk Factors—The Perceptive Credit Agreement provides our secured lender with liens on substantially all of our assets, including our intellectual property, contains financial covenants and other restrictions on our actions, which may cause significant risks to our stockholders and may impact our ability to pursue certain transactions and operate our business, and provides that a material adverse change constitutes an event of default.*” As of March 31, 2022, we were in compliance with our covenants under the Perceptive Credit Agreement.

Cash Flows

The following table summarizes our cash flows for the periods presented (in thousands):

	Three Months Ended March 31,	
	2022	2021
Net cash used in operating activities	$ (44,743)	$ (83,048)
Net cash used in investing activities	$ (4,678)	$ (8,639)
Net cash provided by financing activities	$ 303	$ 4,329

Net Cash Used in Operating Activities

The cash used in operating activities resulted primarily from our net losses adjusted for non-cash charges and changes in components of operating assets and liabilities, which are generally attributable to timing of payments, and the related effect on certain account balances, operational and strategic decisions and contracts to which we may be a party.

Net cash used in operating activities for the three months ended March 31, 2022 of $44.7 million primarily related to our net loss of $72.1 million, adjusted for non-cash charges of $23.0 million and net cash inflows of $4.4 million due to changes in our operating assets and liabilities. Non-cash charges primarily consisted of depreciation and amortization of property and equipment, stock-based compensation, non-cash lease expense and non-cash interest expense related to the amortization of the debt discount and accretion of the end-of-term payment related to our Perceptive debt. The main drivers of the changes in operating assets and liabilities were a decrease of $0.7 million in accounts receivable (billed and unbilled), a $2.8 million increase in accounts payable and a decrease in net other assets and liabilities of $1.4 million. These changes resulted in a cash inflow and were partially offset by cash outflows resulting from a $2.0 million decrease in deferred revenue.

Net cash used in operating activities for the three months ended March 31, 2021 of $83.0 million primarily related to our net loss of $84.6 million, adjusted for non-cash charges of $5.3 million and net cash outflows of $3.8 million provided by changes in our operating assets and liabilities. Non-cash charges primarily consisted of depreciation and amortization of property and equipment, stock-based compensation, and gain on fair value change of warrant liability. The main drivers of the changes in operating assets and liabilities were a $6.5 million decrease in accounts payable, accrued expenses and other liabilities resulting primarily from a pay down of vendor balances; an increase in inventories of $0.7 million, a $0.7 million increase in other current assets and a decrease of $0.3 million in deferred revenue. These changes resulted in a cash outflow and were partially offset by cash inflows resulting from an increase in deferred rent of $3.1 million, resulting from the straight-line impact of leases, and a reduction in prepaid expenses of $1.0 million.

Net Cash Used in Investing Activities

Net cash used in investing activities was $4.7 million for the three months ended March 31, 2022 and mainly related to the purchase of property and equipment, of which a substantial majority related to purchases of laboratory equipment and facilities improvements.

Net cash used in investing activities was $8.6 million for three months ended March 31, 2021 related to the purchase of property and equipment.

Net Cash Provided by Financing Activities

Net cash provided by financing activities was $0.3 million for three months ended March 31, 2022, which consisted of the exercise of common stock options.

Net cash provided by financing activities was $4.3 million for the three months ended March 31, 2021, which consisted primarily of proceeds from the repayment of non-recourse loans and the exercise of common stock options.

Off Balance Sheet Arrangements

As of March 31, 2022 and 2021, we did not have any relationships with any entities or financial partnerships, such as structured finance or special purpose entities that would have been established for the purpose of facilitating off balance sheet arrangements or other purposes.

Critical Accounting Policies and Estimates

We have prepared our financial statements in accordance with GAAP. Our preparation of these financial statements requires us to make estimates, assumptions, and judgments that affect the reported amounts of assets, liabilities, expenses, and related disclosures at the date of the financial statements, as well as revenue and expenses recorded during the reporting periods. We evaluate our estimates and judgments on an ongoing basis. We base our estimates on historical experience and on various other factors that we believe are reasonable under the circumstances, the results of which form the basis for making judgments about the carrying value of assets and liabilities that are not readily apparent from other sources. Actual results could therefore differ materially from these estimates under different assumptions or conditions.

There have been no material changes to our critical accounting policies from those described in "Management's Discussion and Analysis of Financial Condition and Results of Operations" included in our Annual Report on Form 10-K for the year ended December 31, 2021, except as described below.

Leases

We adopted FASB ASC 842 on January 1, 2022. We determine if an arrangement is or contains a lease at inception by assessing whether the arrangement contains an identified asset and whether we have the right to control the identified asset. Lease assets represent our right to use an underlying asset for the lease term and lease liabilities represent our obligation to make lease payments arising from the lease.

We have a variety of different types of operating leases, the specific terms and conditions of which vary from lease to lease. Certain operating lease agreements include terms such as: (i) renewal and early termination options; (ii) tenant improvement allowances; and (iii) rent escalation clauses. The lease agreements also include provisions for the maintenance of the leased asset and payment of lease related costs. We review the specific terms and conditions of each lease and, as appropriate, renewal or termination options reasonably certain to be exercised are included in the Company's lease terms.. Our leases do not contain any residual value guarantees.

Our lease agreements include rental payments that may be adjusted in the future based on economic conditions and others include rental payments adjusted periodically for inflation. Variable lease expense is disclosed for the adjusted portion of such payments. Lease income, attributable to subleases, is recognized in Cost and operating expenses on the Condensed Consolidated Statements of Operations and Comprehensive Loss, as the sublease activity is outside our normal business operations.

Currently, underlying assets classes for our leases are as follows: (i) real estate, (ii) office equipment, (iii) lab equipment, (iv) contract manufacturing/research assets, and (v) vehicles.

Lease liabilities are recognized at the lease commencement date based on the present value of lease payments over the non-cancelable lease term. Right-of-use assets are recognized for the amount of the lease liability, adjusted for any lease payments made prior to or on lease commencement, lease incentives received and initial direct costs incurred, as applicable. As most of our operating leases do not provide an implicit rate, as such, we use an estimated incremental borrowing rate based on information available at the date of adoption and subsequent lease commencement dates in calculating the present value of its operating lease liabilities. The incremental borrowing rate is determined using the our synthetic credit rating, adjusted for a credit premium, historical recovery rates of secured debt, and the respective tenor's risk-free rates determined using U.S. Treasury rates.

Item 3. Quantitative and Qualitative Disclosures About Market Risk

Interest Rate Risk

We are exposed to market risk related to changes in interest rates. Our primary exposure to market risk is interest rate sensitivity, which is affected by changes in the general level of U.S. interest rates, particularly because our cash equivalents are primarily invested in short-term U.S. Treasury obligations, and our term loan bears interest at a variable rate.

Our term loan bears a variable interest rate which is the sum of 9.25% plus the greater of the one-month LIBOR and 2.25%. Accordingly, increases in LIBOR could increase our interest payments under the term loan. An increase of 100 basis points in the interest rate of the term loan would not have a material impact on our financial position or results of operations.

Foreign Currency Risk

We are not currently exposed to significant market risk related to changes in foreign currency exchange rates; however, we have contracted with and may continue to contract with foreign vendors. Our operations may be subject to fluctuations in foreign currency exchange rates in the future.

Item 4. Controls and Procedures

Evaluation of Disclosure Controls and Procedures

We maintain disclosure controls and procedures that are designed to provide reasonable assurance that information required to be disclosed in our periodic and current reports that we file with the SEC is recorded, processed, summarized and reported within the time periods specified in the SEC's rules and forms, and that such information is accumulated and communicated to our management, including our acting Chief Executive Officer and our Chief Financial Officer, as appropriate, to allow timely decisions regarding required disclosure.

Our management, with the participation and supervision of our acting Chief Executive Officer and our Chief Financial Officer, have evaluated our disclosure controls and procedures (as defined in Rules 13a-15(e) and 15d-15(e) under the Exchange Act) as of the end of the period covered by this Quarterly Report on Form 10-Q. Based on that evaluation, our acting Chief Executive Officer and our Chief Financial Officer have concluded that, as of the end of the period covered by this Quarterly Report on Form 10-Q, our disclosure controls and procedures were effective to provide reasonable assurance that information we are required to disclose in reports that we file or submit under the Exchange Act is recorded, processed, summarized, and reported within the time periods specified in SEC rules and forms, and that such information is accumulated and communicated to our management, including our acting Chief Executive Officer and Chief Financial Officer, as appropriate, to allow timely decisions regarding required disclosure.

Changes in Internal Control over Financial Reporting

Our management is responsible for establishing and maintaining adequate internal control over financial reporting as such term is defined in Rule 13a-15(f) of the Exchange Act. An evaluation was also performed under the supervision and with the participation of our management, including our acting Chief Executive Officer and our Chief Financial Officer, of any change in our internal control over financial reporting that occurred during our last fiscal quarter and that has materially affected, or is reasonably likely to materially affect, our internal control over financial reporting. That evaluation did not identify any change in our internal control over financial reporting that occurred during our latest fiscal quarter that has materially affected, or is reasonably likely to materially affect, our internal control over financial reporting.

Limitations on Effectiveness of Controls and Procedures

In designing and evaluating the controls and procedures, management recognizes that any controls and procedures, no matter how well designed and operated, can provide only reasonable and not absolute assurance of achieving the desired control objectives. In reaching a reasonable level of assurance, management is required to apply its judgment in evaluating the cost-benefit relationship of possible controls and procedures. In addition, the design of any system of controls also is based, in part, upon certain assumptions about the likelihood of future events, and there can be no assurance that any design will succeed in achieving its stated goals under all potential future conditions; over time, controls may become inadequate because of changes in conditions, or the degree of compliance with policies or procedures may deteriorate. Because of the inherent limitations in a cost-effective control system, misstatements due to error or fraud may occur and not be detected.

PART II - OTHER INFORMATION

Item 1. Legal Proceedings

We are currently in and may, from time to time, become involved in legal proceedings arising in the ordinary course of our business. For example, on August 4, 2021, a putative securities class action was filed on behalf of purchasers of our common stock pursuant to or traceable to the registration statement for our initial public offering ("IPO"). The action is pending in the United States District Court for the Northern District of California, and is captioned *Shankar v. Zymergen Inc. et al.*, Case No. 3:21-cv-06028-JCS. The action alleges violations of Sections 11 and 15 of the Securities Act of 1933, as amended (the "Securities Act") in connection with our IPO, names the Company, certain of our current and former officers and directors, our IPO underwriters, and certain stockholders as defendants and seeks damages in an unspecified amount, attorneys' fees, and other remedies. We intend to defend vigorously against such allegations.

On November 9, 2021, one of our purported shareholders filed a putative derivative lawsuit in the United States District Court for the Northern District of California that is captioned Mellor v. Hoffman, et al., Case No. 4:21-cv-08723. The complaint names certain of our current and former officers and directors and the Company as nominal defendants based on allegations substantially similar to those in the securities class action. The complaint purports to assert claims on the Company's behalf for breach of fiduciary duty, unjust enrichment, abuse of control, gross mismanagement, corporate waste, and contribution under the federal securities laws and seeks corporate reforms, unspecified damages and restitution, and fees and costs.

In addition, certain government agencies, including the Securities and Exchange Commission ("SEC"), have requested information related to our August 3, 2021 disclosure. The Company is cooperating fully.

Item 1A. Risk Factors

Investing in our common stock involves a high degree of risk. You should carefully consider the risks described below, as well as the other information in this report, including our financial statements and the related notes and the section titled "Management's Discussion and Analysis of Financial Condition and Results of Operations" in this report, before deciding whether to invest in our common stock. The occurrence of any of the events or developments described below could harm our business, financial condition, results of operations and growth prospects. In such an event, the market price of our common stock could decline and you may lose all or part of your investment. Additional risks and uncertainties not presently known to us or that we currently deem immaterial also may impair our business operations.

Risk Factors Summary

Our business is subject to numerous risks and uncertainties, including those outside of our control, that could cause our actual results to be harmed. These risks include, but are not limited to, the following:

- We may not be able to successfully commercialize or generate revenue from our products.
- We may not be able to successfully execute on our new strategic plan.
- Our efforts to reduce our operating costs and extend our cash runway may not be successful.
- We expect to need to raise additional capital to fund our operations, which we may not be able to obtain on favorable terms, or at all, and which, if obtained, may cause dilution to our stockholders or cause us to further limit our operations.
- Loss of key personnel and/or failure to attract, train and retain additional key personnel, including a permanent Chief Executive Officer, could delay our product development programs and harm our R&D efforts and our ability to meet our business objectives.
- We have a history of operating losses and we do not expect to be profitable for the foreseeable future.
- We have a limited operating history, which has made it and may continue to make it difficult to evaluate the prospects for our future viability and predict our future performance.
- The size of the market for our products and solutions may be smaller than estimated and new opportunities may not develop as quickly as we expect, or at all.
- The market, including customers and potential investors, may be skeptical of the viability and benefits of our pipeline products because they are based on a relatively novel and complex technology and we may encounter challenges to align the fit of the products in our pipeline to the relevant market.
- The success of our drug discovery business depends on the quality of our drug discovery platform and synthetic biology capabilities and their acceptance by partners in our market.
- Biopharmaceutical drug development is inherently uncertain, and it is possible that none of the leads discovered using our platform that are further developed will receive marketing approval or become viable commercial products on a timely basis, or at all.

- Our efforts to market our automation solutions externally may not succeed.
- Our automation sales cycle may be long and unpredictable.
- Our automation solutions involve complex hardware and software, and if our automation solutions fail to perform as expected, our ability to develop, market and sell our solutions could be harmed.
- Any failure to offer high-quality technical support services could adversely affect our relationships with our automation customers and our operating results.
- It is difficult to predict the time and cost of development of our pipeline products, which are produced by or based on a relatively novel and complex technology and are subject to many risks, any of which could prevent or delay revenue growth and adversely impact our market acceptance, business and results of operations.
- The Perceptive Credit Agreement provides our secured lender with liens on substantially all of our assets, including our intellectual property, contains financial covenants and other restrictions on our actions, which may cause significant risks to our stockholders and may impact our ability to pursue certain transactions and operate our business, and provides that a material adverse change constitutes an event of default.
- Our restructuring activities have resulted in impairment and other charges, which may adversely affect our financial condition and results of operations.
- If goodwill, other intangible assets or long-lived assets become impaired, we may be required to record a significant charge to earnings.
- We may not be successful in our efforts to use our proprietary platform to build a pipeline of products.
- Even if we are successful in expanding our platform, rapidly changing technology and extensive competition in the synthetic biotech and petrochemical industries could make the products we are developing and producing obsolete or non-competitive unless we continue to develop and manufacture new and improved products and pursue new market opportunities.
- The success of our advanced materials business relies heavily on the performance of our products and developing new products at lower costs and faster development timelines.
- We may launch products with a non-fermentation produced molecule and, if we are not successful in our efforts to convert to a fermentation-produced version of our product, our products may not be commercially successful.
- We do not have our own commercial scale manufacturing capability, and any disruptions or interruptions in our manufacturing capacity may prevent us from launching products or producing products at necessary volumes to meet commercial demand, which may result in loss of customers or lost revenue opportunities.
- The manufacture of our products is complex, and we may be unable to secure necessary talent to establish and scale our manufacturing and supply chain to the extent necessary to make a profit or sustain and grow our current business.
- We depend on a limited number of suppliers for critical components of development and manufacturing of our products. The loss of any one or more of these suppliers, or their failure to supply us with the necessary components on a timely basis, could cause delays in our production capacity and adversely affect our business.
- We face increased supply chain risks with respect to our automation business.
- Unfavorable global economic or political conditions could adversely affect our business, financial condition or results of operations.
- The COVID-19 pandemic has had, and is expected to continue to have, an impact on our business, results of operations and financial condition.
- Our revenue, results of operations, cash flows and reputation in the marketplace may suffer upon the loss of a significant customer.
- We are involved in securities litigation and other related matters that are expensive and time-consuming. Such litigation and other related matters could harm our business.
- Governmental trade controls, including export and import controls, sanctions, customs requirements and related regimes, could subject us to liability or loss of contracting privileges or limit our ability to compete in certain markets.

Risks Related to Our Business

We may not be able to successfully commercialize or generate revenue from our products.

We have not yet generated revenue from product sales (except for nominal revenue related to the sale of samples) and expect product revenue to be immaterial in 2022. During the second half of 2021, we conducted an assessment of our target markets and the fit of the products in our pipeline to those markets (the "Portfolio Review") to assess our target markets and the fit of the products in our pipeline to those markets. As a result of our Portfolio Review, we determined to focus on a smaller number of programs that we believe capitalize on our capabilities and provide clear commercial opportunities. As a result, we discontinued our electronics film programs, other than Z1, which is partnered with Sumitomo Chemical, because emerging data on the market segment we were targeting with Hyaline and other electronics films indicated a smaller near-term opportunity than previously expected. We also discontinued our consumer care programs, including our insect repellent, Z2, because we determined through our Portfolio Review that the costs of customer acquisition with a direct-to-consumer model would have been prohibitive and, in the case of Z2, it could not be produced and distributed at a price point competitive with incumbent products. Following our Portfolio Review, we are focused on our advanced materials business, including agriculture, water repellency, advanced polymers, and healthcare, as well as our drug discovery and automation businesses. We are also investing heavily in research with the goal of building a pipeline of new opportunities. We do not currently know which, if any, of our future products will be successfully commercialized, we do not have a firm pipeline of customers or visibility on commitments, and our prospects for sales of our products are highly uncertain. In addition, if we are unable to commercialize or generate revenue from the products in our focus areas, we may be unable to identify or develop suitable alternative product candidates in a timely manner or at all. If we are unable to successfully commercialize or generate revenue from product sales, our results of operations could differ materially from our expectations, and our business, financial condition and results of operations would be materially and adversely affected and the value of our common stock could decline.

We may not be able to successfully execute on our new strategic plan.

With the benefit of the analyses and evaluations that we have conducted through the Portfolio Review, we adopted a new strategic plan in early 2022 with clear milestones and goals. Under our new strategic plan, we are focused on our advanced materials business, including agriculture, water repellency, advanced polymers, and healthcare, as well as our drug discovery and automation businesses. We are also investing heavily in research with the goal of building a pipeline of new opportunities. Some or all of the programs on which we are focused could fail to produce commercially viable products on the timelines that we anticipate or at all. We expect that some of our programs will not reach commercialization because we determine that the commercial opportunities we target are smaller than we anticipate, we encounter technical difficulties, the competitive landscape shifts, or we otherwise determine in our business judgment to terminate a program. We may also modify our strategic plan. Any decision to terminate a program will further reduce the number of programs that we are pursuing and reduce the number of opportunities available to us. The success of our narrowed focus and our new strategic plan depends on our ability to identify and execute on commercial opportunities for our products in our focus areas. If we are unable to successfully execute our strategy, our business, financial condition and results of operations may be materially and adversely affected.

Our efforts to reduce our operating costs and extend our cash runway may not be successful.

We recently implemented several cost reduction measures, including reductions in force in the fall of 2021 that resulted in the elimination of approximately 220 positions and the discontinuation of a number of programs. We believe that following these measures we will have sufficient capital to support our operations to the middle of 2023, but our estimates of our future costs and the resources required to support our operations may prove incorrect, and we may be unable to support our operations for such period. For example, widespread inflationary pressures exist across global economies, which could result in the costs to support our operations exceeding our estimates. Further, global economic, financial, and political conditions, such as a resurgence of COVID-19, political unrest or war, including the current war in Ukraine (the "Ukraine War"), a weakening economy or any other disruption of the global economy or financial markets, could result in a variety of risks to our business, including further inflation or other increases to the costs of our operations. In addition, our recent reductions in force, and any future reductions in force or other cost-cutting measures, could adversely affect our ability to attract and retain employees, which could require us to expend more resources on employee attraction and retention than we currently anticipate. Even if our efforts to reduce our operating costs are successful, our resources may not be sufficient to support our current research, development or commercialization efforts to success, and we may have insufficient resources to invest in research, development or commercialization of otherwise promising future programs or activities, either of which could be detrimental to the success of our programs or our strategy and our ability to commercialize and generate revenue from our products. Any inability to support our operations could also require us to raise additional capital. See the risk factor titled "—*We expect to need to raise additional capital to fund our operations, which we may not be able to obtain on favorable terms, or at all, and which, if obtained, may cause dilution to our stockholders or cause us to further limit our operations*." If we do not have sufficient funds to support our programs, then our programs, business, financial condition and results of operations may be materially and adversely affected.

In addition, our customers, vendors and partners may consider our credit profile when considering whether to contract with us or negotiating or renegotiating contract terms, and certain third parties have issued negative reports regarding our business and financial risk. If our existing or potential customers, vendors or partners develop a negative perception of our short- or long-term financial prospects, including as a result of third-party reports, such parties may decide not to do business with us or change the terms on which they do business with us, which could limit our ability to develop products and generate revenue, require us to find alternate vendors, customers or partners, or limit the availability of credit from vendors and increase our costs. Any of these consequences could have a material adverse effect on our business, prospects, results of operations, financial condition, and efforts to reduce our operating costs and extend our cash runway.

We have a history of operating losses and we do not expect to be profitable for the foreseeable future.

We have incurred significant operating losses in each period since our inception. Our operating losses reflect the substantial investments we made to develop our platform and to work on the development of our products. We incurred net losses of $72.1 million and $84.6 million for the three months ended March 31, 2022 and 2021, respectively. As of March 31, 2022, we had an accumulated deficit of $1.2 billion. We have not yet generated revenue from product sales (except for nominal revenue related to the sale of samples) and expect product revenue to be immaterial in 2022. We expect our losses to continue for the foreseeable future as we continue to invest significant additional funds toward ongoing R&D as we develop new products. We have recently implemented several cost reductions measures, but incurred increased operating costs in 2021 given the external consultants that we engaged to assist with our Portfolio Review and development of our new strategic plan and one-time restructuring costs. We may incur additional similar costs in the future. Further, our limited operating history makes it difficult to effectively plan for and model future growth, revenue and operating expenses. Our ability to achieve or sustain profitability is based on numerous factors, many of which are beyond our control, including whether or when we achieve market acceptance of our products, product and platform development, our ability to develop and commercialize new products, our ability to scale our manufacturing capacity, our ability to manufacture products with a fermentation-produced biomolecule and our market penetration and margins. We may never be able to generate sufficient revenue to achieve or sustain profitability or it may take longer than we anticipate. Our failure to achieve or maintain profitability could negatively impact the value of our common stock.

We expect to need to raise additional capital to fund our operations, which we may not be able to obtain on favorable terms, or at all, and which, if obtained, may cause dilution to our stockholders or cause us to further limit our operations.

Following our recent implementation of several cost reduction measures to better align our operating costs to our extended runway, we believe that we will have sufficient capital to support our operations to the middle of 2023. Until such time as we can generate significant revenue from product sales or other customer arrangements to fund operations, we expect to require additional capital to fund our operations, which may include seeking capital from the issuance of additional equity, debt financings or other capital-raising transactions. There can be no assurance that such additional funding will be available on terms attractive to us, or at all. Our ability to obtain additional funding will depend on a variety of factors, many of which are unpredictable and beyond our control, including general conditions in the global economy and in the global financial markets, which may be impacted by interruptions, delays and/or cost increases resulting from the ongoing COVID-19 pandemic, political instability or geopolitical tensions, such as the Ukraine War, economic weakness, inflationary pressures or other factors. If the equity and credit markets deteriorate, including as a result of economic weakness, a resurgence of COVID-19, political unrest or war, including the Ukraine War, or any other reason, such deterioration may make any necessary equity or debt financing more difficult to obtain in a timely manner and on favorable terms, if at all, and, if obtained, such financing may be more costly or more dilutive. The various ways we could raise additional capital carry potential risks. If we raise funds by issuing equity securities, our shareholders would experience dilution. Any preferred equity securities issued also would likely provide for rights, preferences or privileges senior to those of holders of our common shares. If we raise funds by issuing debt or convertible debt securities, those securities would have rights, preferences and privileges senior to those of holders of our common shares. Debt and convertible debt financing and preferred equity financing, if available, would increase our fixed payment obligations and may also involve agreements that include covenants restricting our ability to take specific actions, such as incurring additional debt, selling or licensing our assets, making product acquisitions, making capital expenditures or declaring dividends. For example, the Perceptive Credit Agreement contains restrictions on our ability to purchase or dispose of assets and has other affirmative or negative covenants that impact how we run our business. If we raise funds through additional collaborations, strategic alliances or licensing arrangements with third parties, we may have to relinquish valuable rights to our intellectual property, future revenue streams, research programs or pipeline products or to grant licenses on terms that may not be favorable to us.

If we are unable to obtain adequate financing or financing on terms satisfactory to us, our ability to continue to pursue our business objectives and to respond to business opportunities, challenges or unforeseen circumstances could be significantly limited and could have a material adverse effect on our business, results of operations, prospects and financial condition.

In addition, because perceptions of our credit risk are an important factor influencing our ability to access capital and the terms of any new indebtedness, including covenants and interest rates, we could be adversely affected if our credit ratings or other third-party reports on our creditworthiness are negative, downgraded or weaker than those of our competitors. For example, certain third parties have issued negative reports regarding our business and financial risk, and any such reports or negative credit ratings could harm our ability to raise additional capital at acceptable cost and as a result adversely affect our business, prospects, results of operations and financial condition. Our existing and potential customers, partners and vendors may also consider our credit profile when considering whether to contract with us or negotiating contract terms, and if they develop a negative perception of our short- or long-term financial prospects, decide not to do business with us or change the terms on which they do business with us, it could have a further adverse effect on our business, prospects, results of operations and financial condition.

Loss of key personnel and/or failure to attract, train and retain additional key personnel, including a permanent Chief Executive Officer, could delay our product development programs and harm our R&D efforts and our ability to meet our business objectives.

Our business involves complex, global operations across a variety of markets and requires a management team and employee workforce that is knowledgeable in the many areas in which we operate, including our target industries. As a result of some of the issues we have experienced with our commercial product pipeline, we are working to bring additional talent to our commercial team and to our sales pipeline qualification and forecast processes. Our future success depends upon our ability to attract, train, retain and motivate highly qualified management, scientific, engineering, information technology, and sales personnel, among others, including a permanent Chief Executive Officer. The market for qualified personnel is very competitive because of the limited number of people available who have the necessary technical skills and understanding of our technology and products and the nature of our industry which requires certain of our technical personnel to be on-site in our facilities. We compete for qualified scientific and information technology personnel with other life sciences and information technology companies as well as academic institutions and research institutions in the markets in which we operate, including the San Francisco Bay Area, California and Boston, Massachusetts. To attract top talent, we believe we will need to offer competitive compensation and benefits packages, including equity incentive programs, which may require significant investment.

The departure of one or more of our senior management team members or other key employees could be disruptive to our business until we are able to hire qualified successors. Our employees, including members of our management team, could leave our company with little or no prior notice and would be free to work for a competitor. We do not maintain “key man” life insurance on any of our employees.

On August 3, we announced that Josh Hoffman, our former Chief Executive Officer, stepped down, and we appointed Jay Flatley as Acting Chief Executive Officer. Additionally, Aaron Kimball, our Chief Technology Officer, resigned effective as of April 1, 2022. Our Board of Directors has commenced a search process to identify a permanent Chief Executive Officer. We also recently reduced our workforce by approximately 220 positions and have experienced higher levels of voluntary attrition in recent months. In addition, our recent reductions in force and attrition levels have adversely affected, and any future reductions in force or other cost-cutting measures could adversely affect, employee morale and further increase voluntary attrition or increase the difficulty of attracting qualified personnel. During this period of management transition and uncertainty, we have experienced, and may experience in the future, diversion of management attention from business concerns, failure to retain other key personnel and loss of institutional knowledge. Additionally, the recent decline in the perceived value of our equity awards has affected and may continue to adversely affect our ability to attract and retain key employees. If we are unable to successfully identify and attract adequate candidates for the permanent Chief Executive Officer vacancy or any other key vacancies that occur in a timely manner, we could experience harm to our business, growth, financial conditions, results of operations and cash flows.

In addition, some of our scientific personnel are qualified foreign nationals whose ability to live and work in the United States is contingent upon the continued availability of appropriate visas. Due to the competition for qualified personnel in the key markets in which we operate, we expect to continue to utilize foreign nationals to fill part of our recruiting needs. As a result, changes to United States immigration policies have and could further restrain the flow of technical and professional talent into the United States and adversely affect our ability to hire qualified personnel.

We have a limited operating history, which has made it and may continue to make it difficult to evaluate the prospects for our future viability and predict our future performance.

As a business with a limited operating history, we have encountered unforeseen expenses, difficulties, complications, delays and other known and unknown obstacles. For example, as a result of our Portfolio Review, we discontinued our electronics film programs, other than Z1, which is partnered with Sumitomo Chemical, because emerging data on the market segment we were targeting with Hyaline and other electronics films indicated a smaller near-term opportunity than previously expected. We also discontinued our consumer care programs, including our insect repellent, Z2, because we determined through our Portfolio Review that the costs of customer acquisition with a direct-to-consumer model would have been prohibitive and, in the case of Z2, it could not be produced and distributed at a price point competitive with incumbent products. We are now focused on opportunities in advanced materials, drug discovery and automation, which are areas in which we have a limited operating history and which may present expenses, difficulties, complications, delays and other obstacles that we do not currently foresee.

Our long-term objective is to generate revenue from the sale of numerous breakthrough products across a variety of industries. We expect that there will be variability between individual products with respect to the timelines and costs for launching a product, which may be greater where regulatory requirements lead to longer timelines, which could apply to certain of our products. In addition, with respect to some of our products, we expect to generate revenue only after customers have completed all aspects of their qualification processes for those products and have decided to place orders for such products, which is typically done on a purchase order basis, rather than under long-term contractual commitments.

Substantially all of our revenue to date has been generated from R&D service contracts and collaboration and other arrangements aimed at developing, testing and validating our platform by providing custom services for use only by the collaboration partner. Our prospects must be considered in light of the uncertainties, risks, expenses and difficulties frequently encountered by companies in their early stages of operations. We have not yet achieved market acceptance for our products, generated revenue from product sales (except for nominal revenue related to the sale of samples), produced our products at scale, scaled our manufacturing capabilities to meet potential demand at a reasonable cost, established a sales model or conducted sales and marketing activities necessary for successful product commercialization. Predictions about our future success or viability are highly uncertain and may not be as accurate as they could be if we had a longer operating history or a company history of successfully developing, commercializing and generating revenue from products.

We have encountered in the past, and will encounter in the future, risks and uncertainties frequently experienced by growing companies with limited operating histories in emerging and rapidly changing industries, such as our recent decision to focus on opportunities in advanced materials, drug discovery, and automation and our determination to discontinue our electronics film programs, other than Z1, which is partnered with Sumitomo Chemical, and our consumer care programs, including our insect repellent, Z2. If our assumptions regarding these risks and uncertainties, which we use to plan and operate our business, are incorrect or change, or if we do not address these risks successfully, our results of operations could differ materially from our expectations, and our business, financial condition and results of operations could be adversely affected.

The size of the market for our products and solutions may be smaller than estimated and new opportunities may not develop as quickly as we expect, or at all.

The demand for our products and solutions is new and evolving, making it difficult to predict with any accuracy the total potential demand for our current and future products and solutions. Our estimates of the annual total addressable markets and serviceable addressable markets for our current and future products and solutions are based on a number of internal and third-party estimates and assumptions. In addition, our strategy involves building our drug discovery and automation businesses, which we have only recently launched, and we have limited experience marketing these solutions to biopharmaceutical or other customers. Sales of new products or solutions may take several years to develop and mature, if at all, and these opportunities may not develop as we expect. As a result, the sizes of the annual total addressable markets and serviceable addressable markets for our products and solutions are even more difficult to predict. Our assumptions regarding and the data underlying our estimates of the total annual addressable markets and serviceable addressable markets may not be correct, and the conditions supporting our assumptions or estimates, or those underlying the third-party data we have used, may change at any time, thereby reducing the accuracy of our estimates. As a result, our estimates of the annual total addressable markets and serviceable addressable markets for our products and solutions may be incorrect. The future growth of our current and future products and solutions depends on many factors, including factors that are beyond our control, such as recognition and acceptance of our products and solutions by our customers and the growth, prevalence and costs of competing products and solutions. Such recognition and acceptance may not occur in the near term, or at all. If demand for our current and future products and solutions is smaller than estimated or does not develop as we expect, our growth may be limited and our business, financial condition and operational results may be adversely affected. For example, as a result of our Portfolio Review, we discontinued our electronics film programs, other than Z1, which is partnered with Sumitomo Chemical, because emerging data on the market segment we were targeting with Hyaline and other electronics films indicated a smaller near-term opportunity than previously expected.

The market, including customers and potential investors, may be skeptical of the viability and benefits of our products because they are based on a relatively novel and complex technology and we may encounter challenges to align the fit of the products in our pipeline to the relevant market.

The market, including customers and potential investors, may be skeptical of the viability and benefits of our products because they are based on a relatively novel and complex technology. There can be no assurance that, once we launch them, our products will be understood, approved, or accepted by customers, regulators and potential investors or that we will be able to sell our products profitably at competitive prices and with features sufficient to establish demand. In addition, in order for novel materials to get designed into new products, dialogue across the relevant supply chain is needed. While the ultimate customers for our products may only be specific parts of the relevant value chain, relationships with all parts of the chain are important in order to gain visibility into market trends and feature and specification requirements, and in order to get designed into the end products. If we are unable to convince these potential customers, including the consumers or businesses who purchase end-products containing our products, of the utility and value of our products or the end products in which they are incorporated or that our products are superior to the products they currently use, we will not be successful in entering these markets and our business and results of operations will be adversely affected. If potential investors are skeptical of the success of our products, our ability to raise capital and the value of our stock may be adversely affected.

The success of our drug discovery business depends on the quality of our drug discovery platform and synthetic biology capabilities and their acceptance by partners in our market.

We utilize our drug-discovery platform, which combines access to our Unified Metagenomics Database (“UMDB”) with our machine learning and synthetic biology capabilities, to identify drug candidate leads for further development and potential commercialization by partners or internally. As a result, the quality and sophistication of our drug discovery platform and capabilities is critical to our ability to conduct our research and discovery activities and to deliver promising molecules. In particular, the success of our drug discovery business depends, among other things, on:

- our ability to successfully identify therapeutic leads on the desired timeframes;
- our ability to enter into partnerships and establish an internal pipeline of drug candidates;
- our ability to increase awareness of the capabilities of our drug discovery business;
- our potential partners’ willingness to embrace new technologies;
- our potential partners’ perception of the cost effectiveness and reliability of our drug discovery platform, including in comparison to legacy and other alternative technologies;
- the rate of adoption of our solutions by pharmaceutical companies, biotechnology companies, government organizations and non-profit organizations and others;
- the timing and scope of any approvals that may be required by the Food and Drug Administration ("FDA") or any other regulatory body for drugs that are developed based on leads we discover;
- any negative publicity regarding defects or errors in our or our competitors’ technologies; and

- our ability to validate our drug discovery platform through research and accompanying publications.

There can be no assurance that we will successfully address any of these or other factors that may affect the market acceptance of our drug discovery platform or our technology. If we are unsuccessful in achieving and maintaining market acceptance of our platform, our business, financial condition, results of operations and prospects could be materially and adversely affected.

Biopharmaceutical drug development is inherently uncertain, and it is possible that none of the leads discovered using our platform that are further developed will receive marketing approval or become viable commercial products on a timely basis, or at all.

We seek to use our drug discovery platform to offer drug-discovery solutions to partners who are engaged in drug discovery and development. Our potential partners include pharmaceutical companies, biotechnology companies of varying sizes, and non-profit and government organizations. While we expect that we would receive upfront payments generated through our receipt of technology access fees and discovery research fees for performing research activities for our partners, we estimate that the vast majority of the economic value of any contracts that we enter into with drug discovery partners will be in the downstream payments that are payable if certain milestones are met or approved products are sold. As a result, the success of our drug discovery business will depend on the ability of our partnerships to successfully develop and commercialize therapies based on drug candidate leads discovered using our drug discovery platform. Due to our initial plan to rely on partners in our drug discovery business, the risks relating to product development, regulatory clearance, authorization or approval and commercialization will apply to us derivatively through the activities of our partners, but we will face the same risks with any drug candidates that we develop on our own. There can be no assurance that drug candidate leads that we discover will be successfully developed, approved or commercialized. As a result, we may not realize the intended benefits of our partnerships. We launched our drug discovery business in 2022 and have not yet executed any new partnerships since that launch.

Due to the uncertain, time-consuming, and costly clinical development and regulatory approval process, there may not be successful development of any drug candidates with the drug candidate leads that we discover, and we and our partners may choose to discontinue the development of these drug candidates for a variety of reasons, including due to safety, lack of efficacy, risk versus benefit profile, exclusivity, competitive landscape, commercialization potential, production limitations or prioritization of resources. It is possible that none of the drug candidate leads that we discover will ever receive regulatory approval and, even if approved, such drug candidates may never be successfully commercialized. Furthermore, approved drugs may not achieve broad market acceptance among physicians, patients, the medical community and third-party payors, in which case revenue generated from their sales would be limited. Additionally, given the costs of drug development, companies frequently must make decisions about which drug candidates to develop and advance, and we or any partners may not have the resources to invest in all of the drug candidates that we discover using our platform, or clinical data and other development considerations may not support the advancement of one or more drug candidates. Decision-making about which drug candidates to prioritize involves inherent uncertainty, and any partners' development program decision-making and resource prioritization decisions, which would be outside of our control, may adversely affect the potential value of those partnerships or perceptions regarding the potential for drug candidate leads discovered using our drug discovery platform. Further, if the development of drug candidate leads discovered using our drug discovery platform encounter safety issues or fail to demonstrate efficacy in clinical trials, such failure could result in skepticism about the likelihood of success of other drug candidate leads discovered with our drug discovery platform, making it more difficult to attract partners. The failure to effectively advance, market and sell suitable drug candidates with the leads that we discover could materially and adversely affect our business, financial condition, prospects and results of operations.

Our efforts to market our automation solutions externally may not succeed.

We launched our automation business in early 2022 and have limited experience selling our automation solution to external customers. Our efforts to offer our automation solution to external customers may not succeed. We do not know if we can successfully compete in this new market, and our expectations for this business may not materialize. It is difficult to predict customer adoption rates and demand for our automation solutions, the entry of competitive products or the future growth rate and size of the market. The expansion of this market depends on a number of factors, including: the cost, performance, and perceived value associated with automation hardware and software as an alternative to legacy systems or manual processes. If there is a reduction in demand or demand is lower than we expect, whether as a result of a lack of customer acceptance, technological challenges, weakening economic conditions, data security or privacy concerns or competing technologies and products, the market for our solutions might not develop or might develop more slowly than we expect. Even if we succeed in selling automation solutions we may not be able to generate significant revenues and cash flows from these activities. The failure to successfully build our automation business may materially adversely affect our business, financial condition, prospects and results of operations.

Our automation sales cycle may be long and unpredictable.

Our automation solution combines hardware and software offerings, and the sales cycle for such solutions can vary and be long and unpredictable. The timing of sales of our automation solution is difficult to forecast, in part because of our lack of experience selling this offering to external customers. Further, we anticipate that some potential customers may want custom solutions that require longer sales cycles as we work with the potential customer to understand their needs and design a solution to meet those needs, which we expect will often be an iterative process. Initially, we intend to focus our sales efforts for automation on the biotech industry, where we believe the processes and systems that we have built for our own programs will have the most utility. Our solutions may be viewed as a large expenditure for smaller or early-stage biotech companies and larger, more established companies may have long approval processes and/or be reluctant to switch to a new technology, all of which may further extend our sales cycles or limit our ability to acquire customers. We expect the length of time that potential automation customers devote to their evaluation, contract negotiation, and budgeting processes will vary significantly, depending on the sizes of the organizations and the nature of their needs. In addition, we might devote substantial time and effort to a particular unsuccessful sales effort, and as a result, we could lose other sales opportunities or incur expenses that are not offset by an increase in revenue, which could harm our business.

Our automation solutions involve complex hardware and software, and if our automation solutions fail to perform as expected, our ability to develop, market and sell our solutions could be harmed.

Our automation solutions, including our Reconfigurable Automation Carts (“RACs”) and Automation Control Software (“ACS”), use a substantial amount of proprietary software and complex technological hardware, some of which is still subject to further development and testing, to operate. The development and implementation of such advanced technologies is inherently complex, and requires coordination with our vendors and suppliers in order to integrate such technology into our products and ensure it interoperates with other complex technology as designed and as expected.

Our automation solutions may contain software bugs or defects in design and manufacture that may cause them not to perform as expected or that may require software patches, repairs, recalls, and design changes, any of which would require significant financial and other resources to successfully navigate and resolve. These products use a substantial amount of software code to operate, and software products are inherently complex and may contain defects and errors when first introduced. If our products contain defects in design or manufacture that cause them not to perform as expected or that require repair, our ability to develop, market and sell our solutions could be harmed. Although we will attempt to remedy issues we observe in our products effectively and rapidly, such efforts could significantly distract management’s attention and divert technical resources from other important business objectives, may not be timely, may hamper production or may not be to the satisfaction of our customers. Further, our limited operating history and limited field data reduce our ability to evaluate and predict the long-term quality, reliability, durability and performance characteristics of our RACs. There can be no assurance that we will be able to detect and fix any defects in our products prior to their sale to customers.

Any defects, bugs or other failure of our automation solutions to perform as expected could harm our reputation and result in delivery delays, product recalls, breach of warranty claims and significant warranty and other expenses, and could have a material and adverse impact on our business, results of operations, prospects and financial condition. As a new entrant to the industry attempting to build customer relationships and earn trust, these effects could be significantly detrimental to us.

Any failure to offer high-quality technical support services could adversely affect our relationships with our automation customers and our operating results.

As part of our automation solution, we will offer customers our support to resolve technical issues relating to our automation offerings, including hardware and software. We anticipate that customers will rely on us to troubleshoot problems with the performance of our automation solutions, design customized automation systems, inform them about the best way to set up and analyze various types of experiments, among other services and advice. We just launched our automation business in early 2022 and do not yet have significant experience responding to external customer demands. We may be unable to resolve problems that customers encounter with our solution quickly enough to accommodate their needs or at all. Additionally, we may experience short-term increases in customer demand for these support services, particularly as we roll out new implementations of our solutions and may not have sufficient resources to adequately satisfy those demands. Our effective and prompt response to customer demands will depend upon our ability to attract, train, retain and motivate highly qualified engineers and other personnel to perform customer service and troubleshooting tasks. In addition, certain problems may require us to go on-site at a customer's location to troubleshoot, and our current business model will need to adequately scale to enable timely support for customers that are located outside the San Francisco Bay Area. Increased customer demand for our services, without corresponding revenues, could increase costs and adversely affect our operating results. In addition, we expect that our sales process for automation will be highly dependent on the reputation of our solutions and business and on positive recommendations from existing customers. Any failure to offer high-quality technical support, or a market perception that we do not offer high-quality support, could adversely affect our reputation, our ability to sell our automation solutions and our business and operating results.

It is difficult to predict the time and cost of development of our products, which are produced by or based on a relatively novel and complex technology and are subject to many risks, any of which could prevent or delay revenue growth and adversely impact our market acceptance, business and results of operations.

We concentrate our R&D efforts on a select number of products that we believe are both technically feasible and present a market opportunity. The typical development cycle of new pipeline products can be lengthy and may require new scientific discoveries or advancements and the development and engineering of complex technology, including improvements or modifications to our platform. Some of our products may also be subject to customer qualification processes, which may increase our costs and extend our timelines, and we may encounter unforeseen difficulties as we develop and commercialize our products. As we ramp the sale of new products, we may initially experience negative product gross margins. Material manufacturing process changes could also result in reduced or possibly negative margins. We expect our cost of product revenue to increase over time in absolute dollars, and our gross margins will vary based on the volume and mix of products sold. Timing for achieving positive gross margins for any product will depend on the pace at which we achieve commercial scale for that product. We may not achieve the product gross margins that we anticipate.

Further, the variety of our products and different industries as well as pricing pressures and other factors may lead to challenges in scaling production across our product portfolio as well as adapting our platform to solve different development problems arising in the development processes. We also may depend on third parties for the supply of key inputs and various components and for manufacturing capacity, making our ability to develop new products complex and subject to risks and uncertainties regarding commercial feasibility, timing and satisfactory technical performance of products. For example, as a result of the COVID-19 pandemic, the inability to travel delayed the establishment of our Hyaline manufacturing capacity and delayed the process of selecting and vetting contract manufacturing organizations (“CMOs”) for our insect repellent product, Z2, and we experienced delays at our U.S. CMO site for Hyaline and at a key supplier of a raw material for Hyaline and one of our other optical film products. If we experience additional problems or delays in developing our pipeline products, we may be subject to further unanticipated costs, including the loss of customers or potential customers. Additionally, even after the incurrence of significant costs to develop a product, we may not be able to solve development problems or develop a commercially viable product at all. For example, we launched our first product, Hyaline, in December 2020, but as a result of our Portfolio Review determined to discontinue our electronics film programs, other than Z1, which is partnered with Sumitomo Chemical, because emerging data on the market segment we were targeting with Hyaline and other electronics films indicated a smaller near-term opportunity than previously expected. We also discontinued our consumer care programs, including our insect repellent, Z2, because we determined through our Portfolio Review that the costs of customer acquisition with a direct-to-consumer model would have been prohibitive and, in the case of Z2, it could not be produced and distributed at a price point competitive with incumbent products. If we do not achieve the required technical specifications or successfully manage our new product development processes, or if development work is not performed according to schedule, then our revenue growth from new products may be prevented or delayed, and our business and operating results may be harmed.

The Perceptive Credit Agreement provides our secured lender with liens on substantially all of our assets, including our intellectual property, contains financial covenants and other restrictions on our actions, which may cause significant risks to our stockholders and may impact our ability to pursue certain transactions and operate our business, and provides that a material adverse change constitutes an event of default.

In December 2019, we entered into a credit and guaranty agreement with Perceptive Credit Holdings II, LP and PCOF EQ AIV II, LP (the “Perceptive Credit Agreement”), which was amended and restated in February 2021 and further amended in October 2021 (the “October 2021 Amendment”), pursuant to which the secured lender agreed to provide us with a $100 million credit facility. As of March 31, 2022, our debt under this credit facility totaled $50 million in principal amount outstanding. During the course of 2020 and into 2021, we sought and obtained various default waivers and amendments under this agreement due to our inability, or anticipated inability, to comply with certain of our covenants relating to the treatment of our acquisitions as permitted transactions under the terms of the Perceptive Credit Agreement, the achievement of quarterly revenue milestones, the timing for consummation of specified debt or equity transactions and the timing for delivery of audited financials for the year ending December 31, 2019. As a result of the amendments and waivers to the Perceptive Credit Agreement, we regained compliance with the applicable covenants under the agreement. The October 2021 Amendment shortened the term of the loan by moving the final maturity date to June 2022. Pursuant to the terms of the October 2021 Amendment we also deposited funds equal to the remaining outstanding principal amount of the loans under the Credit Agreement plus interest through the maturity date and further prepayment premium into a blocked account controlled by the administrative agent, which was released in November 2021 upon the administrative agent’s completion of diligence to its reasonable satisfaction regarding our anticipated operating costs and budget through the maturity date. We will be required to utilize cash that would otherwise be available to support our operations to repay this indebtedness when it becomes due.

In addition, in association with the secured debt, we have granted liens on substantially all of our assets, including our intellectual property, as collateral, and have agreed to significant covenants, including covenants that require us to maintain minimum liquidity and covenants that materially limit our ability to take certain actions, including our ability to pay dividends, make certain investments and other payments, incur additional indebtedness, undertake certain mergers and consolidations, encumber and dispose of assets and customary events of default, including failure to pay amounts due, breaches of covenants and warranties, material adverse effect events, certain cross defaults and judgements and insolvency. For example, the Perceptive Credit Agreement contains restrictions on our ability to purchase or dispose of assets and has other affirmative and negative covenants that impact how we run our business. A failure to comply with the covenants and other provisions of the Perceptive Credit Agreement, including any failure to make a payment when required, would generally result in events of default under such instruments. Although we have obtained waivers from the lender of certain defaults in 2020 and 2021, there can be no assurance that the lender would be willing to grant such waivers in the future. The Perceptive Credit Agreement also provides that a material adverse change constitutes an event of default. The occurrence of any default would cause the interest rate to increase during the period of such default and could permit acceleration of such indebtedness with a prepayment premium. Any required repayment of our indebtedness as a result of acceleration or otherwise would lower our current cash on hand such that we would not have those funds available for use in our business, which could also reduce our ability to support our operations.

If we are at any time unable to service our indebtedness when payment is due, we may be required to attempt to renegotiate the terms of the instruments relating to the indebtedness, seek to refinance all or a portion of the indebtedness, or obtain additional financing. There can be no assurance that we would be able to successfully renegotiate such terms, that any such refinancing would be possible or that any additional financing could be obtained on terms that are favorable or acceptable to us, if at all. Any debt financing that is available could cause us to incur substantial costs and subject us to covenants that significantly restrict our ability to conduct our business. If we seek to complete additional equity financings, the interests of existing equity holders may be diluted.

If we are unable to make payment on our secured debt instruments when due, our secured lender may foreclose on and sell the assets securing such indebtedness, which includes substantially all of our property (including our intellectual property), to satisfy our payment obligations, which could prevent us from accessing those assets for our business and conducting our business as planned. Our business, financial condition, prospects and results of operations could be materially adversely affected as a result of any of these events.

Our restructuring activities have resulted in impairment and other charges, which may adversely affect our financial condition and results of operations.

Our restructuring activities have resulted in the impairment of certain manufacturing equipment and may result in impairment of additional assets in the future. Impairment may result from, among other things, decisions to discontinue a program or dispose of assets, deterioration in our stock price or adverse market conditions. For example, in connection with our decision to discontinue our electronics film programs, other than Z1, which is partnered with Sumitomo Chemical, we determined that certain assets used solely for our electronics film program were impaired and recorded a non-cash impairment charge of $11.8 million related to that equipment during 2021. In addition, we incurred $8.7 million in severance and employee-related restructuring charges, $3.7 million of contract termination costs and $4.6 million in consulting fees in 2021 related to our restructuring activities. We may incur further restructuring charges or impairment charges with respect to restructuring activities that we expect to complete through the first half of 2022 or as a result of the recent decline in our stock price or adverse market conditions, among other things. Determining whether an impairment exists and the amount of the impairment involves quantitative data and qualitative criteria that are based on estimates and assumptions requiring significant management judgment. Future events or new information may change management's valuation of assets in a short amount of time. The timing and amount of impairment charges recorded in our consolidated statements of operations and write-downs recorded in our consolidated balance sheets could vary if management's conclusions change. Any impairment of assets, which will result in non-cash charges against earnings, or other restructuring costs that we incur could have a material adverse effect on our financial condition and results of operations.

If goodwill, other intangible assets or long-lived assets become impaired, we may be required to record a significant charge to earnings.

We have recorded a significant amount of goodwill in our condensed consolidated financial statements. As of March 31, 2022, goodwill recorded on our consolidated balance sheet totaled $40.6 million. We review goodwill for impairment on at least an annual basis and at any interim date whenever events or changes in circumstances indicate that the carrying value may not be recoverable. We review our other intangible and long-lived assets for impairment whenever events or changes in circumstances indicate that the carrying amount of the assets may not be recoverable. Events or changes in circumstances (i.e., information that indicates an impairment might exist) could include: a significant sustained decrease in the market price of our common stock; current period cash flow losses or operating losses combined with a history of losses or a forecast of continuing losses associated with the use of the assets; slower growth rates in our industry; significant adverse changes in the business climate or legal factors; accumulation of costs significantly in excess of the amount originally expected for the acquisition or construction of the assets; loss of significant customers or partners; or the current expectation that the assets will more likely than not be sold or disposed of significantly before the end of their estimated useful life. We tested goodwill for impairment in the first quarter of 2022. Based on our analysis, we determined that the fair value of goodwill at the reporting unit level exceeded the carrying value and that no impairment was necessary as of March 31, 2022. Nevertheless, we may experience additional events or changes in circumstances in the future that we determine to be indicators of impairment and that may in turn require us to undertake impairment analysis in future periods. For example, the market price of our common stock has declined significantly in recent periods and may continue to decline in the future. If declines in the market price of our common stock cause the total book value of our company, including goodwill, to exceed its fair value, or if other circumstances and judgments require us to recognize impairment, we may be required to record a significant charge to earnings in our financial statements during the period in which any impairment of our goodwill or other intangible or long-lived assets is determined, resulting in an adverse effect on our financial condition and results of operations.

We may not be successful in our efforts to use our proprietary platform to build a pipeline of products.

A key element of our strategy is to build a pipeline of products through our platform and develop those pipeline products into commercially viable products. Although our R&D efforts to date have resulted in potential pipeline products, we have not yet successfully commercialized a product. We may not be able to continue to identify and develop additional pipeline products through the use of our platform.

Even if we are successful in continuing to build our product pipeline through the use of our platform, not all potential pipeline products we identify will be suitable for development and use in commercial products. For example, as a result of our Portfolio Review, we discontinued our electronics film programs, other than Z1, which is partnered with Sumitomo Chemical, because emerging data on the market segment we were targeting with Hyaline and other electronics films indicated a smaller near-term opportunity than previously expected. We also discontinued our consumer care programs, including our insect repellent, Z2, because we determined through our Portfolio Review that the costs of customer acquisition with a direct-to-consumer model would have been prohibitive and, in the case of Z2, it could not be produced and distributed at a price point competitive with incumbent products.

In addition, machine learning and automation, generally, remain in the early stages of development. Although we expect machine learning and automation to improve over time, the operation of our platform will continue to require significant human interaction, which introduces risks of error and requires us to recruit and retain highly skilled employees, which is more challenging in a competitive market and particularly in light of our recent workforce reductions and higher levels of attrition. Identifying and developing commercially viable pipeline products may require us to make continued advancements in our platform to lower costs, reduce development time, better align our products with industry trends or customer demands or otherwise more quickly identify pipeline products. Our ability to advance our platform may be adversely impacted if our efforts to reduce our operating costs result in insufficient resources to support research and development in this area. See the risk factors titled "*—Even if we are successful in expanding our platform, rapidly changing technology and extensive competition in the synthetic biotech and petrochemical industries could make the products we are developing and producing obsolete or non-competitive unless we continue to develop and manufacture new and improved products and pursue new market opportunities*" and "*—Our efforts to reduce our operating costs may not be successful*." If we are unable to use our platform to successfully identify and develop pipeline products, our business, results of operations and financial condition may be adversely and materially affected.

Even if we are successful in expanding our platform, rapidly changing technology and extensive competition in the synthetic biotech and petrochemical industries could make the products we are developing and producing obsolete or non-competitive unless we continue to develop and manufacture new and improved products and pursue new market opportunities.

The synthetic biotech and, to a lesser extent, the petrochemical industries, are characterized by rapid and significant technological changes, frequent new product introductions and enhancements and evolving industry demands and standards. Our future success will depend on our ability to develop and launch new products that address the evolving needs of our customers on a timely and cost-effective basis, to continually improve the products we are developing and producing and to pursue new market opportunities that develop as a result of technological and scientific advances. Due to the significant lead time involved in launching a new product, we are required to make a number of assumptions and estimates regarding the commercial feasibility of a new product, including assumptions and estimates regarding the size of an emerging product category and demand for those products, our ability to penetrate that emerging product category, customer adoption of a downstream product, the existence or non-existence of products being simultaneously developed by competitors, potential market penetration and obsolescence. As a result, it is possible that we may introduce a new product that has been displaced by the time of launch, addresses a market that no longer exists or is smaller than previously thought, that end-consumers do not like or otherwise is not competitive at the time of launch, in each case after the incurrence of significant costs to develop such product. For example, as a result of our Portfolio Review, we discontinued our electronics film programs, other than Z1, which is partnered with Sumitomo Chemical, because emerging data on the market segment we were targeting with Hyaline and other electronics films indicated a smaller near-term opportunity than previously expected. We also discontinued our consumer care programs, including our insect repellent, Z2, because we determined through our Portfolio Review that the costs of customer acquisition with a direct-to-consumer model would have been prohibitive and, in the case of Z2, it could not be produced and distributed at a price point competitive with incumbent products. Any extended product qualification process and other delays in the timelines for launching our products may exacerbate these risks. The ultimate success of our products, even if successful in meeting the technical needs of our customers, may be dependent on the success of our customers within that market which, in each case, may not reach the size anticipated by us or may be replaced by another emerging product category.

There is extensive competition in the synthetic biotech and, to a lesser extent, the petrochemical industries, and our future success will depend on our ability to maintain a competitive position with respect to technological advances. Technological development by others may result in our technologies, as well as products developed using our technologies, becoming obsolete. Our ability to compete successfully will depend on our ability to develop proprietary technologies and products that are technologically superior to, otherwise differentiated from, and/or less expensive than our competitors' technologies and products. Our competitors may be able to develop competing and/or superior technologies and processes and compete more aggressively and sustain that competition over a longer period of time due to greater human and financial resources, longer operating histories, track records for product development and existing market share. If we are unable to successfully develop and manufacture new and improved products and successfully commercialize our products at scale, our business and results of operations will be adversely impacted.

The success of our advanced materials business relies heavily on the performance of our products and developing new products at lower costs and faster development timelines.

To date our revenue has primarily been derived from relationships with partners where we seek to test and validate the ability of our platform to improve or optimize our clients' products. However, the success of our advanced materials business will depend on our ability to successfully establish and maintain a sustainable business model and generate continuous streams of revenue through the sale of our products. Our current advanced materials business model is premised on innovating and producing new products rapidly and at lower costs than traditional methods and achieving results that may only be obtained through leveraging biology. While we may launch bio-based versions of existing products or existing molecules that are too expensive to utilize in products today, production of previously unavailable, superior molecules and materials is key to our plans for long-term success. If we are unable to successfully transition into becoming a producer of new products and create novel products at lower costs and on accelerated development timelines, our business and results of operations will be adversely affected.

We may launch products with a non-fermentation produced molecule and, if we are not successful in our efforts to convert to a fermentation-produced version of our product, our products may not be commercially successful.

During the design phase of our development cycle, we identify molecules from biology that we believe have the potential to add value to products and evaluate potential means of sourcing such molecules, including through fermentation. In some cases, we may initially launch products using molecules that we have identified during the design phase but which are first produced with traditional, non-fermentation based methods. We may use this approach for a variety of reasons, including, as was the case with Hyaline, when use of non-fermentation produced molecules allows for faster commercial launch, even if the cost of production or sourcing of these molecules is more expensive than can be achieved with fermentation-based production.

While the use of a non-fermentation produced molecule can accelerate product launch, it may result in consumer confusion or misperceptions about the characteristics or differentiation of our products. Launching fermentation-produced products or products with fermentation-produced components or ingredients is a key element of our strategy for lowering manufacturing costs and launching products desirable to our customers more quickly. If we do not successfully develop fermentation-produced versions of our products that lower the costs of manufacturing, we may not be able to achieve anticipated product margins in future periods and may lose our anticipated competitive advantage, each of which could have an adverse result on our business, results of operations and financial condition.

We do not have our own commercial scale manufacturing capability, and any disruptions or interruptions in our manufacturing capacity may prevent us from launching products or producing products at necessary volumes to meet commercial demand, which may result in loss of customers or lost revenue opportunities.

We do not have our own commercial scale manufacturing capability. If we are unable to establish or maintain adequate manufacturing capacity, we may not have sufficient supply of our products to satisfy demand from our customers, which may result in loss of customers and lost revenue opportunities. If our CMOs are unable to meet our future demand or do so at a reasonable cost or in a timely fashion, we may be required to identify a suitable replacement CMO, which is a burdensome and time-consuming process that could take significant time and requires us to become satisfied with their quality control, responsiveness and service, financial stability, security and labor and other ethical practices. Even if we are able to identify an alternative CMO, we may encounter delays in product development, production and added costs as a result of the time it takes to train a new CMO in our methods, products and quality control standards. Any future CMO agreements that we enter into could require us to agree to terms that may increase our costs and reduce our margins, or result in delays as we ramp up new manufacturing capabilities.

In addition, we outsource assembly of our automation hardware to CMOs, and the assembly process is characterized by long lead times between the placement of orders for and delivery of our hardware. We do not currently have long-term agreements with these CMOs but rather, secure our materials and services on a purchase order basis. As we seek to scale our automation business, we expect to significantly increase production of our automation hardware, which will increase our reliance on reliable, higher-volume manufacturing partners. If our CMO is unable to meet demand, if we do not accurately anticipate our needs, or if we are otherwise unable to assemble our automation hardware with the quality, at the quantities and on the timing we require, our ability to sell our automation solutions may be adversely affected.

Process development is a key component of product R&D to enable the manufacturing of products at scale. If we cannot attract, develop and retain product leaders and process engineers with the necessary expertise to drive process development of our manufacturing for our pipeline of products, we will be unable to achieve commercially viable volumes of our pipeline products to meet customer demand. Further, we will need the bio-manufacturing ecosystem to continue its emergence as we launch production at commercial scale, a process we have not yet undergone. If we encounter difficulties in accessing pilot plant facilities with the required downstream processing equipment to enable our process development, we may face delays in our time-to-market and increased R&D costs relative to our targets. If the bio-manufacturing ecosystem and overall capacity does not grow enough to provide the volumes we need to satisfy anticipated commercial needs, we may face delays in scaling our production of bioproducts which could cause delays, increase costs in scaling manufacture of our bioproducts, and negatively impact our financial position.

Any adverse developments affecting manufacturing of our pipeline products may result in shipment delays, inventory shortages, lot failures, product withdrawals or recalls or other interruptions in the supply of our pipeline products or enforcement actions by regulatory authorities. We may also have to take inventory write-offs and incur other charges and expenses for our pipeline products that fail to meet specifications or undertake costly remediation efforts. Accordingly, failures, difficulties or delays faced at any level of our manufacturing capabilities could adversely affect our business and delay or impede the development and commercialization of any of our pipeline products and could have an adverse effect on our business, financial condition, results of operations and prospects.

The manufacture of our products is complex, and we may be unable to secure necessary talent to establish and scale our manufacturing and supply chain to the extent necessary to make a profit or sustain and grow our current business.

The manufacture of our products is complex and to commercialize our products requires significant expertise in a variety of specialties and capital investment, including the development of advanced manufacturing techniques and process controls. We are targeting market opportunities in a wide variety of industries. Given the wide range of products we are developing and the even greater range of products we expect to develop in the future, manufacturing processes, including the necessary equipment for bio-manufacturing, for one product may not be translatable to other products and, therefore, we may need to identify and recruit additional internal talent to develop products and coordinate manufacturing techniques and process controls required for the variety of pipeline products in the various industries we are targeting. We may also require multiple facilities and partners in order to commercialize various products and to meet the volumes we need to satisfy our anticipated commercial needs. For example, our electronics films have been manufactured in different facilities than our agriculture pipeline products and require completely separate supply chains and manufacturing facilities. If we are unable to successfully establish adequate manufacturing capacity for all of our pipeline products, we may not have the capacity required to meet our commercial needs. See the risk factor titled "*—We do not have our own commercial scale manufacturing capability, and any disruptions or interruptions in our manufacturing capacity may prevent us from launching products or producing products at necessary volumes to meet commercial demand, which may result in loss of customers or lost revenue opportunities.*"

We must continue to secure and maintain sufficient and stable supplies of disposable lab equipment, raw materials and synthetic biology materials and services.

The COVID-19 pandemic has caused substantial disruption in global supply chains. The Ukraine War is further disrupting global supply chains. Additionally, widespread inflationary pressures exist across global economies, resulting in disruptions or higher costs for disposable lab equipment, raw materials and synthetic biology materials and services, and significant increases in the future could adversely affect our results of operations. We have experienced shortages in some of our key supplies, including materials required in our labs and may continue to do so in the future as a result of the pandemic, or otherwise. We have also experienced price increases due to unexpected material shortages, services disruptions and other unanticipated events. We typically do not enter into long-term agreements with our suppliers but secure our materials and services on a purchase order basis. Our suppliers may reduce or cease their supply of materials or services to us or increase prices at any time in the future. If the supply of materials or services is interrupted, our production processes may be delayed. Further, if we are unable to procure sufficient supplies of disposable lab equipment, raw materials and synthetic biology materials and services at acceptable costs for the development or production of our products or the sale of our automation solutions, our business, financial condition and results of operations could be negatively impacted.

A deterioration of our relationship with any of our suppliers, or problems experienced by these suppliers, could lead to shortages in our production capacity for the development or production of some or all of our products. Therefore, we may not be able to cost-effectively develop new products or fulfill the demand of existing customers or supply new customers. In addition, as we grow, our existing suppliers may not be able to meet our increasing demand, and we may need to find additional suppliers. In some cases, we purchase non-commodity or specially prepared consumables, materials or services, and obtaining such consumables, materials and services requires lead time. We may not be able to secure suppliers who provide materials at, or services to, the specification, quantity and quality levels that we demand (or at all) or be able to negotiate acceptable fees and terms of services with any such suppliers. Identifying a suitable supplier is an involved process that requires us to become satisfied with their quality control, responsiveness and service, financial stability, security and labor and other ethical practices. Even if we are able to expand existing sources, we may encounter delays in product development and production and added costs as a result of the time it takes to train new suppliers in our methods, products and quality control standards. If any of the above events occur, our operations and results of operations may be adversely affected.

We cannot assure you that any instability or other issues relating to the manufacture of any of our products will not occur in the future. Additionally, our manufacturers may experience manufacturing difficulties due to resource constraints or as a result of labor disputes or unstable global economic or political environments, including disruption in global supply chains as a result of the COVID-19 pandemic, the Ukraine War, or otherwise. Any future impact of such global economic and political events on our ability to procure sufficient supplies at acceptable costs for the development or production of our products or the sale of our automation solutions may negatively impact our business, financial condition and results of operations.

For the quarter ended March 31, 2022, our cost of disposable lab equipment, raw materials and synthetic biology materials and services accounted for a significant portion of our total cost of revenue. In the event of significant price increases by suppliers, including as result of inflation, we may have to pass the increased costs to our customers. However, we may not be able to raise the prices of our products sufficiently to cover increased costs resulting from increases in the cost of our materials and services, overcome the interruption of a sufficient supply of materials or services for our pipeline products or products, or adequately reduce supplier costs. As a result, materials and services costs, including any price increase for our materials and services may negatively impact our business, financial condition and results of operations.

We depend on a limited number of suppliers for critical components of development and manufacturing of our products. The loss of any one or more of these suppliers, or their failure to supply us with the necessary components on a timely basis, could cause delays in our production capacity and adversely affect our business.

We depend on a limited number of suppliers for critical components, including lab consumables, for the development and manufacturing of our products. The COVID-19 pandemic has caused substantial disruption in global supply chains, and the Ukraine War is further disrupting global supply chains. Additionally, widespread inflationary pressures exist across global economies, resulting in higher costs for disposable lab equipment, raw materials and synthetic biology materials and services used in our operations. We have experienced shortages in some of our key supplies, including lab consumables. We do not currently have the infrastructure or capability internally to manufacture these components. Although we have a reserve of supplies and although alternative suppliers exist for some of these critical components, our existing manufacturing process has been designed based on the functions, limitations, features and specifications of the components that we currently utilize. While we work with a variety of domestic and international suppliers, our suppliers may not be obligated to supply product or our arrangements may be terminated with relative short notice periods. Our supply of these components could be limited, interrupted, or of unsatisfactory quality or cease to be available at acceptable prices. Additionally, we do not have any control over the process or timing of the acquisition or manufacture of materials by our manufacturers and cannot ensure that they will deliver to us the components we order on time, or at all.

The loss of these components provided by these suppliers could require us to change the design of our development and manufacturing processes based on the functions, limitations, features and specifications of the replacement components or seek out a new supplier to provide these components.

However, the lead time needed to establish a relationship with a new supplier can be lengthy, and we may experience delays in meeting demand in the event we must switch to a new supplier. The time and effort to qualify a new supplier could result in additional costs, diversion of resources or reduced manufacturing yields, any of which would negatively impact our operating results. Further, we may be unable to obtain critical components on commercially reasonable terms, which could have a material adverse impact on our business, financial condition and results of operations.

In addition, some disposable lab equipment, synthetic biology materials and other supplies and materials that we purchase are purchased from single-source or preferred suppliers, which limits our negotiating leverage and our ability to rely on additional or alternative suppliers for these products. Our dependence on these single-source and preferred suppliers exposes us to certain risks, including the following:

- our suppliers may cease or reduce production or deliveries, raise prices or renegotiate terms;
- we may be unable to locate a suitable replacement on acceptable terms or on a timely basis, if at all;
- if there is a disruption to our single-source or preferred suppliers' operations, and if we are unable to enter into arrangements with alternative suppliers, we will have no other means of completing our manufacturing process until they restore the affected facilities or we or they procure alternative manufacturing facilities or sources of supply;
- delays caused by supply issues may harm our reputation, frustrate our customers and cause them to turn to our competitors for future projects; and
- our ability to progress the development and production of our pipeline products could be materially and adversely impacted if the single-source or preferred suppliers upon which we rely were to experience a significant business challenge, disruption or failure due to issues such as financial difficulties or bankruptcy, issues relating to other customers such as regulatory or quality compliance issues, or other financial, legal, regulatory or reputational issues.

Moreover, to meet anticipated market demand, our single-source and preferred suppliers may need to increase manufacturing capacity, which could involve significant challenges. This may require us and our suppliers to invest substantial additional funds and hire and retain the technical personnel who have the necessary experience. Neither we nor our suppliers may successfully complete any required increase to existing manufacturing capacity in a timely manner, or at all.

We face increased supply chain risks with respect to our automation business.

As we seek to scale our automation business, produce our automation hardware in greater quantities and sell our solutions to customers, we will face increased supply chain risks with respect to the components of our automation hardware, including our RACs. Our automation business involves the production of hardware that is complex and requires a large number of components, many of which are currently available only from a limited number of suppliers, and in some cases, single sources. We have chosen to source certain critical components from a single source, including with respect to certain hardware components of our RACs. In addition, certain suppliers of our components are competitors or potential competitors, and we may be unable to negotiate supply agreements with such competitors on terms that are favorable to us, or at all. Our limited, and in many cases single-source, supply chain exposes us to multiple potential sources of delivery failure or component shortages. Our third-party suppliers may not be able to meet our required product specifications and performance characteristics, which would impact our ability to achieve our product specifications and performance characteristics as well. Additionally, our third-party suppliers may be unable to obtain required certifications or provide necessary warranties for their products that are necessary for use in our RACs.

We have also been affected by ongoing, industry-wide challenges in logistics and supply chains, such as increased port congestion, intermittent supplier delays, and a shortfall of semiconductor supply. For example, we previously experienced significant delays in the supply of programmable logic controllers used in our RACs, and we have experienced, and may in the future experience, lengthy lead times on other components, which could impair our ability to produce our RACs on a timely basis and could result in increased costs. Likewise, any significant increases in our production may in the future require us to procure additional components in a short amount of time. Our suppliers may not ultimately be able to continually and timely meet our cost, quality and volume needs, requiring us to replace them with other sources. In many cases, our suppliers provide us with parts that would require significant lead time to obtain from alternative suppliers, or may not be available from alternative suppliers at all. If we are unable to obtain suitable components and materials used in our products from our suppliers or if our suppliers decide to create or supply a competing product, our business could be adversely affected. Further, if we are unsuccessful in our efforts to control and reduce supplier costs, our results of operations will suffer.

In addition, we do not currently have long-term agreements with our suppliers but rather, secure our materials and services on a purchase order basis. We may experience delays if our suppliers do not meet agreed upon timelines, experience capacity constraints, or deliver components that do not meet our quality standards. Any disruption in the supply of components, whether or not from a single-source supplier, could temporarily disrupt production of our RACs until an alternative supplier is able to supply the required material. Any such delay, even if caused by a delay or shortage in only one part, could significantly affect our ability to produce our RACs and sell our automation solutions. Even in cases where we may be able to establish alternate supply relationships and obtain or engineer replacement components for our single-source components, we may be unable to do so quickly, or at all, at prices or quality levels that are acceptable to us. This risk is heightened by the fact that we have less negotiating leverage with suppliers than larger and more established companies, which could adversely affect our ability to obtain necessary components and materials on a timely basis, on favorable pricing and other terms, or at all. Any such supply disruption could materially and adversely affect our results of operations, financial condition and prospects.

Furthermore, as the scale of our RAC production increases, we will need to accurately forecast, purchase, warehouse and transport components to our CMOs at much higher volumes. If we are unable to accurately match the timing and quantities of component purchases to our actual needs, successfully recruit and retain personnel with relevant experience, or successfully implement automation, inventory management and other systems or processes to accommodate the increased complexity in our supply chain and manufacturing operations, we may incur unexpected production disruption, storage, transportation and write-off costs, which could have a material and adverse effect on our ability to sell our automation solutions, results of operations and financial condition.

Changes to our business focus and organization may place significant demands on our management and our infrastructure.

As a result of our Portfolio Review, we determined to focus on a smaller number of programs. Our management team has also been focused on our plan to reduce our operating costs, the development of our new strategic plan and the development and implementation of our new product development process. These changes and our diversified operations have placed, and may continue to place, significant demands on our management and our operational and financial infrastructure. For example, our Portfolio Review and cost reduction activities, among other activities, have placed and will continue to place significant demands on our management team. Managing these changes has required, and will continue to require, significant expenditures and allocation of valuable management resources. If we fail to achieve the necessary level of efficiency in our organization as it changes, our business, financial condition and results of operations would be adversely impacted.

We are subject to risks related to our reliance on collaboration arrangements to fund development and commercialization of certain of our products or drug candidate leads, and our financial results may be adversely impacted if such collaborations do not lead to the commercialization of products.

Substantially all of our revenue to date has been generated from R&D service contracts and collaboration arrangements. For example, we have entered into a collaboration agreement with Sumitomo Chemical which led to the development of Z1. Over the next several years, our goal for our advanced materials business is to commercialize our products, and we expect revenue from R&D and collaboration arrangements to represent a smaller component of our total revenue. However, in the near term, we expect to continue generating revenue from R&D service agreements and collaborations and expect to pursue additional arrangements with new or existing partners as we seek to enter new industry verticals. Further, for our recently launched drug discovery business, we expect revenue from collaborations to represent the majority of our revenue from such business for the foreseeable future. Collaborations with strategic partners are necessary to successfully commercialize our existing and future products. The terms of our collaboration agreements typically include one or more of the following: joint ownership of the new intellectual property, assignment of the new intellectual property to either us or the collaborator, either exclusive or non-exclusive licenses to the new intellectual property to us or the collaborator and other restrictions on our sole use of developments, such as non-competes and rights of first refusal. Our collaboration agreements also typically include one or more of the following: payments for the R&D services to be performed, milestone payments to be received upon the achievement of the milestone events defined in the agreements, revenue-sharing and royalty payments upon the commercialization of the molecules or microbes in which we share in the customer's profits.

These exclusivity, revenue-sharing and other similar terms limit our ability to commercialize our products and technology and may impact the size of our business or our profitability in ways that we do not currently envision. The competition for collaborators is intense. Whether or not we pursue a collaboration will depend on a number of factors, including our assessment of the collaborator's resources and expertise, the terms and conditions of the proposed collaboration and their interest in our product or services. The collaborator must also, in turn, evaluate a number of factors, such as our technical and commercial capabilities as a partner, the potential market for the subject product, the costs and complexities of manufacturing and delivering the product to the market, and the potential for competing products. The collaborator may also consider alternative product or technologies for similar indications or applications that may be available to develop internally or to collaborate on with another partner and whether such alternative approaches could be more attractive than the proposed collaboration with us for our product.

Even if a suitable collaboration partner is identified, the negotiation process is time-consuming and complex. Any new collaboration may be on terms that are not optimal for us, and we may not be able to maintain any new collaboration. Any such collaboration may require us to incur non-recurring or other charges, increase our near- and long-term expenditures and pose significant integration or implementation challenges or disrupt our management or business. These transactions would entail numerous operational and financial risks, including exposure to unknown liabilities, disruption of our business and diversion of our management's time and attention to manage a collaboration, incurrence of substantial debt or dilutive issuances of equity securities to pay transaction consideration or costs, higher than expected collaboration, acquisition or integration costs, write-downs of assets or goodwill or impairment charges, increased amortization expenses, difficulty and cost in facilitating the collaboration or combining the operations and personnel of any acquired business, impairment of relationships with key suppliers, manufacturers or customers of any acquired business due to changes in management and ownership and the inability to retain key employees of any acquired business.

Many factors may impact the success of such collaborations, including our ability to perform our obligations, our collaborators' satisfaction with our products and services, our collaborators' participation and interest in supporting commercialization of products, and exposure to the risks of our collaborators. Like us, many of our collaborators are exposed to a number of risks, any of which could impact their ability to fulfill their obligations under our collaboration agreements, which in turn would adversely impact our ability to derive the anticipated benefits from these collaboration agreements. In addition, most of these agreements do not affirmatively obligate the other party to commercialize a product we have developed for them or to purchase specific quantities of any products. Some agreements do not require funding all R&D costs necessary to bring products to market. We may encounter numerous uncertainties and difficulties in developing, manufacturing and commercializing any new products subject to these collaboration arrangements that may delay or prevent us from realizing their expected benefits or enhancing our business, including uncertainties on the feasibility of taking new molecules to commercial-scale. Further, we have in the past and may in the future have disputes with our collaborators, which may harm these relationships or require us to settle the disputes on unfavorable terms. It is possible that these agreements could result in restrictions on our ability to use molecules which have been discovered through the collaborations, which could restrict our ability to commercialize certain products in the future. For example, Z1, our optical film product, was developed through our collaboration with Sumitomo Chemical. In that agreement, we agreed to exclusive cooperation activities with Sumitomo Chemical within the defined field, as well as a right of first offer for Sumitomo Chemical to use Sumitomo Chemical technology or items developed for Sumitomo Chemical outside of the defined field. However, Sumitomo Chemical is not obligated to commercialize or support commercialization of any products developed through our collaboration. Sumitomo Chemical's continued interest and support in developing products, scaling up manufacturing for existing and new pipeline products, evaluating the market opportunity, providing potential sales channels or access to customers, and conducting sales and marketing activities will have an effect on the commercialization of Z1 and our ability to access this market.

Any failure or difficulties in maintaining existing collaboration arrangements, establishing new collaboration arrangements, or building up or retooling our operations to meet the demands of our collaboration partners could have a significant negative impact on our business, including our ability to commercialize or achieve commercial viability for our products, lead to the inability to meet our contractual obligations, and could cause us to allocate or divert capital, personnel and other resources from our organization which could adversely affect our business, financial condition, results of operations, prospects and reputation.

We expect to face competition for our products from established enterprises and new companies, and if we cannot compete effectively against these companies, products or prices, we may not be successful in bringing our products to market.

We are focused on developing products that we expect will compete with both the traditional products that are currently being used in our target markets and with the alternatives to these existing products that established enterprises and new companies are seeking to produce. In the markets that we seek to enter, and in other markets that we may seek to enter in the future, we will compete primarily with the established providers of components used in products or finished products in these markets. Producers of these incumbent products include global agricultural companies, large international chemical and materials companies, pharmaceutical companies and companies specializing in specific products.

Some of the competitors in our target markets are large publicly-traded companies, or are divisions of or established contractors to large publicly-traded companies, and may enjoy a number of competitive advantages over us, including:

- greater name and brand recognition;
- greater financial and human resources;
- larger R&D departments;
- broader product lines;
- larger sales forces and more established distributor networks;
- substantial intellectual property portfolios;
- larger and more established customer bases and relationships;
- the leverage to enter into contracts on more favorable terms; and
- better established, larger scale and lower cost manufacturing capabilities.

With the emergence of many new companies seeking to produce products from renewable sources, we may face competition from such companies in bringing new products to market. Some of these companies may develop products that are disruptive to ours or may be able to establish production capacity and commercial partnerships to compete with us.

Some of our competitors may also receive government support that is not available to us. For example, there are risks that foreign governments may, among other things, provide government funding or support to domestic companies to produce new technology, require the use of local suppliers in place of non-domestic suppliers like us, compel companies to partner with local companies to conduct business or provide incentives to government-backed local customers to buy from local suppliers, thereby creating a significant competitive advantage for domestic companies and creating obstacles for us. Any such actions or similar actions taken by foreign governments could significantly harm our competitive position and adversely affect our business and results of operations.

If and when commercialized, our products may not compete favorably or be successful in the face of increasing competition from products and technologies introduced by our existing or future competitors or developed by our customers internally. In addition, our competitors may have or develop products or technologies that currently or in the future will enable them to produce competitive products with greater capabilities or at lower costs than ours or run comparable experiments at a lower total experiment cost. Any failure to compete effectively could materially and adversely affect our business, financial condition and results of operations.

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 operate portions of our business through various international subsidiaries. Further, because we and our collaborators currently conduct business outside of the United States and may market future products outside of the United States, our business is subject to risks associated with doing business outside of the United States, including an increase in our expenses and diversion of our management's attention from the development of future products. Accordingly, we are subject to a variety of risks inherent in doing business internationally, and our exposure to these risks will increase as we expand our operations, customer base and advertiser base globally. These risks include:

- political, social and economic instability, including wars, terrorism and political unrest, such as instability in Europe stemming from the Ukraine War;
- fluctuations in currency exchange rates;
- higher levels of credit risk, corruption and payment fraud;
- enhanced difficulties of integrating any foreign acquisitions;
- regulations that might add difficulties in repatriating cash earned outside the United States and otherwise prevent us from freely moving cash;
- import and export controls and restrictions and changes in trade regulations;
- compliance with the U.S. Foreign Corrupt Practices Act, the U.K. Bribery Act and similar laws in other jurisdictions;
- multiple, conflicting and changing laws and regulations such as privacy, security and data use regulations, tax laws, trade regulations, economic sanctions and embargoes, employment laws, anticorruption laws, regulatory requirements, reimbursement or payor regimes and other governmental approvals, permits and licenses;
- failure by us, our collaborators or our distributors to obtain regulatory clearance, authorization or approval for the use of our products in various countries;
- additional potentially relevant third-party patent rights;
- complexities and difficulties in obtaining intellectual property protection and enforcing our intellectual property rights;
- difficulties in staffing and managing foreign operations;
- logistics and regulations associated with shipping samples and customer orders, including infrastructure conditions and transportation delays;
- financial risks, such as inflation, 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;
- natural disasters and outbreak of disease, such as the ongoing COVID-19 pandemic;
- breakdowns in infrastructure, utilities and other services;
- boycotts, curtailment of trade and other business restrictions (including government-mandated and voluntary restrictions in response to the Ukraine War); and
- the other risks and uncertainties described in this report.

Any of these factors could significantly harm our future international expansion and operations and, consequently, our revenue and results of operations.

Changes in government regulations and trade policies may materially and adversely affect our sales and results of operations.

The markets where we expect to sell our products are heavily influenced by foreign, federal, state and local government regulations and policies. The U.S. or foreign governments may take administrative, legislative, or regulatory action that could materially interfere with our ability to sell products in certain countries and/or to certain customers, particularly in China. The uncertainty regarding future standards and policies may also affect our ability to develop our products or to license our technologies to third parties and to sell products to our end customers, which could have a material adverse effect on our business, financial condition and results of operations.

An escalation of recent trade tensions between the U.S. and China has resulted in trade restrictions that could harm our ability to participate in Chinese markets and numerous additional such restrictions have been threatened by both countries. The U.S. government, for example, has recently implemented stringent export license requirements on U.S.-origin and certain foreign-origin items going to or being used by certain Chinese technology companies. The United States and China have imposed a number of tariffs and other restrictions on items imported or exported between the United States and China. We cannot predict what actions may ultimately be taken with respect to tariffs or trade relations between the United States and China or other countries, what products may be subject to such actions, or what actions may be taken by the other countries in retaliation. The institution of trade tariffs both globally and between the United States and China specifically carries the risk of negatively impacting China's overall economic condition, which could have negative repercussions for our business. Our products are and may continue to be subject to export license requirements or restrictions, particularly in respect of China.

In addition, changes in U.S. trade policy more generally, or economic sanctions imposed against foreign governments and entities, such as the sanctions imposed against Russia in response to the Ukraine War, could trigger retaliatory actions by affected countries or increase the costs of materials, which could impose restrictions on our ability to do business in or with affected countries or prohibit, reduce or discourage purchases of our products by foreign customers, leading to increased costs of components contained in our products, increased costs of manufacturing our products and higher prices for our products in foreign markets. Changes in, and responses to, U.S. trade policy could reduce the competitiveness of our products, cause our sales to decline and adversely impact our ability to compete, which could materially and adversely impact our business, financial condition and results of operations.

In addition, the Chinese economic, legal and political landscape differs from other countries in many respects, including the level of government involvement and regulation, control of foreign exchange and allocation of resources and uncertainty regarding the enforceability and scope of protection for intellectual property rights. The laws, regulations and legal requirements in China are also subject to frequent changes. For example, the Chinese government has intensified enforcement of China's antitrust, data privacy and cybersecurity laws. These laws apply to impose onerous obligations on entities involved in the use, processing, storage and export of personal data. The exact obligations under and enforcement of laws and regulations in China are often subject to unpublished internal government interpretations and policies which makes it challenging to ascertain compliance with such laws.

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

We work with chemical and biological materials that could be hazardous to human health and safety or the environment. Our operations also produce hazardous and nonhazardous chemical and biological waste products, and we largely contract with third parties for the disposal of these products. Federal, state and local laws and regulations govern the use, generation, manufacture, storage, handling and disposal of these materials and wastes. 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, R&D programs and business operations, as well as environmental damage resulting in costly clean-up and liabilities under applicable laws and regulations, as well as potential reputational damage. In May 2021, a localized fire occurred at our chemistry lab in Emeryville, California. Although the physical damage to the facility was minimal and no serious injuries occurred in connection with this fire, a risk of a similar fire in the future is possible. 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. While we do carry a pollution legal liability policy, this policy may not fully cover costs arising from contamination from hazardous and biological products and the resulting cleanup, or claims arising from the handling, storage or disposal of hazardous materials. Accordingly, in the event of fire, injury, or contamination, 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.

Unfavorable global economic or political conditions could adversely affect our business, financial condition or results of operations.

Our business is susceptible to general conditions in the global economy and in the global financial markets. The global macroeconomic environment could be negatively affected by, among other things, instability in global economic markets, increased U.S. trade tariffs and trade disputes with other countries, inflation, instability in the global credit markets, supply chain weaknesses, the Ukraine War and other political tensions, and foreign governmental debt concerns. A global financial crisis or a global or regional political disruption, such as the Ukraine War, could cause extreme volatility in the capital and credit markets. A severe or prolonged economic downturn, including a recession or depression resulting from the current COVID-19 pandemic, inflation and other cost increases, including as a result of any tariffs or trade disputes, or political disruption could result in a variety of risks to our business, including weakened demand for our products and our ability to raise additional capital, when needed, on acceptable terms, or at all. A weak or declining economy, inflation and other cost increases, or political disruption could also strain our manufacturers or suppliers, possibly resulting in supply disruption or increased materials costs, or cause our future customers to delay making decisions to invest in our products or solutions or delaying payments for our potential products. Any of the foregoing could materially and adversely affect our business, financial condition, results of operations and prospects, and we cannot anticipate all of the ways in which the political or economic climate and financial market conditions could adversely impact our business.

The COVID-19 pandemic has had, and is expected to continue to have, an impact on our business, results of operations and financial condition.

The full impact of the continuing COVID-19 pandemic and related public health measures on our business will depend largely on future developments, including the duration and severity of the pandemic, which remains highly uncertain. On March 11, 2020, the World Health Organization declared the outbreak of COVID-19 caused by a novel strain of coronavirus as a pandemic, which continues to spread throughout the United States and around the world. Since then, extraordinary actions have been taken by international, federal, state and local public health and governmental authorities to contain and combat the outbreak and spread of COVID-19 throughout the world. These actions include travel bans, quarantines, “stay-at-home” orders and similar mandates for many individuals to substantially restrict daily activities and for many businesses to curtail or cease normal operations. Although these health and safety precautions were loosened in many jurisdictions in 2021 and continuing into 2022, beginning in early July 2021 new variants of COVID-19, including the Delta and Omicron variants, emerged and have caused surges in COVID-19 cases globally. The further impact of the Delta and Omicron variants, or any other variants that may emerge, cannot be predicted at this time, and could depend on numerous factors, including vaccination rates among the population, the effectiveness of COVID-19 vaccines against the applicable variant and the response by governmental bodies and regulators, including whether those precautions previously loosened are reinstated.

The COVID-19 pandemic has had, and is expected to continue to have, an adverse impact on our operations, particularly as a result of preventive and precautionary measures that we, other businesses, and governments are taking, including in response to the outbreak of variants. For example, as part of these efforts and in accordance with applicable government directives, we initially reduced and then temporarily suspended on-site operations at our facilities in Emeryville and Boston in late March 2020. In addition, we began restricting non-essential travel and temporarily reduced salaries of our executives. As a result of the travel restrictions, we limited in-person sales and marketing activities and in-person visits to our partners, customers and manufacturers. We have continued to operate within the rules applicable to our business; however, a continuing implementation of these governmental mandates could further impact our ability to operate effectively and conduct ongoing R&D or other activities.

Governmental mandates related to COVID-19, as well as other infectious diseases or public health crises, have impacted, and we expect them to continue to impact, our personnel and personnel at third-party manufacturing facilities in the United States and other countries. The pandemic has caused substantial disruption in global supply chains. We have experienced shortages in some of our key supplies, including materials required in our labs. For example, we experienced delays at a key supplier of a raw material for our electronics films prior to our decision to discontinue those programs. In addition, the inability to travel delayed the establishment of our Hyaline manufacturing capacity and delayed the process of selecting and vetting CMOs for our insect repellent, Z2, prior to our decision to discontinue those programs. As a result of the restrictions, we also experienced a partial suspension in servicing our R&D services contracts and the development of our own products. This occurred for the duration of the suspension of our on-site operations and for a period afterward as we ramped the operation back up and adopted the new work practices. This resulted in an approximate reduction in R&D services revenue of $0.7 million from existing contracts, not recognized before the year ended December 31, 2020.

In addition, limitations on our ability to travel and restrictions on our ability to conduct site visits or conduct in-person meetings with our customers due to the COVID-19 pandemic may have contributed to issues we identified in the product qualification process for Hyaline. Although such challenges did not contribute to our recent determination to discontinue most of our electronics film programs, difficulties and delays such as those we have experienced and may experience in the future have prevented and may in the future prevent us from meeting our operating and financial goals, both in general and within our targeted timelines, and may cause our revenues and operating results to fluctuate from period to period.

The COVID-19 pandemic also had an adverse effect on our ability to attract, recruit, interview and hire for key roles necessary to support our operations. To the extent that any governmental authority imposes additional regulatory requirements or changes existing laws, regulations and policies that apply to our business and operations, such as additional workplace safety measures, our product development plans may be delayed, and we may incur further costs in bringing our business and operations into compliance with changing or new laws, regulations and policies.

Further, the effect of the COVID-19 pandemic and mitigation efforts on our customers and on consumer demand for our customers' products could materially and adversely affect us, particularly to the extent our customers experience declines in demand for their goods that contain our products.

The COVID-19 pandemic has negatively impacted the global economy, disrupted global supply chains and created significant volatility and disruption of financial markets. The ultimate impact of the COVID-19 pandemic is highly uncertain and subject to sudden change, including as a result of the spread of the Delta, Omicron and other variants. We are following, and plan to continue to follow, recommendations from federal, state and local governments regarding workplace policies, practices and procedures. We are continuing to monitor the potential impact of the pandemic, including on global supply chains for some of our lab materials and manufacturing capacity, but we cannot be certain what the overall impact will be on our business, financial condition, results of operations and prospects on a go-forward basis.

Our revenue, results of operations, cash flows and reputation in the marketplace may suffer upon the loss of a significant customer.

Substantially all of our revenue to date has been generated from R&D service contracts and collaboration arrangements. We have derived, and may continue to derive, a significant portion of our revenue from a limited number of large customers. In 2021, we had three customers that each represented 10% or greater of our total revenue, including two customers that each represented over 20% of our total revenue. In 2020, we had four customers that each represented 10% or greater of our total revenue, including one customer that represented 35% of our total revenue. In 2019, we had three customers that each represented 10% or greater of our total revenue. Due to the significant time required to develop and commercialize new pipeline products, or to acquire new customers, the loss of any one or more of these customers, or the loss of any other significant customer or a significant reduction in the amount of product ordered by a significant customer would adversely affect our revenue, results of operations, cash flows and reputation in the marketplace.

In addition, we generally do not have long-term contracts with our customers requiring them to purchase any specified quantities from us, and without such contracts our customers are not obligated to order or reorder our products. As a result, we cannot accurately predict our customers' decisions to reduce or cease purchasing our products. Even where we enter into contracts with our customers, there is no guarantee that such agreements will be negotiated on terms that are commercially favorable to us in the long-term. Our customers may buy less of our products depending on their own technological developments, end-user demand for our products and internal budget cycles. In addition, existing customers may choose to produce some or all of the products they purchase from us internally by using or developing manufacturing capabilities organically or by using capabilities from acquisitions of assets or entities from third parties with such capabilities. Therefore, if our customers were to substantially reduce their transaction volume or cease ordering products from us, this could materially and adversely affect our financial performance.

Our pipeline products may cause undesirable side effects or environmental effects which may delay or prevent marketing approval, or, if approval is received, require them to be taken off the market, require them to include safety warnings or otherwise limit their sales.

Undesirable side effects from our pipeline products or from drugs produced using our drug discovery platform could arise either during development or after product has been marketed. Similarly, undesired environmental effects from agricultural or other pipeline products could arise after a pipeline product is commercialized. The results of future safety or environmental studies may show that our pipeline products cause undesirable side effects or environmental harm, which could interrupt, delay or halt the development and commercialization of our products, resulting in delay of, or failure to obtain, marketing approval from applicable regulatory authorities.

If any of our pipeline products or drugs produced using our drug discovery platform cause undesirable side effects or environmental effects or suffer from quality control issues:

- regulatory authorities may impose a hold or risk evaluation and mitigation strategies which could result in substantial delays, significantly increase the cost of development and/or adversely impact our ability to continue development of the product;
- regulatory authorities may require the addition of statements, specific warnings, or contraindications to the product label;
- we may be required to conduct additional safety, or environmental studies;
- we may be required to implement a risk minimization action plan, which could result in substantial cost increases and have a negative impact on our ability to commercialize the product;
- we may be subject to limitations on how we promote the product;
- we may, voluntarily or involuntarily, initiate product recalls;
- sales of the product and interest in collaborations may decrease significantly;
- regulatory authorities may require us to take our product off the market;
- we may be subject to litigation or product liability claims; and
- our reputation may suffer.

Any of these events could prevent us from achieving or maintaining market acceptance of the affected pipeline products, cause injury to our reputation, or substantially increase commercialization costs and expenses, which in turn could delay or prevent us from generating significant revenue from the sale of our products.

Our products, or the end products of which they are components, could have defects or errors, which may give rise to claims against us or delays in production and adversely affect our business, financial condition and results of operations.

Some applications of our technology or pipeline products are components of end products and therefore our success is tied to the success of such end products. Material performance problems, defects, errors or delays could arise in our products or the end products in which they are components, and as we commercialize our products, these risks may increase. We expect to provide warranties that our products will meet performance expectations and will be free from defects. The costs incurred in correcting any defects or errors may be substantial and could adversely affect our operating margins.

In manufacturing our products, we depend upon third parties for the supply of our instruments and various components, many of which require a significant degree of technical expertise to produce. If our suppliers fail to produce our product components to specification or provide defective products to us and our quality control tests and procedures fail to detect such errors or defects, or if we or our suppliers use defective materials or workmanship in the manufacturing process, the reliability and performance of our products will be compromised.

If our products or the end products of which they are components contain defects or are delayed, we may experience:

- a failure to achieve market acceptance for our products or expansion of our products sales;
- the development of new technology rendering our products, or the end products of which they are components, obsolete;
- loss of customer orders and delay in order fulfillment;
- damage to our brand or reputation;
- increased warranty and customer service and support costs due to product repair or replacement;
- product recalls or replacements;
- inability to attract new customers and collaboration opportunities;
- diversion of resources from our manufacturing and R&D departments into our service department; and
- legal and regulatory claims against us, including product liability claims, which could be costly, time consuming to defend, result in substantial damages and result in reputational damage.

We may become subject to lawsuits or indemnity claims in the ordinary course of business, which could materially and adversely affect our business and results of operations.

From time to time, we may in the ordinary course of business be named as a defendant in lawsuits, indemnity claims and other legal proceedings. These actions may seek, among other things, compensation for alleged product liability, personal injury, employment discrimination, breach of contract, property damage and other losses or injunctive or declaratory relief. See the risk factors titled "*—Theft, loss, or misuse of personal data about our employees, customers, or other third parties could increase our expenses, damage our reputation, or result in legal or regulatory proceedings*," and "*—Our use of open source software could adversely affect our platform or our automation business and subject us to possible litigation"* for a discussion of intellectual property infringement lawsuits.

The marketing, sale and use of our products and services could lead to the filing of product liability claims were someone to allege that our products or services failed to perform as designed or intended or caused injury or other harms. A product liability claim could result in substantial damages and be costly and time-consuming for us to defend.

Regardless of merit or eventual outcome, product liability claims may result in:

- decreased demand for any products that we have developed or may develop;
- loss of revenue;
- substantial monetary payments;
- significant time and costs to defend related litigation;
- the inability to commercialize any products that we have developed or may develop; and
- injury to our reputation and significant negative media attention.

In the event that such actions, claims or proceedings are ultimately resolved unfavorably to us at amounts exceeding our accrued liability, or at material amounts, the outcome could materially and adversely affect our business and results of operations. In addition, payments of significant amounts, even if reserved, could adversely affect our liquidity position. We maintain product liability insurance, but this insurance may not fully protect us from the financial impact of defending against product liability claims. Any product liability claim brought against us, with or without merit, could increase our insurance rates or prevent us from securing insurance coverage in the future. Additionally, any product liability lawsuit could cause current collaborators to terminate existing agreements or potential collaborators to seek other companies, any of which could impact our business and results of operations.

We are involved in securities litigation and other related matters that are expensive and time-consuming. Such litigation and other related matters could harm our business.

We are involved in securities litigation and we may continue to be a target for securities and shareholder lawsuits in the future. For example, on August 4, 2021, a putative securities class action was filed on behalf of purchasers of our common stock pursuant to or traceable to the registration statement for our IPO. On November 9, 2021, certain of our officers and directors were named in a shareholder derivative lawsuit purportedly brought on behalf of the Company, which is named as a nominal defendant. These and future litigation, including any related shareholder litigation or governmental or regulatory investigation, could have a material adverse effect on our business, results of operations, financial condition, reputation and cash flows, as well as on the market price of our common stock. Although the results of lawsuits and claims cannot be predicted with certainty, defending these claims is costly and can impose a significant burden on management and employees. Any litigation to which we are a party may result in an onerous or unfavorable judgment that may not be reversed on appeal, or we may decide to settle lawsuits on similarly unfavorable terms. Any such negative outcome could result in payments of substantial monetary damages or fines, or changes to our business practices, and accordingly our business could be seriously harmed.

We may face risks relating to the use of our genetically modified organisms and microorganisms and if we are not able to secure regulatory approval or if we face material ethical, legal and social concerns about use of our GMO or GMM technology, our business could be adversely affected.

Our technologies and products involve the use of genetically modified organisms (“GMOs”) and genetically modified microorganisms (“GMMs”). The use of GMOs and GMMs is subject to laws and regulations in many countries, some of which are new and some of which are still evolving. In the United States, the FDA, the Environmental Protection Agency (“EPA”) and the U.S. Department of Agriculture (“USDA”) are the primary agencies that regulate the use of GMOs, GMMs, as well as potential products or substances derived from GMOs or GMMs. If regulatory approval of the GMOs, GMMs, or resulting products or substances is not secured, our business operations, financial condition and our ability to grow as a business could be adversely affected. We expect to encounter GMO and GMM regulations in most if not all of the countries in which we may seek to establish production capabilities or sell our products and the scope and nature of these regulations will likely be different from country to country. Governmental authorities could, for safety, social or other purposes, impose limits on, or implement regulation of, the use of GMOs or GMMs. If we cannot meet the applicable requirements in other countries in which we intend to produce or sell our products, or if it takes longer than anticipated to obtain such approvals, our business could be adversely affected.

In addition, public attitudes about the safety and environmental hazards of and ethical concerns over genetic research, GMOs and GMMs could influence public acceptance of our technology and products. These concerns could result in increased expenses, regulatory scrutiny, delays or other impediments to our programs. The use of GMOs and GMMs has in the past received negative publicity, which could lead to greater regulation or restrictions on imports of our products. Such concerns or governmental restrictions could limit the use of GMOs or GMMs in our products, which could have a material adverse effect on our business, financial condition and results of operations.

We may engage in strategic transactions, including acquisitions, that could disrupt our business, cause dilution to our stockholders, reduce our financial resources, or prove not to be successful.

From time to time, we have entered, and may in the future enter, into strategic transactions, including, among others, transactions to acquire other businesses, products or technologies, and our ability to do so successfully cannot be ensured. In December 2017, we acquired Radiant Genomics, Inc. which allowed us to add desired technology and talent related to metagenomics and associated building of metagenomic libraries. In March 2020, we acquired EnEvolv, Inc., which allowed us to acquire desired technology and talent related to the development and use of biosensors in development of pipeline products. In May 2021, we acquired Lodo Therapeutics Corporation, a company that uses its proprietary bacterial metagenomics discovery platform to develop novel therapeutics from nature. Even if we identify suitable opportunities, we may not be able to make such acquisitions on favorable terms or at all. Any acquisitions we make may not strengthen our competitive position, and these transactions may be viewed negatively by customers or investors. We may decide to incur debt in connection with an acquisition or issue our common stock or other equity securities to the stockholders of the acquired company, which would reduce the percentage ownership of our existing stockholders. We could incur losses resulting from undiscovered liabilities of the acquired business that are not covered by any indemnification we may obtain from the seller. In addition, we may not be able to successfully integrate the acquired personnel, technologies and operations into our existing business in an effective, timely and non-disruptive manner. Acquisitions or other strategic transactions may also divert management attention from day-to-day responsibilities, increase our expenses and reduce our cash available for operations and other uses. In addition, we may not be able to fully recover the costs of such acquisitions or be successful in leveraging any such strategic transactions into increased business, revenue or profitability. We also cannot predict the number, timing or size of any future acquisitions or strategic transactions or the effect that any such transactions might have on our operating results.

Accordingly, although there can be no assurance that we will undertake or successfully complete any strategic transactions, any transactions that we do complete may be subject to the foregoing or other risks and have a material and adverse effect on our business, financial condition, results of operations and prospects. Conversely, any failure to pursue any acquisition or other strategic transaction that would be beneficial to us could delay the development and potential commercialization of our products.

Our headquarters and other facilities are located in active earthquake and tsunami or in active hurricane or wildfire zones, and an earthquake, tsunami, hurricane, wildfire or other type of natural disaster affecting us or our suppliers could cause resource shortages, disrupt our business and harm our results of operations.

We conduct our primary R&D operations in the San Francisco Bay Area in an active earthquake and tsunami zone, and certain of our suppliers conduct their operations in the same region or in other locations that are susceptible to natural disasters. In addition, California and some of the locations where certain of our suppliers and manufacturers are located have experienced shortages of water, electric power and natural gas from time to time. The occurrence of a natural or other disaster, such as an earthquake, tsunami, hurricane, drought, flood, fire, wildfire or any potential effects of climate change or localized extended outages of critical utilities or transportation systems, or any critical resource shortages, affecting us or, our suppliers or manufacturers could cause a significant interruption in our business, damage or destroy our facilities, production equipment or inventory or those of our suppliers and cause us to incur significant costs or result in limitations on the availability of our raw materials, any of which could harm our business, financial condition and results of operations. The insurance we maintain against fires, earthquakes and other natural disasters may not be adequate to cover our losses in any particular case. Accordingly, an earthquake or other disaster could materially and adversely harm our ability to conduct business.

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

We depend on various information technology and equipment systems, including services licensed, leased or purchased from third parties such as cloud computing infrastructure, operating systems and artificial intelligence platforms, for significant elements of our operations.

We use complex software processes to manage samples and evaluate sequencing result data. These software processes are subject to initial design challenges and may require ongoing modifications, each of which may result in unanticipated issues, leading to service disruptions or errors, resulting in liability. Our ability to maintain these processes depends on our ability to recruit and retain highly skilled employees in a competitive market and after recently reducing our workforce and, if we are successful in reducing our operating costs, on our ability to allocate sufficient resources to support the needs of this area. See the risk factor titled "*—Our efforts to reduce our operating costs may not be successful*."

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 systems handling human resources, financial controls and reporting, contract management, regulatory compliance and other infrastructure operations. In addition to these business systems, we have installed, and intend to extend, the capabilities of both our preventative and detective security controls by augmenting the monitoring and alerting functions and the network design of our technical systems. These information technology and telecommunications systems support a variety of functions, including data and cybersecurity, laboratory operations, quality control, R&D activities and general administrative activities. In addition, our third-party billing and collections provider depends upon technology and telecommunications systems provided by outside vendors.

Information technology and telecommunications systems are vulnerable to damage from a variety of sources, including telecommunications or network failures, malicious acts and natural disasters. In addition to traditional computer “hackers”, malicious code (such as viruses and worms), employee theft or misuse, and denial-of-service attacks, sophisticated nation-state and nation-state supported actors also now engage in attacks (including advanced persistent threat intrusions), each of which could impair our ability to prevent the theft or misappropriation of our intellectual property, know-how or technologies. In addition, in connection with heightened geopolitical tensions stemming from the Ukraine War, the risk of such attacks from nation-state and nation-state supported actors may increase. 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. Despite the precautionary measures we take to prevent unanticipated problems that could affect our information technology and telecommunications systems, failures or significant downtime of these systems or those used by our collaborators or subcontractors could prevent us from conducting our operations. Any disruption or loss of information technology or telecommunications software and systems on which critical aspects of our operations depend could have an adverse effect on our business, our reputation, and we may be unable to regain or repair our reputation in the future.

Our use of open source software could adversely affect our platform or our automation business and subject us to possible litigation.

We use open source software in connection with our platform and our automation business. Use of open source software may entail greater risks than use of third-party commercial software, as open source licensors generally do not provide support, updates, warranties, or other contractual protections regarding infringement claims or the quality of the code, and the wide availability of source code to components used in our products could expose us to security vulnerabilities. Furthermore, the terms of many open source licenses have not been interpreted by U.S. courts, and there is a risk that such licenses could be construed in a manner that imposes unanticipated conditions or restrictions on our ability to market or commercialize our products. As a result, we could be subject to lawsuits by parties claiming ownership of what we believe to be open source software or claiming noncompliance with open source licensing terms. 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. 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 technologies that are similar to or better than ours. Any of the foregoing could harm our business, financial condition, results of operations and prospects.

If we are unable to raise additional capital to fund our operations, we will be required to significantly reduce our operating expenses and may not be able to continue as a going concern.

The audit report with respect to our audited financial statements for the year ended December 31, 2020 included an explanatory paragraph stating that there are material uncertainties which caused substantial doubt about our ability to continue as a going concern, in the absence of additional financing and cost reduction or cost management measures. We are subject to various covenants related to the Perceptive Credit Agreement, and given the substantial doubt about our ability to continue as a going concern, there was a risk that we would not meet our covenants in the future. Following the issuance of our audited financial statements, we raised net proceeds of approximately $529.9 million in our IPO. We have not yet generated revenue from product sales (except for nominal revenue related to the sale of samples) and expect product revenue to be immaterial in 2022. We expect to need to raise additional cash through debt, equity or other forms of financing to fund future operations, which may not be available on acceptable terms, or at all. If sufficient funds on acceptable terms are not available when needed, we will be required to significantly reduce our operating expenses. See the risk factor titled "*—We expect to need to raise additional capital to fund our operations, which we may not be able to obtain on favorable terms, or at all, and which, if obtained, may cause dilution to our stockholders or cause us to further limit our operations*." Further, if at any time in the future we are unable to continue as a going concern, we may be forced to discontinue operations and liquidate our assets and may receive less than the value at which those assets are carried on our audited financial statements, which would cause our shareholders to lose some or all of their investment.

We have pursued in the past and may pursue additional U.S. Government contracting and subcontracting opportunities in the future, and as a U.S. Government contractor and subcontractor, we would be subject to a number of procurement rules and regulations.

We have entered into agreements with governmental entities and contractors in the past to serve as a U.S. Government contractor or subcontractor and may do so again in the future. U.S. Government procurement contractors and subcontractors must comply with specific procurement regulations and other requirements. These requirements, although customary in U.S. Government contracts, could impact our performance and compliance costs, including by limiting or delaying our ability to share information with business partners, customers and investors. The U.S. Government has in the past and may in the future demand contract terms that are less favorable than comparable arrangements with private sector customers and may have statutory, contractual, or other legal rights to terminate contracts with us for convenience or for other reasons. Any such termination may adversely affect our ability to contract with other government customers as well as our reputation, business, financial condition and results of operations. In addition, changes in U.S. Government budgetary priorities could lead to changes in the procurement environment, affecting availability of U.S. Government contracting, subcontracting or funding opportunities, which could lead to modification, reduction or termination of our U.S. Government contracts or subcontracts. If and to the extent such changes occur, they could impact our results and potential growth opportunities.

In addition, failure by us, our employees, representatives, contractors, channel partners, agents, intermediaries or other third parties to comply with these regulations and requirements could result in reductions of the value of contracts, contract modifications or termination, claims for damages, refund obligations, the assessment of civil or criminal penalties and fines, loss of exclusive rights in our intellectual property and temporary suspension or permanent debarment from government contracting, all of which could negatively impact our results of operations and financial condition. See the risk factor titled "*—We do not have exclusive rights to intellectual property we develop under U.S. federally funded research grants and contracts, including with DARPA, and we could ultimately share or lose the rights we do have under certain circumstances*." Any such damages, penalties, disruptions or limitations in our ability to do business with the public sector could result in reduced sales of our products, reputational damage, penalties and other sanctions, any of which could harm our business, reputation and results of operations.

We face risks related to cybersecurity threats and incidents, as well as significant disruptions of our information technology systems or data security incidents that could result in significant financial, legal, regulatory, business and reputational harm.

We may face attempts by others to gain unauthorized access through the Internet or to introduce malicious software, to our IT systems. Additionally, individuals or organizations, including malicious hackers, state-sponsored organizations, insider threats including employees and third-party service providers or intruders into our physical facilities, may attempt to gain unauthorized access and try to steal our technology and data. In connection with heightened geopolitical tensions stemming from the Ukraine War, the risk of such attacks from nation-state and nation-state supported actors may increase. We are also a potential target of malicious attackers who attempt to gain access to our network or data centers or those of our customers or end users; steal proprietary information related to our business, products, employees and customers; interrupt our systems and services or those of our customers or others; or demand ransom to return control of such systems and services. Such attempts by malicious attackers in general are increasing in number and in technical sophistication, and if successful, expose us and the affected parties to risk of loss or misuse of proprietary or confidential information or disruptions of our business operations, including our technology operations. Furthermore, malicious online actors may employ false pretenses or technical measures in an attempt to induce our employees to use IT systems in a manner contrary to our benefit, such as, by authorizing payment of false bills or to run software that would encrypt our information in such a way that it cannot be used by us without paying ransom. While we have implemented security measures and employee training programs intended to protect our information technology systems and infrastructure, there can be no assurance that such measures will successfully prevent service interruptions or further security incidents. We have also outsourced elements of our operations (including elements of our information technology infrastructure) to third parties, and as a result, we manage a number of third-party vendors who may or could have access to our computer networks or our confidential information. Many of those third parties in turn subcontract or outsource some of their responsibilities to third parties. These providers can experience breaches of their systems and products that impact the security of our systems and our proprietary or confidential information.

Our information systems may also experience interruptions, delays, or cessations of service or produce errors in connection with system integration, software upgrades, or system migration work that takes place from time to time. While all information technology operations are inherently vulnerable to inadvertent or intentional security breaches, incidents, attacks and exposures, the size, complexity, accessibility and distributed nature of our information technology systems, and the large amounts of sensitive information stored on those systems, make such systems potentially vulnerable to unintentional or malicious, internal and external attacks on our technology environment. While we have implemented security measures intended to protect our information technology systems and infrastructure, there can be no assurance that such measures will successfully prevent service interruptions or further security incidents.

Should we fail to maintain required security qualifications, we may face regulatory concerns or be in breach of contract, which may trigger regulatory action, litigation and/or damages, reputational harm, or loss of certain contracts. While we actively work to manage our information security compliance program, we cannot guarantee that we will always meet the certification standard going forward.

We may encounter intrusions or unauthorized access to our network, services or infrastructure. Any such incidents, whether or not successful, could result in our incurring significant costs related to, for example, rebuilding internal systems, implementing additional threat protection measures, defending against litigation, responding to regulatory inquiries or actions, paying damages, providing customers with incentives to maintain the business relationship, or taking other remedial steps with respect to third parties, as well as reputational harm. In addition, these threats are constantly evolving, thereby increasing the difficulty of successfully defending against them or implementing adequate preventative measures. While we seek to detect and investigate all unauthorized attempts and attacks against our network, products and services and to prevent their recurrence where practicable through changes to our internal processes and tools and changes or updates to our products and services, we may not be successful in doing so and remain potentially vulnerable to additional known or unknown threats. In some instances, we, our customers and the users of our products and services can be unaware of an incident or its magnitude and effects.

While we maintain cyber liability insurance with coverage we believe adequate to cover our risk profile, we cannot guarantee that tail risks, should they occur, would not cause us to incur significant losses or liabilities resulting from data security incidents. Any litigation or regulatory review arising from these types of data security incidents could result in significant legal exposure to us. In addition, information technology system disruptions, whether from attacks on our technology environment or from computer viruses or malware, natural disasters, terrorism, war and telecommunication and electrical failures, could result in a material disruption of our facilities, R&D activities, manufacturing activities and general business operations. Any event that leads to unauthorized access to, use or disclosure of personal information could, among other consequences, disrupt our business, harm our reputation and/or compel us to comply with applicable federal and/or state breach notification laws and foreign law equivalents. In addition, failure to maintain effective internal accounting controls related to security breaches and cybersecurity in general could impact our ability to produce timely and accurate financial statements and subject us to regulatory scrutiny.

Theft, loss, or misuse of personal data about our employees, customers, or other third parties could increase our expenses, damage our reputation, or result in legal or regulatory proceedings.

The theft, loss, or misuse of personal data collected, used, stored or transferred by us to run our business could result in significantly increased business and security costs or costs related to defending legal claims or implementing remedial or punitive measures. Global privacy legislation, enforcement and policy activity in this area are rapidly expanding and creating a complex regulatory compliance environment. Costs to comply with and implement these privacy-related and data protection measures could be significant and noncompliance could expose us to significant monetary penalties, damage to our reputation, suspension of online services or sites in certain countries, mandatory changes in business processes and even criminal sanctions. Even our inadvertent failure to comply with federal, state, or international privacy-related or data-protection laws and regulations could result in audits, regulatory inquiries or proceedings against us by governmental entities or other third parties.

Breaches of physical security systems and/or theft of physical materials could result in significant financial, legal, regulatory, business and reputational harm to us.

We seek to preserve the integrity and confidentiality of our and our partners', suppliers' and customers' data, trade secrets, proprietary chemical and biological materials (e.g., genetically modified host microbes) by maintaining physical security of our premises, biological materials storage systems and information technology systems. While we have confidence in these physical security systems, they may in the future be breached. In addition, we use third party vendors for certain services (e.g., DNA synthesis and sequencing or archiving of samples of engineered organisms) that require us to send or receive physical samples of materials that may constitute or contain proprietary or confidential information, and such third-party vendors may experience breaches. We also exchange physical samples of materials that may constitute or contain proprietary or confidential information with our customers and business partners. In many cases, these customers, partners, and third-party vendors are located internationally, sometimes in areas that are particularly susceptible to malicious physical security breaches.

Any breach of our own physical security, or that of a third party supplier, customer, or business partner, could adversely affect our business operations and/or result in the loss, misappropriation and/or unauthorized access to, or use or disclosure of, confidential or proprietary information (including trade secrets), which could result in financial and reputational harm to us, significant legal exposure to us, and/or compel us to comply with applicable federal and/or state breach notification laws and foreign law equivalents.

See also the risk factor titled, "*—We face risks related to cybersecurity threats and incidents, as well as significant disruptions of our information technology systems or data security incidents that could result in significant financial, legal, regulatory, business and reputational harm.*"

Risks Related to Our Intellectual Property

Our proprietary rights may not adequately protect our technologies and pipeline products.

Our commercial success will depend substantially on our ability to obtain patents and maintain adequate legal protection for the intellectual property we may own solely or jointly with, or license from, third parties, including our technologies and pipeline products in the United States and other countries. Our ability to protect our proprietary rights from unauthorized use by third parties relies on our ability to obtain and maintain valid and enforceable patents covering our proprietary technologies and future products and to maintain the confidentiality of information and technology that we maintain as either confidential or as trade secrets.

We apply for patents covering both our technologies and pipeline products, as we deem appropriate. However, filing, prosecuting, maintaining and defending patents in all countries throughout the world would be prohibitively expensive, and our intellectual property rights in some countries outside the United States are less robust than those in the United States. We may also fail to apply for patents on important technologies or pipeline products in a timely fashion, or at all. Our existing and future patents may not be sufficiently broad to prevent others from practicing our technologies or from designing products around our patents or otherwise developing competing products or technologies. In addition, the breadth of protections offered by patents is highly uncertain and involves complex legal and factual questions for which important legal principles remain unresolved. Additional uncertainty may result from legal decisions by the United States Federal Circuit and Supreme Court as they determine legal issues concerning the scope and construction of patent claims and inconsistent interpretation of patent laws or from new legislation enacted by the U.S. Congress. For instance, the availability of patent protection with respect to software and claims reciting abstract ideas, laws of nature, natural phenomena and/or natural products, regardless of whether the claimed subject matter is otherwise novel and inventive, is uncertain and subject to change. The patent situation outside of the United States is also changing and difficult to predict. As a result, the validity and enforceability of patents cannot be predicted with certainty.

We do not know whether any of our pending patent applications or any pending patent applications that we license from others will result in the issuance of any patents. Even if patents are issued, they may not be sufficient to protect our technology or pipeline products. The patents we own or take licenses to and those that may be issued in the future may be challenged, invalidated, rendered unenforceable or circumvented, and the rights granted under any issued patents may not provide us with proprietary protection or competitive advantages. Moreover, third parties could practice our inventions in territories where we do not have patent protection or in territories where they could obtain a compulsory license to our technology even when patented. Such third parties may then try to import products made using our inventions into the United States or other territories. Accordingly, we cannot ensure that any of our pending patent applications will result in issued patents, or even if issued, that we will be able to predict the breadth, validity and enforceability of the claims upheld in those patents.

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 confidential information or 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.

If competitors are able to copy and use our technology, our ability to compete effectively could be harmed. Others may independently develop and obtain patents for technologies that are similar to, or superior to, our technologies. If that happens, their owners may demand that we take a license, or refuse to grant us a license on reasonable terms or an exclusive license, if at all, which could cause harm to our business.

We rely in part on trade secrets to protect our products and technology, and our failure to obtain or maintain trade secret protection, or a competitor independently developing technology we protect through trade secrets, could adversely affect our competitive business position.

Others may attempt to copy or otherwise improperly obtain and use our products or technology and trade secrets. We seek to preserve the integrity and confidentiality of our confidential proprietary information and trade secrets 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. Monitoring unauthorized access and use is difficult, and we cannot be certain that the steps we have taken will prevent that, particularly in certain foreign countries where the local laws may not protect our proprietary rights as fully as in the United States. Moreover, in some cases our ability to determine if our intellectual property is being unlawfully used by a competitor may be limited.

We rely heavily on confidentiality agreements and confidentiality terms in our other agreements to protect unpatented trade secrets, know-how and confidential technology, including parts of our platform, molecule identity and production organisms, in order to protect our competitive position. This is particularly relevant where patent protection may not be available, for example, aspects of our platform that are naturally occurring. We regularly enter into agreements to maintain and protect our intellectual property and proprietary technology, including confidentiality agreements, non-disclosure agreements with our employees, consultants, academic institutions, corporate partners and when needed, our advisers. 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 adversely impact our ability to establish or maintain a competitive advantage in the market.

Trade secrets and know-how can be difficult to maintain and protect. Monitoring unauthorized disclosure is difficult, and despite the steps we have taken and the employee education we also conduct, 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 improperly obtained and was using our trade secrets, the lawsuit would be expensive and time-consuming, and the outcome would be unpredictable. In addition, courts outside the United States may be less willing to protect trade secrets.

We may need to commence or defend litigation to enforce our intellectual property rights, which would divert resources and management's time and attention and the results of which would be uncertain.

Any litigation arising from our enforcement of claims that a third party is infringing, misappropriating or otherwise violating our proprietary rights without permission or defending claims by a third party that we are infringing, misappropriating or otherwise violating their proprietary rights without permission would be expensive, time consuming and uncertain. There can be no assurances that we would prevail in any suit brought by us or against us by third parties, or successfully settle or otherwise resolve those claims. Significant litigation would have substantial costs, even if the eventual outcome is favorable to us, and would divert management's attention from our business objectives.

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 use our technologies, and could result in the award of substantial damages against us, including treble damages, attorney's fees, costs and expenses if we are found to have willfully infringed. In the event of a successful claim 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 using certain technologies. We may not be able to obtain these licenses on acceptable or commercially reasonable terms, if at all. In addition, we could encounter delays in product or service introductions while we attempt to develop alternative or redesign existing products or technologies to avoid or resolve these claims. Our loss in any lawsuit or failure to obtain a license, could prevent us from commercializing the products or using the technologies (or, in the case of a suit we make against a third party, our failure to prevent their commercialization of product or use of technologies we believe to be in violation of our intellectual property rights) and the prohibition of sale of any of our products or use of technologies (or our failure to prohibit a third party's sales of competitive products or use of competing technologies) could materially affect our business, our ability to gain market acceptance for our products and our ability to use our technologies for the development of our pipeline products.

Furthermore, because of the substantial amount of discovery required in connection with intellectual property litigation, there is a risk that some of our confidential information could be compromised by disclosure during this type of litigation. In addition, during the course of this kind of litigation, there could be public announcements of the results of hearings, motions or other interim proceedings or developments. If securities analysts or investors perceive these results to be negative, it could have a substantial adverse effect on the price of our common stock.

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 if they become involved in infringement claims that target our products, services or technologies, including the types of claims described above. We could also voluntarily agree to defend or indemnify third parties even if we are not obligated to do so if we determine it would be important to our business relationships to do so. 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, operating results or financial condition.

Furthermore, the laws of some foreign countries do not protect intellectual property rights to the same extent as do the laws of the United States or apply differing rules concerning effective assignment of intellectual property rights. Many companies have encountered significant problems in protecting and defending intellectual property rights in certain foreign jurisdictions. We may encounter similar difficulties, particularly as we expand to work with foreign employees and contractors and expand sales into foreign markets. The legal systems of certain countries, particularly certain developing countries, do not favor the enforcement of patents by foreign holders and other intellectual property protection, particularly those relating to biotechnology and bioindustrial technologies. This could make it difficult for us to stop the infringement of our patents or misappropriation or other violation of our other intellectual property rights. Proceedings to enforce our patent rights in foreign jurisdictions could result in substantial costs and divert our efforts and attention from other aspects of our business.

We do not have exclusive rights to intellectual property we develop under U.S. federally funded research grants and contracts, including with DARPA, and we could ultimately share or lose the rights we do have under certain circumstances.

Some of our intellectual property has been or may be developed during the course of research funded by the U.S. government, including under our agreements with the U.S. Defense Advanced Research Projects Agency ("DARPA"). As a result, the U.S. government may have certain rights to intellectual property that we use in our current or future products pursuant to the Bayh-Dole Act of 1980, as amended (the "Bayh-Dole Act"). Under the Bayh-Dole Act, U.S. Government rights in certain "subject inventions" developed under a government-funded program include a nonexclusive, non-transferable and irrevocable worldwide license to use inventions for any governmental purpose. In addition, the U.S. government has the right to require us, or an assignee or exclusive licensee to such inventions, to grant licenses to any of these inventions to the government or a third party if the government determines that: (i) adequate steps have not been taken to commercialize the invention; (ii) government action is necessary to meet public health or safety needs; (iii) government action is necessary to meet requirements for public use under federal regulations; or (iv) the right to use or sell such inventions is exclusively licensed to an entity within the United States and substantially manufactured outside the United States without the U.S. government's prior approval. Additionally, we may be restricted from granting exclusive licenses for the right to use or sell our inventions created pursuant to such agreements unless the licensee agrees to comply with relevant Bayh-Dole Act restrictions (e.g., manufacturing substantially all of the invention in the United States) and reporting requirements. The U.S. government also has the right to take title to these inventions if we fail to disclose the invention to the government or fail to file an application to register for a patent for the intellectual property within specified time limits. In addition, the U.S. government may acquire title in any country in which a patent application is not filed. Certain technology and inventions are also subject to transfer restrictions during the term of these agreements with the U.S. government and for a period thereafter. These restrictions may limit sales of products or components, transfers to foreign subsidiaries for the purpose of the relevant agreements and transfers to certain foreign third parties. If any of our intellectual property becomes subject to any of the rights or remedies available to the U.S. government or third parties pursuant to the Bayh-Dole Act, this could impair the value of our intellectual property and could adversely affect our business.

We use naturally occurring materials that are not patentable and changes to patent laws in the United States and other jurisdictions could diminish the value of patents in general, thereby impairing our ability to protect our products.

Various courts, including the U.S. Supreme Court, have rendered decisions that impact the scope of patentability of certain inventions or discoveries relating to the life sciences. Specifically, these decisions stand for the proposition that patent claims that recite laws of nature, a natural phenomenon (for example a naturally occurring protein having the same amino acid sequence found in nature) or an abstract idea are not themselves patentable unless those patent claims have sufficient additional features that provide practical assurance that the processes are genuine inventive applications of those laws rather than patent drafting efforts designed to monopolize the law of nature itself. What constitutes a "sufficient" additional feature is uncertain. Furthermore, in view of these decisions, in December 2014 the United States Patent and Trademark Office ("USPTO"), published revised guidelines for patent examiners to apply when examining process claims for patent eligibility. This guidance was updated by the USPTO in July 2015 and additional illustrative examples provided in May 2016. The USPTO provided additional guidance on examination procedures pertaining to subject matter eligibility in April 2018 and June 2018. The guidance indicates that claims directed to a law of nature, a natural phenomenon or an abstract idea that do not meet the eligibility requirements should be rejected as non-statutory, patent ineligible subject matter; however, method of treatment claims that practically apply natural relationships should be considered patent eligible. We cannot assure you that our patent portfolio will not be negatively impacted by the current uncertain state of the law, new court rulings or changes in guidance or procedures issued by the USPTO. From time to time, the U.S. Supreme Court, other federal courts, the U.S. Congress or the USPTO may change the standards of patentability and validity of patents within the life sciences and any such changes could have a negative impact on our business.

In addition, the patent positions of companies in the development and commercialization of software and biologics are particularly uncertain. Recent U.S. Supreme Court rulings have narrowed the scope of patent protection available in certain circumstances and weakened the rights of patent owners in certain situations. This combination of events has created uncertainty with respect to the validity and enforceability of patents once obtained. Depending on future actions by the U.S. Congress, the federal courts and the USPTO, the laws and regulations governing patents could change in unpredictable ways that could have a material adverse effect on our patent rights and our ability to protect, defend and enforce our patent rights in the future.

Patent terms may be inadequate to protect our competitive position on our products and technologies 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 and technologies are obtained, once the patent life has expired, we may be open to competition from products leveraging the proprietary technologies described in our patents. Given the amount of time required for the development, testing and, in some cases, regulatory review of new products, patents protecting such products might expire before or shortly after such products are commercialized. As a result, our owned and licensed patent portfolio may not provide us with sufficient rights to exclude others from commercializing products, or using technologies, similar or identical to ours.

We may be subject to claims by third parties asserting that our employees, consultants, or contractors have wrongfully used or disclosed confidential information of third parties, or we have wrongfully used or disclosed alleged trade secrets of their current or former employers or claims asserting we have misappropriated their intellectual property, or claiming ownership of what we regard as our own intellectual property.

Certain of our employees, consultants and contractors were previously employed at universities or other software or biopharmaceutical companies, including our competitors or potential competitors. Although we try to ensure that our employees, consultants and contractors do not use the proprietary information or know-how of others in their work for us, we may be subject to claims that these individuals or we have used or disclosed intellectual property, including trade secrets or other proprietary information, of any such individual's current or former employer. Litigation may be necessary to defend against these claims.

In addition, while it is our policy to require that our employees, consultants and contractors who may be involved in the development of intellectual property, execute agreements assigning such intellectual property to us, we may be unsuccessful in executing such an agreement with each party who in fact develops intellectual property that we regard as our own. Our intellectual property assignment agreements with them may not be self-executing or may be breached, and we may be forced to bring claims against third parties, or defend claims they may bring against us, to determine the ownership of what we regard as our intellectual property. Such claims could have a material adverse effect on our business, financial condition, results of operations and prospects.

If we fail in prosecuting or defending any such claims, in addition to paying monetary damages, we may lose valuable intellectual property rights or personnel, which could have a material adverse effect on our competitive business position and prospects. Such intellectual property rights could be awarded to a third party, and we could be required to obtain a license from such third party to use or commercialize our technology or products, which license may not be available on commercially reasonable terms, or at all. Even if we are successful in prosecuting or defending against such claims, litigation could result in substantial costs and be a distraction to our management and employees.

Risks Relating to Government Regulation and Tax Matters

We may not be able to obtain, or may experience significant delays or costs in obtaining, regulatory approval for our products or their components and even if approvals are obtained, complying on an on-going basis with numerous regulatory requirements will be time-consuming and costly.

The product development and manufacturing requirements of the EPA and FDA and other government bodies, and the criteria these authorities use to determine the safety and/or efficacy of pipeline products or their components, vary substantially according to the type, complexity, novelty, intended use and geographic market of said pipeline product or component. It is difficult to determine the time required or the financial costs to obtain regulatory approvals for our pipeline products or their components or how long it will take to commercialize our pipeline products, even if approved for marketing. In the United States, the EPA administers the Toxic Substances Control Act ("TSCA"), which regulates the commercial registration, distribution and use of many chemicals. Before an entity can manufacture or distribute a new chemical subject to TSCA, it must file a Pre-Manufacture Notice ("PMN"), to add the chemical to the TSCA Inventory. The EPA has 90 days to review the filing but may request additional data or time, which could significantly extend the timeline for approval. As a result, we may not receive EPA approval as expeditiously as we would like. Similar regulations exist in the European Union ("EU"), known as REACH, where regulatory authorization under this program may be delayed or require additional significant costs.

Any future products for the healthcare market or our drug discovery business may be subject to regulation by the FDA, as well as similar agencies of states and foreign jurisdictions where these products are manufactured, sold or proposed to be sold. Pursuant to the Federal Food, Drug, and Cosmetic Act, the FDA is responsible for ensuring the safety, efficacy and security of drugs, biological products, medical devices, and food by regulating the processing, formulation, safety, manufacture, packaging, labeling and distribution of these products. The FDA has prescribed timelines for review, ranging from two to over ten months, depending on the application type. However, the FDA may request additional data or time, which could significantly extend the timeline for approval. As a result, we may not receive FDA approval as expeditiously as we would like.

We expect to encounter regulations in most, if not all, of the countries in which we may seek to produce, import, or sell our products, and we cannot guarantee that we will be able to obtain necessary approvals and third- party verifications in a timely manner or at all. If there are delays or failure to obtain, or unexpected costs in obtaining, the regulatory approval necessary in a particular country, then we may not be able to commercialize our products in such country and our business will be adversely affected. In addition, any enforcement action taken by regulators against us or our products for non-compliance could cause us to suffer adverse publicity, which could harm our reputation and our relationship with our customers and vendors.

In addition, many of our products are intended to be a component of our collaboration partners and/or customers' (or their customers') end-use products. Such end-use products may be subject to similar or other various regulations, including regulations promulgated by U.S. or EU regulatory agencies or authorities. If we or our collaboration partners and customers (or their customers) are not successful in obtaining any required regulatory approval or third-party verifications for their end-use products that incorporate our products, or fail to comply with any applicable regulations for such end-use products, whether due to our products or otherwise, demand for our products may decline and our revenue will be adversely affected.

We may incur significant costs to comply with environmental laws and regulations, and failure to comply with these laws and regulations could expose us to significant liabilities.

We use hazardous and nonhazardous chemicals and biological materials in our business and are subject to a variety of federal, state, local and international laws and regulations governing, among other matters, the use, generation, manufacture, transportation, storage, handling, disposal of and human and environmental exposure to these materials both in the United States and overseas, including regulation by governmental regulatory agencies, such as the Occupational Safety and Health Administration and the EPA. We have incurred and will continue to incur, capital and operating expenditures and other costs in the ordinary course of our business in complying with these laws and regulations.

Although we have implemented safety procedures for handling and disposing of these materials and waste products in an effort to comply with these laws and regulations, we cannot be sure that our safety measures will be compliant or capable of eliminating the risk of injury or contamination from the generation, manufacturing, use, storage, transportation, handling, disposal of and human and environmental exposure to hazardous materials. Failure to comply with environmental, health and safety laws could subject us to liability and resulting damages. There can be no assurance that violations of environmental, health and safety laws will not occur as a result of human error, accident, equipment failure, contamination or other causes. Compliance with applicable environmental laws and regulations may be expensive, and the failure to comply with past, present or future laws could result in the imposition of fines, regulatory oversight costs, third party property damage, product liability and personal injury claims, investigation and remediation costs, the suspension of production or a cessation of operations, and our liability may exceed our total assets. Liability under environmental laws, such as the Comprehensive Environmental Response Compensation and Liability Act in the United States can impose liability for the full amount of damages without regard to comparative fault for the investigation and cleanup of contamination and impacts to human health and for damages to natural resources. Contamination at properties we will own or operate and at properties to which we send materials, may result in liability for us under environmental laws and regulations.

Our business and operations may be affected by other new environmental, health and safety laws and regulations, which may require us to change our operations, or result in greater compliance costs and increasing risks and penalties associated with violations, which could impair our research, development or production efforts and harm our business.

Our collection, use and disclosure of personal information, including health and employee information, is subject to U.S. state and federal privacy and security regulations, and our failure to comply with those regulations or to adequately secure the information we hold could result in significant liability or reputational harm.

The privacy and security of personal information stored, maintained, received or transmitted, including electronically, is a major issue in the United States and abroad. Numerous federal and state laws and regulations govern the collection, dissemination, use and confidentiality of personal information, including genetic, biometric and health information, including state privacy, data security and breach notification laws, federal and state consumer protection and employment laws, the Health Insurance Portability and Accountability Act of 1996, as amended by the Health Information Technology for Economic and Clinical Health Act of 2009 and the Genetic Information Nondiscrimination Act of 2008. These laws and regulations are increasing in complexity and number, may change frequently and sometimes conflict. Penalties for violations of these laws vary, but can be severe. For example, California recently enacted the California Consumer Privacy Act ("CCPA"). The CCPA gives California residents expanded rights to access and delete their personal information, opt out of certain personal information sharing, and receive detailed information about how their personal information is used. The CCPA provides for civil penalties for violations, as well as a private right of action for data breaches that is expected to increase data breach litigation. Additionally, in November 2020, California voters passed the California Privacy Rights and Enforcement Act of 2020 (the "CPRA"), which further expands the CCPA with additional data privacy compliance requirements and establishes a regulatory agency dedicated to enforcing those requirements. The CCPA's and CPRA's enactment likely marks the beginning of a trend toward more stringent privacy legislation in the United States, which could increase our potential liability and adversely affect our business. Similar privacy legislation has been proposed in a number of states, including Virginia and Colorado, which passed new consumer privacy laws in 2021 that take effect in 2023.

While we strive to comply with all applicable privacy and security laws and regulations, including our own posted privacy policies, these laws and regulations continue to evolve and any failure or perceived failure to comply may result in proceedings or actions against us by government entities or others, or could cause us to lose customers, which could have a material adverse effect on our business. Recently, there has been an increase in public awareness of privacy issues in the wake of revelations about the data-collection activities of various government agencies and in the number of private privacy-related lawsuits filed against companies. Concerns about our practices with regard to the collection, use, retention, disclosure or security of personal information or other privacy-related matters, even if unfounded and even if we are in compliance with applicable laws, could damage our reputation and harm our business.

Data collection outside of the United States may be governed by restrictive regulations governing the use, processing and cross-border transfer of personal information.

In the event we decide to conduct business or grow our business in certain territories outside the United States, we may be subject to additional privacy restrictions. For example, the EU General Data Protection Regulation ("GDPR") regulates certain business activities involving the collection, use, storage, disclosure, transfer or other processing of personal data regarding individuals in the European Economic Area ("EEA"). The GDPR is wide-ranging in scope and imposes numerous requirements on companies that process personal data. If we expand our business activities involving the personal data of EEA residents, it may increase our cost of doing business or require us to change our business practices. Compliance with the GDPR and other similar laws and regulations will be a rigorous and time-intensive process that may increase our cost of doing business or require us to change our business practices, and despite those efforts, there is a risk that we may be subject to fines and penalties, litigation and reputational harm in connection with our activities outside the United States, including in the EEA.

We are subject to certain U.S. and foreign anti-corruption, anti-bribery and anti-money laundering laws and regulations. We can face serious consequences for violations.

We are subject to the U.S. Foreign Corrupt Practices Act of 1977, as amended (the "FCPA"), the U.S. domestic bribery statute contained in 18 U.S.C. § 201, the U.S. Travel Act, the U.K. Bribery Act and possibly other anti- corruption, anti-bribery and anti-money laundering laws and regulations in the jurisdictions in which we do business, both domestic and abroad. Anti-corruption and anti-bribery laws have been enforced aggressively in recent years and are interpreted broadly to generally prohibit companies, their employees, agents, representatives, business partners and third-party intermediaries from authorizing, offering, or providing, directly or indirectly, improper payments or offers of improper payments to government officials, political parties, or commercial partners for the purpose of obtaining or retaining business or securing an improper business advantage, or engaging in certain transactions involving criminally-derived property or the proceeds of criminal activity. We plan to engage third parties to conduct our business abroad, for example, for product trials and/or to obtain necessary permits, licenses, patent registrations and other regulatory approvals. We and our third-party business partners, representatives and agents may have direct or indirect interactions with officials and employees of government agencies or state-owned or affiliated universities or other entities, and we may be held liable for the corrupt or other illegal activities of our employees or such third parties even if we do not explicitly authorize such activities. We expect our non-U.S. activities to increase over time, which may also increase our exposure to these laws.

These laws also require that we keep accurate books and records and maintain internal controls and compliance procedures designed to prevent any such actions in violation of those laws. While we have policies and procedures to address compliance with such laws, we cannot assure you that none of our employees, agents, representatives, business partners or third-party intermediaries will take actions in violation of our policies and applicable law, for which we may be ultimately held responsible.

Any allegations or violation of the FCPA or other applicable anti-bribery, anti-corruption laws and anti-money laundering laws may result in whistleblower complaints, sanctions, settlements, investigations, prosecution, enforcement actions, substantial criminal fines and civil penalties, imprisonment, debarment, tax reassessments, breach of contract and fraud litigation, loss of export privileges, suspension or debarment from U.S. government contracts, adverse media coverage, reputational harm and other consequences, all of which may have an adverse effect on our reputation, business, results of operations and prospects. Responding to an investigation or action will likely result in a materially significant diversion of management's attention and resources and significant defense costs and other professional fees.

Governmental trade controls, including export and import controls, sanctions, customs requirements and related regimes, could subject us to liability or loss of contracting privileges or limit our ability to compete in certain markets.

Our products and technologies are subject to U.S. and non-U.S. export controls. Export authorizations may be required for the products, technologies, or services to be exported outside of the United States, to a foreign person, or outside of a foreign jurisdiction. Our current or future products or technologies are, and may in the future, be subject to the Export Administration Regulations ("EAR"). If a product, technology, or service meets certain criteria for control under the EAR, then that product, technology, or service would be exportable outside the United States or to a foreign person or from one foreign jurisdiction to another foreign jurisdiction only if we obtain the applicable export license or other applicable authorization including qualifying for a license exception, if required. Compliance with the U.S. and foreign export laws and regulations and other applicable regulatory requirements regarding the sales, shipment and use of our products and technology may affect our ability to work with foreign partners, affect the speed at which we can introduce new products into non-U.S. markets, or limit our ability to sell products or services or license technologies into some countries.

Additionally, certain materials that we use in our development and production activities are subject to U.S. import controls. We currently have, and may in the course of business need to procure, certain import authorizations, for example, related to plant pests, chemicals, biological agents and other controlled materials, including from the USDA, EPA and U.S. Centers for Disease Control. Compliance with applicable regulatory requirements regarding the import of such materials may limit our access to materials critical to our development activities or affect the speed at which we can develop new products.

Our activities are also subject to the economic sanctions laws and regulations of the United States and other jurisdictions. Such controls prohibit certain transactions, potentially including financial transactions and the transfer of products, technologies and services, to sanctioned countries, governments and persons, without a license or other appropriate authorization. U.S. sanctions policy changes could affect our ability to interact, directly and indirectly, with targeted companies or companies in sanctioned countries, including Chinese companies and Russian companies. For example, in February and March 2022, in response to the Ukraine War, the United States and other countries imposed economic sanctions against Russia and Belarus, and the United States and other countries could impose further sanctions and take other actions should the conflict further escalate. Compliance with these and any further sanctions could limit our ability to interact with Russian companies.

While we take precautions to comply with U.S. and non-U.S. export control, import control and economic sanctions laws and regulations, we cannot guarantee that such precautions will prevent violations of such laws, including transfers to unauthorized persons or destinations, and including inadvertent violations as a result of a misclassification of a product, technology or service under export control laws. Violations could result in our business being subject to government investigations, denial of export or import privileges, significant fines or penalties, denial of government contracts and reputational harm. Any limitation on our ability to export our products, technology, or services, or import materials critical to our development activities would likely adversely affect our business and financial condition.

We are party to a mitigation agreement with the Committee on Foreign Investment in the United States ("CFIUS") and can face penalties or further restrictions if we fail to comply with that agreement. CFIUS may also condition, modify, delay or prevent our future acquisition or investment activities.

Due to certain foreign ownership interests in our business, we operate pursuant to an agreement with CFIUS agencies that requires us to adhere to certain information and technology protection requirements. This agreement will remain in place until CFIUS agrees to terminate it, which CFIUS might do if it determines that the agreement is no longer necessary due to changed circumstances, including any changes to the ownership of our business. We have incurred and will continue to incur, incremental additional costs in implementing and complying with these standards, and those costs may increase as we continue to grow our business. If we fail to comply with our obligations under the agreement, we may be subject to penalties, injunctive action, additional mitigation conditions or other restrictions.

Further, subject to any future changes in the foreign ownership interest in our business, CFIUS may interpret its regulations as continuing to give it jurisdiction to review our acquisitions of, or investments in, other US businesses. If CFIUS conducts such a review, it could impose restrictions on the investments or to deny such transactions to address any national security concerns that it determines are posed by such transactions.

Our ability to use our net operating loss carryforwards and certain other tax attributes may be limited.

We have incurred net losses since our inception and we may never achieve or sustain profitability. Generally, for U.S. federal income tax purposes, net operating losses incurred will carry forward. However, net operating loss carryforwards generated prior to January 1, 2018 are subject to expiration for U.S. federal income tax purposes. As of December 31, 2021, we had federal net operating loss carryforwards of $1.0 billion of which $106.4 million will begin to expire in 2033 and $936.0 million will carryforward indefinitely. As of December 31, 2021, we had a total state net operating loss carryforward of $660.7 million, which will begin to expire in 2027. As of December 31, 2021, we also had federal and state R&D tax credit carryforwards of $34.5 million and $28.8 million, respectively, which may be available to offset future income tax liabilities. The federal R&D tax credit carryforwards would begin to expire in 2034. The state R&D tax credit carryforwards are not subject to expiration.

As of December 31, 2020, we had federal net operating loss carryforwards of approximately $704.1 million of which $99.3 million will begin to expire in 2033 and $604.8 million, which will carryforward indefinitely. As of December 31, 2020, we had a total state net operating loss carryforward of $515.6 million, which will begin to expire in 2027. As of December 31, 2020, we also had federal and state R&D tax credit carryforwards of approximately $26.8 million and $22.3 million, respectively, which may be available to offset future income tax liabilities. The federal R&D tax credit carryforwards would begin to expire in 2034. The state R&D tax credit carryforwards are not subject to expiration.

In addition, under Sections 382 and 383 of the Internal Revenue Code of 1986, as amended (“Code”), if a corporation undergoes an “ownership change,” generally defined as a greater than 50 percentage point change in its equity ownership by certain shareholders over a three-year period, the corporation’s ability to use its pre-ownership change net operating loss carryforwards and other pre-ownership change tax attributes, such as research tax credits, to offset its post-ownership change income or taxes may be limited. As a result, even if we attain profitability, we may be unable to use a material portion of our net operating loss carryforwards and other tax attributes, which could adversely affect our future cash flows. There is also a risk that due to regulatory changes, such as suspensions on the use of net operating losses or other unforeseen reasons, our existing net operating losses could expire or otherwise be unavailable to offset future U.S. federal and state taxable income. For these reasons, we may not be able to utilize some portion of our net operating losses even if we attain profitability.

We have not completed an ownership change analysis pursuant to the Code. If one or more ownership changes have occurred, our ability to use our net operating loss carryforwards and other tax attributes may be limited.

Changes in U.S. and foreign tax laws could have a material adverse effect on our business, cash flow, results of operations or financial conditions.

We are subject to tax laws, regulations and policies of the U.S. federal, state and local governments and of taxing authorities in foreign jurisdictions, including Japan, Spain, the Netherlands and Taiwan. Changes in tax laws, as well as other factors, could cause us to experience fluctuations in our tax obligations and otherwise adversely affect our tax positions and/or our tax liabilities. For example, the Organisation for Economic Co-operation and Development (“OECD”) has published proposals covering various international tax-related issues, including country- by-country reporting, permanent establishment rules, transfer pricing and tax treaties. Future tax reform resulting from this development may result in changes to long-standing tax principles, which could adversely affect our effective tax rate or result in higher cash tax liabilities in those countries or change the manner in which we operate our business. In addition, the Biden administration has proposed several corporate tax increases, including raising the U.S. corporate income tax rate and greater taxation of international income, which, if enacted, could adversely affect our tax liability. There can be no assurance that our tax payments, tax credits, or incentives will not be adversely affected by these or other initiatives.

Risks Related to Ownership of Our Common Stock

The market price of our common stock may be volatile, which could result in substantial losses for investors in our common stock.

The market price of our common stock is likely to be volatile and could be subject to fluctuations in response to the risk factors described in this report and others beyond our control. Some of the factors that may cause the market price of our common stock to fluctuate include:

- our ability to successfully commercialize or generate revenue from our products;
- our ability to execute on our new strategic plan successfully;

- the success of our efforts to reduce our operating costs to extend our runway;
- our ability to identify, recruit and retain skilled personnel, including a permanent Chief Executive Officer;
- the development of our products and the degree to which the timing of launch and commercialization thereof meets the expectations for securities analysts and investors and our ability to achieve market acceptance for our products;
- delays in timing of revenue from future product sales;
- commencement or termination of collaborations for our product development, drug discovery and research programs;
- failure or discontinuation of any of our product development and research programs;
- the success of existing or new competitive products, services or technologies;
- regulatory or legal developments in the United States and other countries;
- developments or disputes concerning patent applications, issued patents, other intellectual property or proprietary rights;
- the impact of COVID-19 on our business and on global economic conditions;
- the level of expenses related to any of our research programs or product development programs;
- actual or anticipated changes in our estimates as to our financial results or development timelines;
- whether our financial results, forecasts and development timelines meet the expectations of securities analysts or investors;
- announcement or expectation of additional financing efforts;
- sales of our common stock by us, our insiders, or other stockholders;
- variations in our financial results or those of companies that are perceived to be similar to us;
- changes in estimates or recommendations by securities analysts, if any, that cover our stock;
- developments with respect to our pending securities litigation and related matters;
- general economic, industry and market conditions, including the effects of inflation, war, geopolitical tensions and other political, social economic instability, such as instability stemming from the Ukraine War and related economic sanctions (and any retaliatory responses thereto); and
- the other factors described in this “Risk Factors” section.

For example, there was a significant decline in the market price for our common stock following our announcement on August 3, 2021, that we had become aware of issues with our commercial product pipeline that impact our product delivery timeline and revenue projections, no longer expect product revenue in 2021 and expect product revenue to be immaterial in 2022, and our stock price has continued to decline.

In recent years, stock markets in general and the market for technology companies (including biopharma companies) in particular have experienced significant price and volume fluctuations that have often been unrelated or disproportionate to changes in the operating performance of the companies whose stock is experiencing those price and volume fluctuations. Broad market and industry factors may seriously affect the market price of our common stock, regardless of our actual operating performance. Following periods of such volatility in the market price of a company’s securities, securities class action litigation has often been brought against that company. For example, on August 4, 2021, following a significant decline in the market price for our common stock, we, certain of our officers and directors, and the underwriters of our IPO were named as defendants in a securities class action purportedly brought on behalf of purchasers of our common stock. Because of the volatility of our stock price, we expect to continue to be the target of securities litigation in the future. Securities litigation could result in substantial costs and divert management’s attention and resources from our business.

An active trading market for our common stock may not be sustained.

Our common stock began trading on the Nasdaq Global Select Market (“Nasdaq”) under the symbol “ZY” on April 22, 2021. However, we cannot assure you of the likelihood that an active trading market for our common stock will be maintained, the liquidity of any trading market, your ability to sell your shares of our common stock when desired or the prices that you may obtain for your shares.

We do not expect to pay dividends in the foreseeable future.

You should not rely on an investment in our common stock to provide dividend income. We do not anticipate paying any cash dividends to holders of our common stock in the foreseeable future. Instead, we plan to retain any earnings to maintain and expand our existing operations and continue to invest in commercializing our existing products, launching products in our pipeline and furthering the development of our platform and technology. In addition, the Perceptive Credit Agreement includes covenants that restrict our ability to pay cash dividends. Consequently, stockholders must rely on sales of their common stock after price appreciation, which may never occur, as the only way to realize any future gains on their investment. As a result, investors seeking cash dividends should not purchase our common stock.

If securities or industry analysts publish negative reports about our business or cease publishing research or reports about our business, our share price and trading volume could decline.

The trading market for our common stock depends in part on the research and reports that securities or industry analysts publish about us or our business. We do not have any control over whether analysts cover our company or for how long they cover our company. If one or more of the analysts who cover us downgrade our shares or change their opinion of our shares, our share price would likely decline. For example, several of the analysts who cover our company downgraded our shares following our announcement on August 3, 2021 that we had become aware of issues with our commercial product pipeline that impact our product delivery timeline and revenue projections, no longer expect product revenue in 2021 and expect product revenue to be immaterial in 2022. If one or more of these analysts cease coverage of our company or fail to regularly publish reports on us, we could lose visibility in the financial markets, which could cause our share price or trading volume to decline.

Sales of a substantial number of shares of our common stock by our existing stockholders could cause the price of our common stock to decline.

Sales of a substantial number of shares of our common stock in the public market could occur at any time. Such sales, or the perception in the market that the holders of a large number of shares of common stock intend to sell shares, could reduce the market price of our common stock.

The restrictions on transfer contained in the lock-up agreements and market standoff agreements that were in effect following our IPO have expired, and substantially all of the shares of our common stock outstanding, other than shares held by our affiliates that are subject to securities laws restrictions on resale, may be freely sold in the public market. In addition, shares issued upon the exercise or settlement of outstanding equity awards under our equity incentive plans or pursuant to future awards granted under those plans will be freely available for sale in the public market upon issuance and once vested, subject to volume limitations applicable to affiliates.

Moreover, holders of an aggregate of 68,115,459 shares of our common stock (calculated as of immediately prior to our IPO) have rights, subject to conditions, to require us to file registration statements with the SEC covering their shares or to include their shares in registration statements that we may file for ourselves or other stockholders. If any of these additional shares are sold, or if it is perceived that they will be sold, in the public market, the market price of our common stock could decline.

Insiders have substantial influence over us, which could limit your ability to affect the outcome of key transactions, including a change of control.

Our directors, executive officers, holders of more than 5% of our outstanding stock and their respective affiliates beneficially own a significant percentage of our outstanding voting stock. As a result, these stockholders, if they act together, will be able to influence our management and affairs and all matters requiring stockholder approval, including the election of directors and approval of significant corporate transactions. This concentration of ownership may have the effect of delaying or preventing a change in control of the Company and might affect the market price of our common stock.

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

We are an "emerging growth company" as defined in the Jumpstart Our Business Startups Act of 2012 (the "JOBS Act"). For so long as we remain an emerging growth company, we are permitted by SEC rules and plan to rely on exemptions from certain disclosure requirements that are applicable to other SEC-registered public companies that are not emerging growth companies. These exemptions include not being required to comply with the auditor attestation requirements of Section 404 of the Sarbanes-Oxley Act of 2002, as amended, not being required to comply with the auditor requirements to communicate critical audit matters in the auditor's report on the financial statements, reduced disclosure obligations regarding executive compensation and exemptions from the requirements of holding a nonbinding advisory vote on executive compensation and stockholder approval of any golden parachute payments not previously approved. As a result, the information we provide stockholders will be different than the information that is available with respect to other public companies. We cannot predict whether investors will find our common stock less attractive if we rely on these exemptions. If some investors find our common stock less attractive as a result, there may be a less active trading market for our common stock and our stock price may be 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 certain accounting standards until those standards would otherwise apply to private companies. We have elected to avail ourselves of the exemption regarding the timing of the adoption of accounting standards and, therefore, while we are an EGC we will not be subject to new or revised accounting standards at the same time that they become applicable to other public companies that are not EGCs.

Delaware law and provisions in our amended and restated certificate of incorporation and bylaws might discourage, delay, or prevent a change in control of the Company or changes in our management and, therefore, depress the trading price of our common stock.

Provisions in our amended and restated certificate of incorporation and bylaws may delay, deter or prevent a merger, acquisition or other change in control that stockholders may consider favorable, including transactions in which you might otherwise receive a premium for your shares of our common stock. These provisions may also prevent or frustrate attempts by our stockholders to replace or remove our management. Therefore, these provisions could adversely affect the price of our common stock. Among other things, our organizational documents:

- establish that our board of directors is divided into three classes, Class I, Class II and Class III, with each class serving staggered three-year terms;
- provide that our directors may be removed only for cause;
- provide that vacancies on our board of directors and any newly created directorship may be filled only by a majority of the remaining directors then in office, even though less than a quorum;
- eliminate cumulative voting in the election of directors;
- authorize our board of directors to issue shares of preferred stock and determine the price and other terms of those shares, including preferences and voting rights, without stockholder approval;
- permit stockholders to take actions only at a duly called annual or special meeting and not by unanimous written consent;
- prohibit stockholders from calling a special meeting of stockholders;
- certain litigation against us can only be brought in federal court or in Delaware and certain litigation in Delaware may require minimum ownership thresholds in order to file suit;
- require that stockholders give advance notice to nominate directors or submit proposals for consideration at stockholder meetings;
- authorize our board of directors, by a majority vote, to amend certain provisions of the bylaws; and
- require the affirmative vote of at least 66 2⁄3% or more of the outstanding shares of common stock entitled to vote generally in the election of directors, voting as a single class to amend many of the provisions described above.

In addition, Section 203 of the Delaware General Corporation Law ("DGCL") prohibits a publicly-held Delaware corporation from engaging in a "business combination" with an "interested stockholder," which is generally a person who, together with its affiliates and associates, owns, or within the last three years has owned, 15% or more of our voting stock, for a period of three years after the date of the transaction in which the person became an interested stockholder, unless the business combination is approved in a prescribed manner. Generally, a "business combination" includes a merger, asset or stock sale or other transaction resulting in a financial benefit to the interested stockholder.

Any provision of our amended and restated certificate of incorporation, amended and restated bylaws or the DGCL that has the effect of delaying or preventing a change in control could limit the opportunity for our stockholders to receive a premium for their shares of our capital stock and could also affect the price that some investors are willing to pay for our common stock.

Our certificate of incorporation designates the state courts in the State of Delaware as the sole and exclusive forum for certain types of actions and proceedings that may be initiated by our stockholders, which could limit stockholders' ability to obtain a favorable judicial forum for disputes with the Company and our directors, stockholders, officers and employees.

Our amended and restated certificate of incorporation provides that the Court of Chancery of the State of Delaware will be the sole and exclusive forum for the following types of actions or proceedings under Delaware statutory or common law unless we otherwise consent in writing to an alternative forum: (i) any derivative action or proceeding brought on behalf of us; (ii) any action asserting a claim of breach of fiduciary duty owed by, or otherwise wrongdoing by, any director, stockholder, officer or other employee of our company to us or our stockholders; (iii) any action asserting a claim arising pursuant to any provision of the DGCL or our amended and restated certificate of incorporation and bylaws (as each may be amended from time to time); (iv) any action to interpret, apply, enforce or determine the validity of the Certificate of Incorporation or the Bylaws (as either may be amended from time to time); or (v) any action asserting an internal corporate claim (as defined in Section 115 of the DGCL) or a claim otherwise implicating our internal affairs (except for, as to each of (i) to (v) above, any claim as to which the Court of Chancery determines that it does not have subject matter jurisdiction or there is an indispensable party not subject to the personal jurisdiction of the Court of Chancery (and the indispensable party does not consent to the personal jurisdiction of the Court of Chancery within 10 days following such determination), or which is statutorily vested in the exclusive jurisdiction of a court other than the Court of Chancery. For the avoidance of doubt, this provision would not apply to any direct action brought to enforce a duty or liability created by the Securities Act or any successor thereto or the Securities Exchange Act of 1934, as amended (the "Exchange Act").

Furthermore, our amended and restated certificate of incorporation provides that unless we consent in writing to the selection of an alternative forum, the federal district courts of the United States shall be the 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 our shares of capital stock shall be deemed to have notice of and consented to the foregoing forum selection provisions.

Our exclusive forum provision will not relieve us of our duties to comply with the federal securities laws and the rules and regulations thereunder, and our stockholders will not be deemed to have waived our compliance with these laws, rules and regulations.

This choice of forum provision may limit a Company stockholder's ability to bring a claim in a judicial forum that stockholder finds favorable for disputes with the Company or any of our directors, officers, other employees or stockholders, which may discourage lawsuits with respect to such claims, although our stockholders will not be deemed to have waived our compliance with federal securities laws and the rules and regulations thereunder. The enforceability of similar federal court choice of forum provisions in other companies' certificates of incorporation has been challenged in legal proceedings, and it is possible that a court could find this type of provision to be inapplicable or unenforceable. If a court were to find either of the choice of forum provisions contained in our amended and restated certificate of incorporation or amended and restated bylaws to be inapplicable or unenforceable in an action, we may incur additional costs associated with resolving such action in other jurisdictions which could harm our business, results of operations and financial condition.

Risks Related to being a Public Benefit Corporation

Our status as a public benefit corporation may not result in the benefits that we anticipate.

We are a public benefit corporation under the DGCL. As a public benefit corporation, we are required to have a purpose to produce a public benefit or benefits and to operate in a responsible and sustainable manner. Our public benefit, as provided in our certificate of incorporation, is: to displace the petrochemicals that pollute the Planet by designing, developing, and commercializing bio-based materials that deliver better performance than existing products, at attractive costs. We make products with broad applications and global reach that are safer for the people who manufacture them, healthier for the people who use them and better for the environment. Our directors and officers will be obligated to manage the Company in a manner that balances our stockholders' pecuniary interests, the best interests of those materially affected by our conduct and the public benefit or benefits identified in our amended and restated certificate of incorporation. There can be no assurance that we will achieve our public benefit purpose or that the expected positive impact from being a public benefit corporation will be realized, which could have a material adverse effect on our reputation, which may have a material adverse effect on our business, results of operations and financial condition.

As a public benefit corporation, we will be required to publicly disclose at least biennially a report on our overall public benefit performance and on our assessment of our success in achieving our specific public benefit purpose, including the objectives established and standards adopted by our Board of Directors and factual information based on the objectives and standards related to the promotion of the public benefits. If we are not timely or are unable to provide this report, if the report does not reflect a positive assessment based on the objectives and standards or if the report is not viewed favorably by parties doing business with us, employees, regulators or others reviewing our credentials, our reputation and status as a public benefit corporation may be harmed.

As a public benefit corporation, our focus on a specific public benefit purpose and producing a positive effect for society may negatively influence our financial performance.

Unlike traditional corporations, whose directors have a fiduciary duty to manage the business in a manner that focuses exclusively on maximizing stockholder value, our directors have a fiduciary duty to consider not only the stockholders' interests, but also our specific public benefit and the interests of other stakeholders affected by our actions. Therefore, we may take actions that we believe will further our specific public benefit or be in the best interests of those stakeholders materially affected by our conduct, even if those actions do not maximize our financial results or stockholder returns. While we intend for this public benefit designation and obligation to provide an overall net benefit to us and our business and stakeholders, including stockholders, it could instead cause us to make decisions and take actions without seeking to maximize the income generated from our business, and hence available for distribution to our stockholders. Our pursuit of longer-term or non-pecuniary benefits may not materialize within the timeframe we expect, or at all, and may have an immediate negative effect on any amounts available for distribution to our stockholders. Accordingly, being a public benefit corporation and complying with our related obligations could have a material adverse effect on our business, results of operations and financial condition, which in turn could cause our stock price to decline.

As a public benefit corporation, we may be less attractive as a takeover target than a traditional company would be and, therefore, your ability to realize your investment through an acquisition may be limited. Public benefit corporations may not be attractive targets for activists or hedge fund investors because new directors would still have to consider and give appropriate weight to the public benefit along with stockholder value and stockholders committed to the public benefit can enforce this through derivative suits. Further, by requiring that the board of directors of public benefit corporations consider additional constituencies other than maximizing stockholder value, Delaware public benefit corporation law could potentially make it easier for a board of directors to reject a hostile bid, even where the takeover would provide the greatest short-term financial yield to investors.

Our directors have a fiduciary duty to consider not only our stockholders' interests, but also our specific public benefit and the interests of other stakeholders affected by our actions. If a conflict between such interests arises, there is no guarantee such a conflict would be resolved in favor of our stockholders.

While directors of traditional corporations are required to make decisions they believe to be in the best interests of their stockholders, directors of a public benefit corporation have a fiduciary duty to consider not only the stockholders' interests, but also the specific public benefit and the interests of other stakeholders affected by the company's actions. Under the DGCL, directors are shielded from liability for breach of these obligations if they make informed and disinterested decisions that serve a rational purpose. Thus, unlike traditional corporations which must focus exclusively on stockholder value, our directors will not merely be permitted, but will be obligated, to consider our specific public benefit and the interests of other stakeholders. In the event of a conflict between the interests of our stockholders and the interests of our specific public benefit or our other stakeholders, our directors must only make informed and disinterested decisions that serve a rational purpose; thus, there is no guarantee such a conflict would be resolved in favor of our stockholders, which could have a material adverse effect on our business, results of operations and financial condition, which in turn could cause our stock price to decline.

As a Delaware public benefit corporation, we may be subject to increased derivative litigation concerning our duty to balance stockholder and public benefit interest, the occurrence of which may have an adverse impact on our financial condition and results of operations.

Stockholders of a Delaware public benefit corporation (if they, individually or collectively, own the lesser of 2% of our outstanding shares or $2,000,000 in market value of our stock) are entitled to file a derivative lawsuit alleging directors failed to balance stockholder and public benefit interests. This potential liability does not exist for traditional corporations. Therefore, we may be subject to the possibility of increased derivative litigation, which would require the attention our management, and, as a result, may adversely impact our management's ability to effectively execute our strategy. Additionally, any such derivative litigation may be costly to defend or increase director and officer liability insurance premiums, which may have an adverse impact on our financial condition and results of operations.

General Risk Factors

We have incurred and 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 have incurred and, particularly after we are no longer an emerging growth company, will continue to incur significant legal, accounting and other expenses that we did not incur as a private company. Federal securities laws, including the Exchange Act, Sarbanes-Oxley Act of 2002, the Dodd-Frank Wall Street Reform and Consumer Protection Act and other applicable securities rules and regulations and the listing requirements of Nasdaq 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 are required to devote a substantial amount of time and resources to these compliance initiatives, potentially at the expense of other business concerns, which could harm our business, financial condition, results of operations and prospects. Moreover, these rules and regulations have increased, and may continue to increase, our legal and financial compliance costs, particularly as we have hired additional financial and accounting employees to meet public company internal control and financial reporting requirements and will make some activities more time-consuming and costly. For example, the costs of our director and officer liability insurance increased as a result of being a public company.

We continue to evaluate 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 practices.

As a public company, we must maintain proper and effective internal controls over financial reporting. Any failure to maintain the adequacy of these internal controls may adversely affect investor confidence in our company and, as a result, the value of our common stock.

As a new public reporting company, we recently became subject to the rules and regulations established by the SEC and Nasdaq. These rules and regulations require, among other things, that we establish and periodically evaluate procedures with respect to our internal control over financial reporting. Reporting obligations as a public company are likely to place a considerable strain on our financial and management systems, processes and controls, as well as on our personnel, including senior management. In addition, as a public company, we will be required to document and test our internal control over financial reporting pursuant to Section 404 of the Sarbanes-Oxley Act so that our management can certify as to the effectiveness of our internal control over financial reporting. Management's initial certification under Section 404 of the Sarbanes-Oxley Act will be required with our annual report on Form 10-K for the year ending December 31, 2022. In support of such certifications, we will be required to document and make significant changes and enhancements, including potentially hiring additional personnel, to our internal control over financial reporting. Likewise, our independent registered public accounting firm will not be required to attest to the effectiveness of our internal control over financial reporting until our first annual report required to be filed with the SEC following the date we are no longer an EGC. At such time as we are required to obtain auditor attestation, if we then have a material weakness, we would receive an adverse opinion regarding our internal control over financial reporting from our independent registered accounting firm.

To achieve compliance with Section 404 within the prescribed period, we are engaged in a process to document and evaluate our internal control over financial reporting, which is both costly and challenging. In this regard, we will need to continue to dedicate internal resources, including through hiring additional financial and accounting personnel, engage outside consultants and adopt a detailed work plan to assess and document the adequacy of internal control over financial reporting, continue steps to improve control processes as appropriate, validate through testing that controls are functioning as documented and implement a continuous reporting and improvement process for internal control over financial reporting. During our evaluation of our internal control, if we identify one or more material weaknesses in our internal control over financial reporting, we will be unable to assert that our internal control over financial reporting is effective. We cannot assure you that there will not be material weaknesses or significant deficiencies in our internal control over financial reporting in the future. Any failure to maintain internal control over financial reporting could severely inhibit our ability to accurately report our financial condition, or results of operations. If we are unable to conclude that our internal control over financial reporting is effective or if our independent registered public accounting firm determines we have a material weakness or significant deficiency in our internal control over financial reporting, we could lose investor confidence in the accuracy and completeness of our financial reports, the market price of shares of our common stock could decline, and we could be subject to sanctions or investigations by Nasdaq, the SEC or other regulatory authorities. Failure to remedy any material weakness in our internal control over financial reporting or to implement or maintain other effective control systems required of public companies, could also restrict our future access to the capital markets.

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

We became a public company in April 2021 and are subject to the periodic reporting requirements of the Exchange Act. We designed our disclosure controls and procedures to reasonably assure 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 or internal 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.

Our results of operations and financial condition could be materially adversely affected by changes in accounting principles.

The accounting for our business is subject to change based on the evolution of our business model, interpretations of relevant accounting principles, enforcement of existing or new regulations and changes in policies, rules, regulations and interpretations of accounting and financial reporting requirements of the SEC or other regulatory agencies. Adoption of a change in accounting principles or interpretations could have a significant effect on our reported results of operations and could affect the reporting of transactions completed before the adoption of such change. For example, in February 2016, the Financial Accounting Standards Board issued ASU 2016-02, *Leases (Topic 842).* We implemented Topic 842 on January 1, 2022. Upon adoption, we recognized $152.3 million of right-of-use assets and $189.9 million of lease liabilities, net of the impact of eliminating existing deferred rent liabilities related to its leasing arrangements. It is difficult to predict the impact of future changes to accounting principles and accounting policies over financial reporting, any of which could adversely affect our results of operations and financial condition and could require significant investment in systems and personnel.

Item 2. Unregistered Sales of Equity and Use of Proceeds

Unregistered Sales of Equity Securities

None.

Use of Proceeds from our Initial Public Offering

In April 2021, the Company completed its IPO in which it sold an aggregate of 18,549,500 shares of its common stock (inclusive of 2,419,500 shares pursuant to the underwriters' option to purchase additional shares) at a price of $31.00 per share for aggregate cash proceeds of approximately $529.9 million, net of $40.3 million in underwriting discounts, commissions, and $4.9 million in offering costs. The offer and sale of the shares in our IPO were registered under the Securities Act pursuant to a registration statement on Form S-1 (File No. 333-254612), which was declared effective by the SEC on April 21, 2021 and a supplemental Registration Statement on Form S-1 (file No. 333-255425) which became automatically effective upon filing on April 21, 2021). The IPO closed on April 26, 2021. The representatives of the underwriters of our IPO were J.P. Morgan Securities LLC and Goldman Sachs & Co. LLC. No payments were made by us to directors, officers or persons owning ten percent or more of our common stock or to their associates, or to our affiliates, other than payments in the ordinary course of business to officers for salaries and to non-employee directors pursuant to our director compensation policy.

Upon receipt, the net proceeds from our IPO were held in cash and cash equivalents. There has been no material change in the planned or actual use of proceeds from our IPO from that described in the Prospectus.

Item 3. Defaults Upon Senior Securities

None.

Item 4. Mine Safety Disclosures

None.

Item 5. Other Information

None.

EXHIBIT INDEX

Exhibit Number	Description	Incorporated by Reference				Filed Herewith
		Form	File Number	Exhibit	Filing Date	
3.1	Amended and Restated Certificate of Incorporation of Zymergen Inc.	8-K	001-40354	3.1	April 26, 2021	
3.2	Amended and Restated Bylaws of Zymergen Inc.	8-K	001-40354	3.2	April 26, 2021	
10.1	Employment Separation Letter Agreement with Aaron Kimball.					X
31.1	Certification of the Principal Executive Officer pursuant to Rules 13a-14(a) and 15d-14(a) under the Securities Exchange Act of 1934, as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.					X
31.2	Certification of the Principal Financial Officer pursuant to Rules 13a-14(a) and 15d-14(a) under the Securities Exchange Act of 1934, as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.					X
32.1*	Certifications of the Principal Executive Officer and 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	XBRL Instance Document					
101.SCH	XBRL Taxonomy Extension Schema Document					
101.CAL	XBRL Taxonomy Extension Calculation Linkbase Document					
101.DEF	XBRL Taxonomy Extension Definition Linkbase Document					
101.LAB	XBRL Taxonomy Extension Label Linkbase Document					
101.PRE	XBRL Taxonomy Extension Presentation Linkbase Document					

* The certifications attached as Exhibit 32.1 that accompany this Quarterly Report on Form 10-Q are deemed furnished and not filed with the Securities and Exchange Commission and are not to be incorporated by reference into any filing of Zymergen, Inc. under the Securities Act of 1933, as amended, or the Securities Exchange Act of 1934, as amended, whether made before or after the date of this Quarterly Report on Form 10-Q, irrespective of any general incorporation language contained in such filing.

SIGNATURES

Pursuant to the requirements of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned thereunto duly authorized.

Zymergen Inc.

Date:	May 12, 2022	By:	/s/ Jay Flatley
		Name:	Jay Flatley
		Title:	Acting Chief Executive Officer (Principal Executive Officer)
Date:	May 12, 2022	By:	/s/ Enakshi Singh
		Name:	Enakshi Singh
		Title:	Chief Financial Officer (Principal Accounting and Financial Officer)

zymergen

April 1, 2022

Aaron Kimball

Re: Employment Separation Letter Agreement

Dear Aaron:

This letter agreement (this "Letter Agreement") confirms the termination of your employment with Zymergen Inc. (the "Company") and your resignation from all positions and offices with the Company and any of its affiliates, in each case, to take effect on April 1, 2022 (the "Separation Date").

In connection with your termination, the Company wishes to provide certain separation benefits to you, and you wish to receive such separation benefits, subject to the terms and conditions below.

This Letter Agreement shall become a binding agreement between you and the Company on the date you sign this Letter Agreement.

Therefore, for the receipt of good and adequate consideration, you and the Company agree as follows:

1. Final Pay; Business Expenses; Equity Grants.

(a) Upon the Separation Date, you will be paid all final wages accruing through the Separation Date as set forth on Exhibit A, in accordance with applicable law. You acknowledge and agree that the payments set forth on Exhibit A accurately and completely reflect all wages earned by you through the Separation Date, and that you are not entitled to any additional wages or benefits, including any salary, bonuses, commissions, benefits, or other compensation, in connection with your employment with or termination of employment from the Company, except as set forth in this Letter Agreement.

(b) As soon as possible and no later than the Separation Date, you will submit for reimbursement in accordance with the Company's expense reimbursement policies and practices all unreimbursed business expenses, if any, incurred by you, so that the Company may promptly pay you.

(c) You acknowledge and agree that as of the Separation Date, the unvested portion of any Company stock options, restricted stock units ("RSUs") or other equity awards held by you (after giving effect to the Separation Benefits, as defined in Section 3 below) shall terminate immediately.

2. Consideration. With the receipt of the payments and benefits set forth in Section 1 above, you will have received all payments and benefits earned or owed to you in connection with your employment with the Company, and you shall not be entitled to any additional compensation or benefits, except as provided below, subject to the terms and conditions set forth in this Letter Agreement. You acknowledge that the compensation and benefits provided below are good and valid consideration for the release of claims and other covenants set forth below.

3. Equity Awards. Provided you timely execute and return the general release attached hereto as Exhibit B (the "Release"), and subject to your continued compliance with the provisions set forth in Section 4 and Section 7 of this Letter Agreement, (i) all Company stock options held by you that are vested as of the Separation Date shall remain exercisable until April 1, 2023 and (ii) 17,708 of RSUs held by you that are unvested as of the Separation Date shall be deemed vested as of such date (collectively, the "Separation Benefits"). You acknowledge that to the extent any of your stock options constitute "incentive stock options" within the meaning of Section 422 of the Internal Revenue Code of 1986, as amended (the "Code"), they shall be deemed modified for the purposes of Section 424 of the Code and, to the extent the exercise price thereof is lower than the fair market value of the Company's common stock as of the date you execute this Letter Agreement, such options will no longer qualify as incentive stock options and you will lose the potentially favorable tax treatment associated with such options.

4. Restrictive Covenants. Both during and after your employment you acknowledge your continuing obligations under that certain Proprietary Information and Invention Assignment Agreement (the "PIIA Agreement") entered into by and between you and the Company on or about March 10, 2021 not to use or disclose any confidential or proprietary information of the Company and to refrain from certain solicitation activities, in each case as detailed in the PIIA Agreement. A copy of your PIIA Agreement is attached hereto as Exhibit C. You acknowledge that all such covenants remain in full force and effect pursuant to their terms, and that your continuing compliance with such obligations is a material condition to the Company's agreement to enter into this Letter Agreement. As of the Separation Date, you will have executed and delivered to the Company the "Termination Certificate" attached as Appendix B to your PIIA Agreement. Following the Separation Date, you agree not to publish or disseminate, directly or indirectly, any statements, whether written or oral, that are or could be harmful to or reflect negatively on any of the Company or any of its affiliates, or that are otherwise disparaging of any of the Company's, its affiliates or any of their past or present officers, directors, employees, advisors, agents, policies, procedures, practices, decision-making, conduct, professionalism or compliance with standards. In the event that following your Separation Date, the Company determines that during your employment with the Company and its affiliates, you engaged in conduct that would have constituted "Cause" for termination (as defined under your Employment Agreement with the Company effective on or about April 21, 2021) or you breached your obligations under this Section 4 or Section 7 (including your obligations under the PIIA Agreement), the Company shall have no further obligations under Section 3 and you will forfeit any stock options that remain outstanding pursuant to Section 3 and, to the extent permitted by applicable law, you shall pay the Company an amount equal to all proceeds received in connection with any sale or other disposition of any shares underlying your stock options, RSUs and any other equity awards.

Notwithstanding the foregoing, nothing herein shall restrict you from responding to a valid subpoena, nor shall you be prohibited from communicating with any government agency, including your right to communicate directly with the U.S. Securities and Exchange Commission, the U.S. Commodity Futures Trading Commission, the U.S. Department of Justice or similar agency, or to cooperate with or participate in any investigation conducted by such agency or to make any other disclosures that are protected under the whistleblower provisions of applicable law. For the avoidance of doubt, you do not need to notify or obtain the prior authorization of the Company to exercise any of the foregoing rights. Further, you understand that: (i) you will not be held criminally or civilly liable under any federal or state trade secret law for the disclosure of a trade secret that is made in confidence to a federal, state, or local government official or to an attorney solely for the purpose of reporting or investigating a suspected violation of law; (ii) you will not be held criminally or civilly liable under any federal or state trade secret law for the disclosure of a trade secret that is made in a complaint or other document filed in a lawsuit or other proceeding, if such filing is made under seal; and (iii) if you file a lawsuit for retaliation by the Company for reporting a suspected violation of law, you may disclose trade secrets to your attorney and use the trade secret information in the court proceeding if you: (x) file any document containing the trade secret under seal; and (y) do not disclose the trade secret, except pursuant to court order.

5. Arbitration. Without limiting your right to file Claims (as defined in the Release) with governmental agencies, you and the Company agree and desire that all disputes between you and the Company relating to or arising out of your employment with the Company or this Letter Agreement, other than Claims which you have effectively released pursuant to the Release and Claims that cannot, as a matter of law, be required to arbitrate (collectively, "Covered Claims"), will, to the fullest extent permitted by law, be resolved by final and binding arbitration in the county where you primarily worked for the Company as of the Separation Date. The arbitration will be conducted by a single, neutral arbitrator in accordance with the applicable arbitration rules ("Rules") of the Judicial Arbitration and Mediation Service ("JAMS") in effect when the dispute is submitted to arbitration, which can be found at www.jamsadr.com, or other rules mutually agreed upon in writing by the Company and you. The arbitrator shall be appointed as mutually agreed upon by you and the Company or, if no agreement can be reached, by JAMS pursuant to its Rules. The Federal Arbitration Act, 9 U.S.C. §§ 1 et seq. shall govern the interpretation and enforcement of this arbitration clause. The Company and you shall be entitled to more than minimal discovery and the arbitrator shall prepare a written decision containing the essential findings and conclusions on which the award is based so as to ensure meaningful judicial review of the decision. The arbitrator shall apply the same substantive law, with the same statutes of limitation and the same remedies that would apply if the claims were brought in a court of law. The Company shall pay all costs unique to arbitration, including without limitation arbitration administrative fees, arbitrator compensation and expenses, and costs of any witnesses called by the arbitrator. Unless otherwise ordered by the arbitrator under applicable law, you and the Company shall each bear your or its own expenses, such as expert witness fees and attorneys' fees and costs. Nothing herein shall prevent you or the Company from seeking a statutory award of reasonable attorneys' fees and costs, if any. This Section 5 shall be governed by and enforceable pursuant to the Federal Arbitration Act. This Section 5 is intended to be the exclusive method for resolving any and all Claims by you or the Company against each other for payment of damages under this Letter Agreement or relating to your employment; provided, however, that neither this Letter Agreement nor the submission to arbitration shall limit your or the Company's right to seek provisional relief, including without limitation injunctive relief, in any court of competent jurisdiction.

6. Waiver of Right to Jury Trial; Class Action Waiver. The Company and you understand and agree that this Letter Agreement constitutes a waiver of its and your right to a trial by court or jury of any Covered Claims. You understand and acknowledge that this Letter Agreement also constitutes a waiver of your right to bring any Covered Claim as part of or in connection with, or to participate with each person in or recover through, a class action lawsuit or claim. You and the Company agree that no Covered Claim shall be resolved by a court or jury trial, and no Covered Claim shall be brought as a class action.

7. Cooperation. You shall assist and cooperate with the Company and its affiliates, (i) concerning reasonable requests for information about the business of the Company or its affiliates or your involvement and participation therein; (ii) in connection with the defense, prosecution or investigation of any claims or actions now in existence or which may be brought in the future against or on behalf of the Company or its subsidiaries or affiliates, including any proceeding before any arbitral, administrative, judicial, legislative, or other body or agency, including testifying in any proceeding to the extent such claims, actions, investigations or proceedings relate to services performed or required to be performed by you, pertinent knowledge possessed by you, or any act or omission by you; and (iii) and in connection with any investigation or review by any federal, state or local regulatory, quasi- or self-regulatory or self-governing authority or organization (including, without limitation, the SEC and FINRA) as any such investigation or review relates to services performed or required to be performed by you, pertinent knowledge possessed by you, or any act or omission by you. Your full cooperation shall include, but not be limited to, being available to meet and speak with board members, officers or employees of the Company, its affiliates and/or their counsel at reasonable times and locations, executing accurate and truthful documents, appearing at the Company's request as a witness at depositions, trials or other proceedings without the necessity of a subpoena, and taking such other actions as may reasonably be requested by the Company and/or its counsel to effectuate the foregoing. In requesting such services, the Company will consider other commitments that you may have at the time of the request.

8. Employee's Representations. You represent and warrant that:

(a) As of your Separation Date, you will have returned to the Company all Company property in your possession, including, without limitation, all Confidential Information, laptops, cell phones, portable devices, software, keys, access badges or IDs, credit cards, thumb drives, equipment, supplies, records, files, handbooks, guidelines, materials, documents, and all other property belonging to the Company, whether in physical or electronic form, and all copies thereof.

(b) You are not owed wages, salaries, commissions, bonuses, business expenses, benefits, or other compensation, other than as set forth in this Letter Agreement.

(c) During the course of your employment, you did not sustain any injuries for which you might be entitled to compensation pursuant to worker's compensation law.

(d) You have not initiated any adversarial proceedings of any kind against any of the Company Parties, nor will you do so in the future, except as specifically allowed by this Letter Agreement.

(e) You have signed this Letter Agreement knowingly and voluntarily, without any duress.

(f) In signing this Letter Agreement, everything you are receiving is set forth herein, and you are not relying upon any agreements, promises or statements, verbal, written, or implied, that are not expressly set forth in this Letter Agreement.

9. Severability. The provisions of this Letter Agreement are severable. If any provision is held to be invalid or unenforceable, it shall not affect the validity or the enforceability of any other provision. You represent that you have thoroughly read and considered all aspects of this Letter Agreement, that you understand all of its provisions, and that you are voluntarily entering into this Letter Agreement.

10. Governing Law. Except as expressly provided otherwise herein, this Letter Agreement will in all respects be interpreted, enforced and governed under the laws of the State of California, without regard to the conflicts of law rules thereof.

11. Integrated Agreement. This Letter Agreement, together with the PIIA Agreement, sets forth the entire agreement between you and Company and supersedes and replaces any and all prior oral or written agreements or understandings between you and Company.

12. Amendment of this Letter Agreement. This Letter Agreement may not be altered, amended, or modified except by a further written document signed by you and an authorized representative of Company.

13. Execution in Counterparts. This Letter Agreement may be executed in counterparts with the same force and effectiveness as though executed in a single document. Facsimile and electronic signatures shall have the same force and effectiveness as original signatures.

14. Section 409A.

(a) General. The intent of the parties is that the payments and benefits under this Letter Agreement comply with or be exempt from Section 409A of the Code and the Department of Treasury regulations and other interpretive guidance issued thereunder, including without limitation any such regulations or other guidance that may be issued after the date hereof, ("Section 409A") and, accordingly, to the maximum extent permitted, this Letter Agreement shall be interpreted to be in compliance therewith. Notwithstanding any provision of this Letter Agreement to the contrary, if the Company determines that any compensation or benefits payable under this Letter Agreement may be subject to Section 409A, the Company shall work in good faith with you to adopt such amendments to this Letter Agreement or adopt other policies and procedures (including amendments, policies and procedures with retroactive effect), or take any other actions, that the Company determines are necessary or appropriate to avoid the imposition of taxes under Section 409A, including, without limitation, actions intended to (i) exempt the compensation and benefits payable under this Letter Agreement from Section 409A, and/or (ii) comply with the requirements of Section 409A; however, this Section 14 shall not create an obligation on the part of the Company to adopt any such amendment, policy or procedure or take any such other action, nor shall the Company (A) have any liability for failing to do so, or (B) incur or indemnify you for any taxes, interest or other liabilities arising under or by operation of Section 409A.

(b) Six-Month Delay. Notwithstanding anything to the contrary in this Letter Agreement, no compensation or benefits shall be paid to you during the six (6)-month period following your "separation from service" with the Company (within the meaning of Section 409A) if the Company determines that paying such amounts at the time or times indicated in this letter would be a prohibited distribution under Section 409A(a)(2)(B)(i) of the Code. If the payment of any such amounts is delayed as a result of the previous sentence, then on the first business day following the end of such six (6)-month period (or such earlier date upon which such amount can be paid under Section 409A without resulting in a prohibited distribution, including as a result of your death), the Company shall pay you a lump-sum amount equal to the cumulative amount that would have otherwise been payable to you during such period (without interest).

(c) Reimbursements. To the extent that any reimbursement of expenses or in-kind benefits constitutes "deferred compensation" under Section 409A, such reimbursement or benefit shall be provided no later than December 31st of the year following the year in which the expense was incurred. The amount of expenses reimbursed in one year shall not affect the amount eligible for reimbursement in any subsequent year. The amount of any in-kind benefits provided in one year shall not affect the amount of in-kind benefits provided in any other year.

Signature Page Follows

To indicate your acknowledgment and agreement to the terms above, please date and sign the original of this Letter Agreement in the place indicated below no later than April 8, 2022.

Very truly yours,

ZYMERGEN INC.

/s/ Judy Gilbert

Judy Gilbert
Chief People Officer

Accepted and agreed to on
this 1st day of April, 2022 by:

/s/ Aaron Kimball

Aaron Kimball

Exhibit A

The final wages referenced in Section 1 shall include your unpaid base salary accruing through the Separation Date; and

Such final wages will be paid out in accordance with the applicable plan documents, if any, and the applicable wage payment laws and will be subject to applicable taxes, garnishments and any other withholding required by law or authorized by you.

Exhibit B

RELEASE OF CLAIMS

WHEREAS, Aaron Kimball (hereinafter "Executive") and Zymergen Inc. (hereinafter the "Company") (collectively, "the parties") are party to that certain Employment Separation Letter Agreement, dated as of April 1, 2022 (the "Letter Agreement");

WHEREAS, Executive's employment with the Company terminated effective April 1, 2022 (the "Termination Date"); and

WHEREAS, the parties have agreed to a separation package to ease Executive's transition from the Company's employment and to resolve any and all disputes between them.

IT IS HEREBY AGREED by and between Executive and the Company as follows:

1. If Executive executes this Release of Claims (this "Release") on or after the Termination Date, then this Release shall become effective and the Company, for and in consideration of the undertakings of Executive set forth and referenced herein, and intending to be legally bound, agrees to provide Executive, the benefits set forth in Section 3 of the Letter Agreement, subject to the terms and conditions set forth in the Letter Agreement (the "Separation Benefits").

2. Executive expressly acknowledges and agrees that he has seven (7) days to consider this Release. If Executive does not sign this Release within seven (7) days following the Termination Date, then Executive will not receive the Separation Benefits.

3. Executive agrees not to sue, or otherwise file any claim against, the Company or its parent companies, subsidiaries or affiliates, and any of their respective successors, assigns, directors, officers, managers, employees, attorneys, insurers, or agents (collectively, the "Company Parties") for any reason whatsoever based on anything that has occurred at any time up to and including the date hereof as follows:

4. On behalf of Executive and Executive's executors, administrators, heirs and assigns, Executive hereby releases and forever discharges the Company Parties, and all persons acting by, through, under or in concert with them, or any of them, of and from any and all manner of action or actions, cause or causes of action, in law or in equity, suits, debts, liens, contracts, agreements, promises, liability, claims, demands, damages, loss, cost or expense, of any nature whatsoever, known or unknown, fixed or contingent (hereinafter called "Claims"), which Executive now has or may hereafter have against any of the Company Parties by reason of any matter, cause, or thing whatsoever from the beginning of time through and including the date hereof, including, without limiting the generality of the foregoing: any Claims arising directly or indirectly out of, relating to, or in any other way involving in any manner whatsoever Executive's employment by the Company or the separation thereof, including without limitation any and all Claims arising under federal, state, or local laws relating to employment; any Claims of any kind that may be brought in any court or administrative agency; any Claims arising under the Age Discrimination in Employment Act, the Older Workers Benefits Protection Act, Title VII of the Civil Rights Act of 1964, the Civil Rights Act of 1991, the Equal Pay Act, the Civil Rights Act of 1866, Section 1981, 42 U.S.C. § 1981, the Family and Medical Leave Act of 1993, the Americans with Disabilities Act of 1990, the False Claims Act, the Employee Retirement Income Security Act, the Worker Adjustment and Retraining Notification Act, the Fair Labor Standards Act, the Sarbanes-Oxley Act of 2002, the National Labor Relations Act of 1935, the Uniformed Services Employment and Reemployment Rights Act of 1994, the Fair Credit Reporting Act, the California Consumer Credit Reporting Agencies Act, the California Fair Employment and Housing Act, the California Family Rights Act, the California WARN Act, the California Labor Code, California Business & Professions Code Section 17200, the California Family Military Leave Law, and California Military and Veterans Code, each of the foregoing as may have been amended, and any other federal, state, or local statute, regulation, ordinance, constitution, or order concerning labor or employment, termination of labor or employment, wages and benefits, retaliation, leaves of absence, or any other term or condition of employment; Claims for breach of contract; Claims for unfair business practices; Claims arising in tort, including, without limitation, Claims of wrongful dismissal or discharge, discrimination, harassment, retaliation, fraud, misrepresentation, defamation, libel, infliction of emotional distress, violation of public policy, and/or breach of the implied covenant of good faith and fair dealing; and Claims for damages or other remedies of any sort, including, without limitation, compensatory damages, punitive damages, injunctive relief and attorney's fees.

5. Notwithstanding the generality of the foregoing, Executive does not release any Claims that cannot be released as a matter of law including, without limitation, (i) Executive's right to file for California unemployment or disability insurance benefits; (ii) Executive's right to seek indemnity under California Labor Code Section 2802; (iii) Executive's right to file a charge of discrimination, harassment, interference with leave rights, failure to accommodate, or retaliation with the Equal Employment Opportunity Commission, the California Department of Fair Employment and Housing or similar local agency, or to cooperate with or participate in any investigation conducted by such agency, provided, however, that Executive hereby releases Executive's right to receive damages in any such proceeding brought by Executive or on Executive's behalf; (iv) Executive's right to communicate directly with the U.S. Securities and Exchange Commission, the U.S. Commodity Futures Trading Commission, the U.S. Department of Justice or similar agency, or to cooperate with or participate in any investigation conducted by such agency; or (v) Executive's right to make any other disclosures that are protected under the whistleblower provisions of applicable law. For the avoidance of doubt, Executive does not need to notify or obtain the prior authorization of the Company to exercise any of the foregoing rights.

6. EXECUTIVE ACKNOWLEDGES THAT EXECUTIVE HAS BEEN ADVISED OF AND IS FAMILIAR WITH THE PROVISIONS OF CALIFORNIA CIVIL CODE SECTION 1542, WHICH PROVIDES AS FOLLOWS:

"A GENERAL RELEASE DOES NOT EXTEND TO CLAIMS WHICH THE CREDITOR OR RELEASING PARTY DOES NOT KNOW OR SUSPECT TO EXIST IN HIS OR HER FAVOR AT THE TIME OF EXECUTING THE RELEASE, WHICH, IF KNOWN BY HIM OR HER, MUST HAVE MATERIALLY AFFECTED HIS OR HER SETTLEMENT WITH THE DEBTOR OR RELEASED PARTY."

BEING AWARE OF SAID CODE SECTION, EXECUTIVE HEREBY EXPRESSLY WAIVES ANY RIGHTS EXECUTIVE MAY HAVE THEREUNDER, AS WELL AS UNDER ANY OTHER STATUTES OR COMMON LAW PRINCIPLES OF SIMILAR EFFECT.

7. Executive acknowledges as follows:

(i) Executive has been advised to consult an attorney of Executive's choice before signing this Release and Executive either has so consulted with counsel or voluntarily decided not to consult with counsel; and

(ii) Executive has carefully reviewed and considered and fully understands the terms set forth in this Release.

This Release will in all respects be interpreted, enforced and governed under the laws of the State of California, without regard to the conflicts of law rules thereof.

EXECUTIVE

/s/ Aaron Kimball

Aaron Kimball

ZYMERGEN INC.

/s/ Judy Gilbert

Judy Gilbert
Chief People Officer

Exhibit C

A copy of your PIIA is attached.

Exhibit 31.1

CERTIFICATION OF PERIODIC REPORT UNDER SECTION 302 OF THE SARBANES-OXLEY ACT OF 2002

I, Jay Flatley, certify that:

1. I have reviewed this quarterly report on Form 10-Q of Zymergen 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) 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

c) 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.

ZYMERGEN INC.

Date: May 12, 2022

By: /s/ Jay Flatley

Jay Flatley

Acting Chief Executive Officer

(Principal Executive Officer)

Exhibit 31.2

CERTIFICATION OF PERIODIC REPORT UNDER SECTION 302 OF THE SARBANES-OXLEY ACT OF 2002

I, Enakshi Singh, certify that:

1. I have reviewed this quarterly report on Form 10-Q of Zymergen 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) 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

c) 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.

ZYMERGEN INC.

Date: May 12, 2022

By: /s/ Enakshi Singh

Enakshi Singh

Chief Financial Officer

(Principal Accounting and Financial Officer)

Exhibit 32.1

CERTIFICATIONS OF PRINCIPAL EXECUTIVE OFFICER AND PRINCIPAL FINANCIAL OFFICER
PURSUANT TO
18 U.S.C. SECTION 1350,
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

I, Jay Flatley, certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that the Quarterly Report on Form 10-Q of Zymergen Inc. for the fiscal quarter ended March 31, 2022 fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934 and that information contained in such Quarterly Report on Form 10-Q fairly presents, in all material respects, the financial condition and results of operations of Zymergen Inc.

I, Enakshi Singh, certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that the Quarterly Report on Form 10-Q of Zymergen Inc. for the fiscal quarter ended March 31, 2022 fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934 and that information contained in such Quarterly Report on Form 10-Q fairly presents, in all material respects, the financial condition and results of operations of Zymergen Inc.

ZYMERGEN, INC.

Date: May 12, 2022

By: /s/ Jay Flatley
Jay Flatley
Acting Chief Executive Officer
(Principal Executive Officer)

Date: May 12, 2022

By: /s/ Enakshi Singh
Enakshi Singh
Chief Financial Officer
(Principal Accounting and Financial Officer)