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 June 30, 2023

or

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

For the transition period from to

Commission file number: 001-34705

Codexis, Inc.

(Exact name of registrant as specified in its charter)

Delaware	**71-0872999**
(State or other jurisdiction of incorporation or organization)	**(I.R.S. Employer Identification No.)**
200 Penobscot Drive, Redwood City, California	**94063**
(Address of principal executive offices)	**(Zip Code)**

Registrant's telephone number, including area code: (650) 421-8100

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

Title of Each Class	Trading Symbol(s)	Name of Each Exchange on Which Registered
Common Stock, par value $0.0001 per share	CDXS	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 transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act. ☐

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

As of July 31 2023, there were 69,803,994 shares of the registrant's Common Stock, par value $0.0001 per share, outstanding.

Codexis, Inc.
Quarterly Report on Form 10-Q
For the Quarter Ended June 30, 2023

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Codexis, Inc.
Condensed Consolidated Balance Sheets
(Unaudited)
(In Thousands, Except Per Share Amounts)

	June 30, 2023	December 31, 2022
Assets		
Current assets:		
Cash and cash equivalents	$ 92,093	$ 113,984
Restricted cash, current	524	521
Financial assets:		
Accounts receivable	8,806	31,904
Contract assets	2,248	2,116
Unbilled receivables	10,691	7,016
Total financial assets	21,745	41,036
Less: allowances	(133)	(163)
Total financial assets, net	21,612	40,873
Inventories	2,052	2,029
Prepaid expenses and other current assets	3,763	5,487
Total current assets	120,044	162,894
Restricted cash	1,530	1,521
Investment in non-marketable equity securities ($0 and $13,921 with a related party)	21,378	20,510
Right-of-use assets - Operating leases, net	36,745	39,263
Property and equipment, net	23,325	22,614
Goodwill	3,241	3,241
Other non-current assets	498	350
Total assets	$ 206,761	$ 250,393
Liabilities and Stockholders' Equity		
Current liabilities:		
Accounts payable	$ 4,042	$ 3,246
Accrued compensation	8,538	11,453
Other accrued liabilities	7,001	15,279
Current portion of lease obligations - Operating leases	5,626	5,360
Deferred revenue	10,529	13,728
Total current liabilities	35,736	49,066
Deferred revenue, net of current portion	10,110	16,881
Long-term lease obligations - Operating leases	35,379	38,278
Other long-term liabilities	1,405	1,371
Total liabilities	82,630	105,596
Commitments and Contingencies (Note 10)		
Stockholders' equity:		
Preferred stock, $0.0001 par value per share; 5,000 shares authorized, none issued and outstanding	—	—
Common stock, $0.0001 par value per share; 100,000 shares authorized; 69,804 shares and 65,811 shares issued and outstanding as of June 30, 2023 and December 31, 2022, respectively	6	6
Additional paid-in capital	579,555	566,081
Accumulated deficit	(455,430)	(421,290)
Total stockholders' equity	124,131	144,797
Total liabilities and stockholders' equity	$ 206,761	$ 250,393

See accompanying notes to the unaudited condensed consolidated financial statements.

Codexis, Inc.
Condensed Consolidated Statements of Operations
(Unaudited)
(In Thousands, Except Per Share Amounts)

	Three Months Ended June 30,		Six Months Ended June 30,	
	2023	2022	2023	2022
Revenues:				
Product revenue ($0, $143, $0 and $143 from a related party)	$ 11,048	$ 34,645	$ 19,412	$ 65,335
Research and development revenue ($0, $0, $0 and $245 from a related party)	10,275	3,761	14,893	8,411
Total revenues	21,323	38,406	34,305	73,746
Costs and operating expenses:				
Cost of product revenue	3,178	11,270	7,698	19,791
Research and development	17,334	19,089	33,988	38,590
Selling, general and administrative	13,365	10,656	28,765	26,360
Restructuring charges	72	—	145	—
Total costs and operating expenses	33,949	41,015	70,596	84,741
Loss from operations	(12,626)	(2,609)	(36,291)	(10,995)
Interest income	1,121	140	2,209	182
Other expense, net	(9)	(63)	(33)	(66)
Loss before income taxes	(11,514)	(2,532)	(34,115)	(10,879)
Provision for income taxes	9	108	25	117
Net loss	$ (11,523)	$ (2,640)	$ (34,140)	$ (10,996)
Net loss per share, basic and diluted	$ (0.17)	$ (0.04)	$ (0.51)	$ (0.17)
Weighted average common stock shares used in computing net loss per share, basic and diluted	67,573	65,288	66,756	65,193

See accompanying notes to the unaudited condensed consolidated financial statements.

Codexis, Inc.
Condensed Consolidated Statements of Stockholders' Equity
(Unaudited)
(In Thousands)

Three Months Ended June 30, 2023	Common Stock Shares	Common Stock Amount	Additional Paid-in Capital	Accumulated Deficit	Total Stockholders' Equity
Balance as of April 1, 2023	66,696	$ 6	$ 569,917	$ (443,907)	$ 126,016
Exercise of stock options	71	—	141	—	141
Release of stock awards	285	—	—	—	—
Employee stock-based compensation	—	—	2,716	—	2,716
Issuance of common stock, net of issuance costs of $331	2,752	—	6,781	—	6,781
Net loss	—	—	—	(11,523)	(11,523)
Balance as of June 30, 2023	69,804	$ 6	$ 579,555	$ (455,430)	$ 124,131

Three Months Ended June 30, 2022	Common Stock Shares	Common Stock Amount	Additional Paid-in Capital	Accumulated Deficit	Total Stockholders' Equity
Balance as of April 1, 2022	65,304	$ 6	$ 554,683	$ (396,054)	$ 158,635
Exercise of stock options	97	—	251	—	251
Release of stock awards	95	—	—	—	—
Employee stock-based compensation	—	—	3,174	—	3,174
Non-employee stock-based compensation	—	—	57	—	57
Taxes paid related to net share settlement of equity awards	(2)	—	(18)	—	(18)
Net loss	—	—	—	(2,640)	(2,640)
Balance as of June 30, 2022	65,494	$ 6	$ 558,147	$ (398,694)	$ 159,459

See accompanying notes to the unaudited condensed consolidated financial statements.

Codexis, Inc.
Condensed Consolidated Statements of Stockholders' Equity
(Unaudited)
(In Thousands)

Six Months Ended June 30, 2023	Common Stock Shares	Common Stock Amount	Additional Paid-in Capital	Accumulated Deficit	Total Stockholders' Equity
Balance as of January 1, 2023	65,811	$ 6	$ 566,081	$ (421,290)	$ 144,797
Exercise of stock options	214	—	422	—	422
Release of stock awards	764	—	—	—	—
Employee stock-based compensation	—	—	5,525	—	5,525
Issuance of common stock, net of issuance costs of $721	3,080	—	7,931	—	7,931
Taxes paid related to net share settlement of equity awards	(65)	—	(404)	—	(404)
Net loss	—	—	—	(34,140)	(34,140)
Balance as of June 30, 2023	69,804	$ 6	$ 579,555	$ (455,430)	$ 124,131

Six Months Ended June 30, 2022	Common Stock Shares	Common Stock Amount	Additional Paid-in Capital	Accumulated Deficit	Total Stockholders' Equity
Balance as of January 1, 2022	65,109	$ 6	$ 552,083	$ (387,698)	$ 164,391
Exercise of stock options	175	—	432	—	432
Release of stock awards	285	—	—	—	—
Employee stock-based compensation	—	—	6,951	—	6,951
Non-employee stock-based compensation	—	—	118	—	118
Taxes paid related to net share settlement of equity awards	(75)	—	(1,437)	—	(1,437)
Net loss	—	—	—	(10,996)	(10,996)
Balance as of June 30, 2022	65,494	$ 6	$ 558,147	$ (398,694)	$ 159,459

See accompanying notes to the unaudited condensed consolidated financial statements.

Codexis, Inc.
Condensed Consolidated Statements of Cash Flows
(Unaudited)
(In Thousands)

	Six Months Ended June 30,	
	2023	**2022**
Operating activities:		
Net loss	$ (34,140)	$ (10,996)
Adjustments to reconcile net loss to net cash used in operating activities:		
Depreciation	2,946	2,556
Amortization expense - right-of-use assets - operating and finance leases	2,517	2,406
Stock-based compensation	5,525	7,069
Provision (recovery) for credit losses	—	(307)
Equity securities earned from research and development activities ($0 and ($245) from a related party)	(118)	(245)
Other non-cash items	(15)	(27)
Changes in operating assets and liabilities:		
Financial assets	19,261	(10,962)
Inventories	(23)	(558)
Prepaid expenses and other assets	1,324	1,811
Accounts payable	631	(958)
Accrued compensation and other accrued liabilities	(10,373)	81
Other long-term liabilities	(2,864)	(2,527)
Deferred revenue	(9,970)	(710)
Net cash used in operating activities	(25,299)	(13,367)
Investing activities:		
Purchase of property and equipment	(4,120)	(7,030)
Proceeds from sale of property and equipment	15	28
Investment in non-marketable securities	(750)	(5,300)
Net cash used in investing activities	(4,855)	(12,302)
Financing activities:		
Proceeds from exercises of stock options	422	432
Proceeds from issuance of common stock in connection with public offering	8,652	—
Costs incurred in connection with issuance of common stock at public offering	(395)	(42)
Taxes paid related to net share settlement of equity awards	(404)	(1,437)
Net cash provided by (used in) financing activities	8,275	(1,047)
Net decrease in cash, cash equivalents and restricted cash	(21,879)	(26,716)
Cash, cash equivalents and restricted cash at the beginning of the period	116,026	118,895
Cash, cash equivalents and restricted cash at the end of the period	$ 94,147	$ 92,179
Supplemental disclosure of cash flow information:		
Interest paid	$ 10	$ 12
Income taxes paid	$ 193	$ —
Supplemental non-cash investing and financing activities:		
Capital expenditures incurred but not yet paid	$ 434	$ 409

The following table provides a reconciliation of cash, cash equivalents and restricted cash reported within the unaudited condensed consolidated balance sheets as of June 30, 2023 and 2022 to the total of the same such amounts shown above in the unaudited condensed consolidated statements of cash flows:

	June 30,	
	2023	**2022**
Cash and cash equivalents	$ 92,093	$ 90,113
Restricted cash, current and non-current	2,054	2,066
Total cash, cash equivalents and restricted cash	$ 94,147	$ 92,179

See accompanying notes to the unaudited condensed consolidated financial statements.

Codexis Inc.
Notes to Condensed Consolidated Financial Statements
(Unaudited)

Note 1. Description of Business

In these notes to the unaudited condensed consolidated financial statements, the "Company," "we," "us," and "our" refers to Codexis, Inc. and its subsidiaries on a consolidated basis.

We discover, develop, enhance, and commercialize novel, high performance enzymes and other classes of proteins leveraging our proprietary CodeEvolver® directed evolution platform.

As of June 30, 2023, we reported our financial results based ontwo reportable segments: Performance Enzymes and Novel Biotherapeutics. Our Performance Enzymes business consists primarily of two focus areas: i) biocatalysts for the sustainable manufacturing of pharmaceuticals and ii) enzymes for life science applications, including genomic sequencing and nucleic acid synthesis. Our Novel Biotherapeutics business includes product candidates in clinical and preclinical development. The segment information aligns with how the chief operating decision maker ("CODM"), who is our Chief Executive Officer (CEO), reviews and manages the business. In July 2023, we announced that we are discontinuing investment in Novel Biotherapeutics and expect to have just one business segment, Performance Enzymes, by the end of 2023.

Note 2. Basis of Presentation and Summary of Significant Accounting Policies

Basis of Presentation and Principles of Consolidation

The accompanying unaudited condensed consolidated financial statements have been prepared in accordance with generally accepted accounting principles in the United States of America ("GAAP") and the applicable rules and regulations of the Securities and Exchange Commission ("SEC") for interim financial information but does not include all the information and notes required by GAAP for complete financial statements. These interim unaudited condensed consolidated financial statements should be read in conjunction with the audited consolidated financial statements and notes thereto contained in our Annual Report on Form 10-K for the year ended December 31, 2022. The condensed consolidated balance sheet at December 31, 2022 has been derived from the audited consolidated financial statements at that date, but does not include all disclosures, including notes, required by GAAP for complete financial statements. The significant accounting policies used in preparation of the unaudited condensed consolidated financial statements for the three and six months ended June 30, 2023 and 2022, are consistent with those discussed in Note 2 to the audited consolidated financial statements in the Company's 2022 Annual Report on Form 10-K and are updated below as necessary. There have been no significant changes in our significant accounting policies or critical accounting estimates since December 31, 2022.

The unaudited condensed consolidated financial statements have been prepared on the same basis as the audited consolidated financial statements and, in the opinion of management, reflect all adjustments of a normal recurring nature considered necessary to present fairly our financial position as of June 30, 2023, results of our operations for the three and six months ended June 30, 2023 and 2022, changes in stockholders' equity for the three and six months ended June 30, 2023 and 2022, and cash flows for the six months ended June 30, 2023 and 2022. The interim results are not necessarily indicative of the results for any future interim period or for the entire year.

The unaudited condensed consolidated financial statements include the accounts of Codexis, Inc. and its wholly owned subsidiaries. All intercompany balances and transactions have been eliminated in consolidation.

Use of Estimates

The preparation of our unaudited condensed consolidated financial statements in conformity with GAAP requires us to make estimates, judgments and assumptions that may affect the reported amounts of assets, liabilities, equity, revenues and expenses and related disclosure of contingent assets and liabilities. We regularly assess these estimates which primarily affect revenue recognition, deferred revenue, inventories, valuation of equity investments, goodwill arising out of business acquisitions, accrued liabilities, stock awards, and the valuation allowances associated with deferred tax assets. Actual results could differ from those estimates and such differences may be material to the consolidated financial statements.

Accounting Pronouncements

Recently adopted accounting pronouncements or recently issued accounting pronouncements not yet adopted

There were no recent accounting pronouncements or changes in accounting pronouncements during the three and six months ended June 30, 2023, that are of significance or potential significance to us.

Note 3. Revenue Recognition

Disaggregation of Revenue

The following table provides information about disaggregated revenue from contracts with customers into the nature of the products and services, and geographic regions, and includes a reconciliation of the disaggregated revenue with reportable segments. The geographic regions that are tracked are the Americas (United States, Canada, and Latin America), EMEA (Europe, Middle East, and Africa), and APAC (Australia, New Zealand, Southeast Asia, and China).

Segment information is as follows (in thousands):

	Three Months Ended June 30, 2023			Three Months Ended June 30, 2022		
	Performance Enzymes	Novel Biotherapeutics	Total	Performance Enzymes	Novel Biotherapeutics	Total
Major products and service:						
Product revenue	$ 11,048	$ —	$ 11,048	$ 34,645	$ —	$ 34,645
Research and development revenue	8,260	2,015	10,275	1,885	1,876	3,761
Total revenues	$ 19,308	$ 2,015	$ 21,323	$ 36,530	$ 1,876	$ 38,406
Primary geographical markets:						
Americas	$ 3,671	$ 266	$ 3,937	$ 2,307	$ 1,307	$ 3,614
EMEA	6,600	1,749	8,349	4,121	569	4,690
APAC	9,037	—	9,037	30,102	—	30,102
Total revenues	$ 19,308	$ 2,015	$ 21,323	$ 36,530	$ 1,876	$ 38,406

	Six Months Ended June 30, 2023			Six Months Ended June 30, 2022		
	Performance Enzymes	Novel Biotherapeutics	Total	Performance Enzymes	Novel Biotherapeutics	Total
Major products and service:						
Product revenue	$ 19,412	$ —	$ 19,412	$ 65,335	$ —	$ 65,335
Research and development revenue	9,382	5,511	14,893	4,294	4,117	8,411
Total revenues	$ 28,794	$ 5,511	$ 34,305	$ 69,629	$ 4,117	$ 73,746
Primary geographical markets:						
Americas	$ 4,589	$ 1,932	$ 6,521	$ 4,861	$ 2,486	$ 7,347
EMEA	7,859	3,579	11,438	7,186	1,631	8,817
APAC	16,346	—	16,346	57,582	—	57,582
Total revenues	$ 28,794	$ 5,511	$ 34,305	$ 69,629	$ 4,117	$ 73,746

Contract Balances

The following table presents balances of contract assets, unbilled receivables, contract costs, and contract liabilities (in thousands):

	June 30, 2023	December 31, 2022
Contract assets	$ 2,248	$ 2,116
Unbilled receivables	$ 10,691	$ 7,016
Contract costs	$ —	$ 19
Contract liabilities: deferred revenue	$ 20,639	$ 30,609

We had no asset impairment charges related to financial assets in the three and six months ended June 30, 2023 and 2022.

The increase in contract assets was primarily due to increases in product revenue from contracts subject to over time revenue recognition. The increase in unbilled receivables was primarily due to the timing of billings. The decrease in deferred revenue was primarily due to timing of recognition of revenue, including the $2.9 million release of prior periods' product revenue deferrals during the second quarter of 2023 due to early termination of the enzyme supply obligations to a customer.

We recognized the following revenues (in thousands):

	Three Months Ended June 30,		Six Months Ended June 30,	
Revenue recognized in the period for:	2023	2022	2023	2022
Amounts included in contract liabilities at the beginning of the period:				
Performance obligations satisfied	$ 6,107	$ 441	$ 7,814	$ 1,413
Changes in the period:				
Changes in the estimated transaction price allocated to performance obligations satisfied in prior periods	3,356	(298)	3,140	(29)
Performance obligations satisfied from new activities in the period - contract revenue	11,860	38,263	23,351	72,362
Total revenues	$ 21,323	$ 38,406	$ 34,305	$ 73,746

Performance Obligations

The following table includes estimated revenue expected to be recognized in the future related to performance obligations that are unsatisfied or partially unsatisfied at the end of the reporting periods. The estimated revenue does not include contracts with original durations of one year or less, amounts of variable consideration attributable to royalties, or contract renewals that are unexercised as of June 30, 2023.

The balances in the table below are partially based on judgments involved in estimating future orders from customers subject to the exercise of material rights pursuant to respective contracts as of June 30, 2023 (in thousands):

	Remainder of 2023	2024	2025	2026 and Thereafter	Total
Product revenue	$ 8,868	$ 9,590	$ 140	$ 500	$ 19,098
Research and development revenue	1,541	—	—	—	1,541
Total revenues	$ 10,409	$ 9,590	$ 140	$ 500	$ 20,639

Note 4. Net Loss per Share

Basic net loss per share is computed by dividing the net loss by the weighted-average number of shares of common stock outstanding, less restricted stock awards ("RSAs") subject to forfeiture. Diluted net loss per share is computed by dividing net loss by the weighted-average number of shares of common stock shares outstanding, less RSAs subject to forfeiture, plus all additional common shares that would have been outstanding, assuming dilutive potential common stock shares had been issued for other dilutive securities. For all periods presented, diluted and basic net loss per share, are identical since potential common stock shares are excluded from the calculation, as their effect was anti-dilutive.

Anti-Dilutive Securities

In periods of net loss, the weighted average number of shares outstanding, prior to the application of the treasury stock method, excludes potentially dilutive securities from the computation of diluted net loss per common share because including such shares would have an anti-dilutive effect.

The following shares were not considered in the computation of diluted net loss per share because their effect was anti-dilutive (in thousands):

	Three Months Ended June 30,		Six Months Ended June 30,	
	2023	2022	2023	2022
Shares issuable under the Equity Incentive Plan	9,312	5,792	9,312	5,792

Note 5. Investments in Non-Marketable Securities

Non-Marketable Equity Securities

In March 2023, we purchased an additional 985,545 shares of Series B preferred stock for $0.8 million in Molecular Assemblies, Inc. ("MAI"), a privately held life sciences company. As of June 30, 2023, we held an aggregate of 19,277,914 shares of MAI's Series A and B preferred stock that we have earned or purchased from MAI. See Note 11 "Related Party Transactions" for additional information on our investment in MAI.

In March 2022, we entered into a Stock Purchase Agreement with seqWell, Inc. ("seqWell"), a privately held life sciences company, pursuant to which we purchased 1,000,000 shares of seqWell's Series C preferred stock for $5.0 million. In March 2023, we entered into a Master Collaboration Agreement and Research Agreement with seqWell (the "seqWell Agreement"), pursuant to which we are providing research and experimental screening and protein engineering activities in exchange for compensation in the form of additional shares of seqWell's common stock. We received 65,982 and 113,915 shares of seqWell's common stock from research and development services with seqWell and we recognized $59 thousand and $118 thousand in research and development revenue from these services during the three and six months ended June 30, 2023, respectively.

We own 207,070 shares of Series B-2 preferred stock of Arzeda Corp. ("Arzeda"), an early-stage computational protein design company.

Our non-marketable equity securities are investments in privately held companies without readily determinable market value and primarily relate to our investments in MAI, seqWell and Arzeda. These investments are accounted for under the measurement alternative and are measured at cost minus impairment, if any, plus or minus changes resulting from observable price changes for identical or similar securities of the same issuer. Non-marketable equity securities are measured at fair value on a non-recurring basis and classified within Level 2 in the fair value hierarchy when we estimate the fair value of these investments using the observable transaction price paid by third party investors for the same or similar security of the same issuers. We adjust the carrying value of non-marketable equity securities which have been remeasured during the period and recognize resulting gains or losses as a component of other expense, net in the unaudited condensed consolidated statements of operations.

There was no remeasurement event for our investments in MAI, seqWell, Arzeda, and other non-marketable equity securities that occurred during the three and six months ended June 30, 2023 and 2022. We recognized no realized gains or losses during the three and six months ended June 30, 2023 and 2022.

The following table presents the carrying value of our non-marketable equity securities (in thousands):

	June 30, 2023	December 31, 2022
MAI	$ 14,671	$ 13,921
seqWell	5,118	5,000
Arzeda	1,289	1,289
Other investments in non-marketable equity securities	300	300
Total non-marketable equity securities	$ 21,378	$ 20,510

Note 6. Fair Value Measurements

The following tables present the financial instruments that were measured at fair value on a recurring basis within the fair value hierarchy (in thousands):

	June 30, 2023			
	Level 1	Level 2	Level 3	Total
Money market funds	$ 80,109	$ —	$ —	$ 80,109

	December 31, 2022			
	Level 1	Level 2	Level 3	Total
Money market funds	$ 77,309	$ —	$ —	$ 77,309

During the three and six months ended June 30, 2023 and 2022, we didnot recognize any significant credit losses nor other-than-temporary impairment losses on non-marketable securities.

Note 7. Balance Sheets Details

Cash Equivalents

Cash equivalents as of June 30, 2023 and December 31, 2022, consisted of the following (in thousands):

	June 30, 2023		December 31, 2022	
	Adjusted Cost	Estimated Fair Value	Adjusted Cost	Estimated Fair Value
Money market funds [1]	$ 80,109	$ 80,109	$ 77,309	$ 77,309

[1] Money market funds are classified in cash and cash equivalents on our unaudited condensed consolidated balance sheets. Average contractual maturities (in days) is not applicable.

As of June 30, 2023, the total cash and cash equivalents balance of $92.1 million consisted of money market funds of $80.1 million and cash of $12.0 million held with major financial institutions. As of December 31, 2022, the total cash and cash equivalents balance of $114.0 million consisted of money market funds of $77.3 million and cash of $36.7 million held with major financial institutions.

Inventories

Inventories consisted of the following (in thousands):

	June 30, 2023	December 31, 2022
Raw materials	$ 108	$ 108
Work-in-process	6	91
Finished goods	1,938	1,830
Total Inventories	$ 2,052	$ 2,029

Inventories are recorded net of reserves of $1.2 million as of June 30, 2023 and December 31, 2022.

Property and Equipment, net

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

	June 30, 2023	December 31, 2022
Laboratory equipment	$ 40,813	$ 39,679
Leasehold improvements	16,771	16,633
Computer equipment and software	3,090	3,039
Office equipment and furniture	1,360	1,345
Construction in progress	3,763	1,739
Property and equipment	65,797	62,435
Less: accumulated depreciation and amortization	(42,472)	(39,821)
Property and equipment, net	$ 23,325	$ 22,614

Depreciation expense included in both research and development expenses and selling, general and administrative expenses in the unaudited condensed consolidated statements of operations was as follows (in thousands):

	Three Months Ended June 30,		Six Months Ended June 30,	
	2023	2022	2023	2022
Depreciation expense	$ 1,480	$ 1,341	$ 2,946	$ 2,556

Goodwill

Goodwill had a carrying value of $3.2 million as of June 30, 2023 and December 31, 2022.

Other Accrued Liabilities

Other accrued liabilities consisted of the following (in thousands):

	June 30, 2023	December 31, 2022
Accrued professional and outside service fees	$ 3,296	$ 3,495
Accrued purchases	2,884	10,852
Other	821	932
Total other accrued liabilities	$ 7,001	$ 15,279

Note 8. Stock-based Compensation

Equity Incentive Plans

In January 2023, our board of directors (the "Board") approved the 2022 Employment Inducement Award Plan (the "2022 Inducement Plan") which provides for the grant of non-qualified stock options, restricted stock awards ("RSAs"), restricted stock units ("RSUs"), performance awards, other stock awards and dividend equivalents to eligible employees with respect to an aggregate of up to 2,000,000 shares of our common stock. In June 2023, the 2022 Inducement Plan was terminated upon the stockholders' approval of an amendment to the Company's 2019 Incentive Award Plan (the "2019 Plan") at the 2023 annual meeting of the Company's stockholders (the "Annual Meeting").

In 2019, the Board and stockholders approved the 2019 Plan. The 2019 Plan superseded and replaced in its entirety our 2010 Equity Incentive Plan (the "2010 Plan") which was effective in March 2010, and no further awards will be granted under the 2010 Plan; however, the terms and conditions of the 2010 Plan will continue to govern any outstanding awards thereunder. The 2019 Plan provides for the grant of stock options, including incentive stock options and non-qualified stock options, stock appreciation rights, RSA, RSUs, performance-contingent restricted stock units ("PSUs"), performance based options ("PBOs"), other stock or cash based awards and dividend equivalents to eligible employees and consultants of the Company or any parent or subsidiary, as well as members of the Board.

The number of shares of our common stock available for issuance under the 2019 Plan is equal to the sum of (i) 7,897,144 shares, and (ii) any shares subject to awards granted under the 2010 Plan that were outstanding as of April 22, 2019 and thereafter terminate, expire, lapse or are forfeited; provided that no more than 14,000,000 shares may be issued upon the exercise of incentive stock options ("ISOs"). In June 2019, 8.1 million shares authorized for issuance under the 2019 Plan were registered under the Securities Act of 1933, as amended (the "Securities Act"). In April 2023, the Board approved an amendment to the 2019 Plan (the "2019 Amended Plan") which became effective upon stockholders' approval at the Annual Meeting in June 2023. The 2019 Amended Plan included the (i) increase in the number of shares available by 8,000,000 shares, such that an aggregate of 15,897,144 shares are reserved for issuance under the 2019 Amended Plan and any shares subject to awards granted under the 2010 Plan, and (ii) increase in the number of shares that may be granted as incentive stock options under the 2019 Amended Plan such that an aggregate of 22,000,000 shares of common stock may be granted as incentive stock options under the 2019 Amended Plan.

The 2010 Plan provided for the grant of incentive stock options, non-statutory stock options, RSUs, RSAs, PSUs, PBOs, stock appreciation rights, and stock purchase rights to our employees, non-employee directors and consultants.

Employee Stock Purchase Plan

In April 2023, the Board approved an employee stock purchase plan (the "ESPP") which became effective upon the stockholders' approval at the Annual Meeting in June 2023. The ESPP allows eligible employees of the Company to purchase shares of our common stock through payroll deductions over 24-month offering periods. The per share purchase price will be the lower of 85% of the closing trading price per share of our common stock on the first trading date of an offering period in which a participant is enrolled or 85% of the closing trading price per share on the purchase date. Participant purchases are limited to a maximum of $25,000 of fair value or our stock per calendar year. The Company is authorized to grant up to 2,000,000 shares of common stock under the ESPP. As of June 30, 2023, the Company had not issued any shares of common stock nor recognized any stock-based compensation expenses related to the ESPP.

Stock Options

The option exercise price for incentive stock options must be at least 100% of the fair value of our common stock on the date of grant and the option exercise price for non-statutory stock options is at least 85% of the fair value of our common stock on the date of grant, as determined by the Board. If, at the time of a grant, the optionee directly or by attribution owns stock possessing more than 10% of the total combined voting power of all of our outstanding capital stock, the exercise price for these options must be at least 110% of the fair value of the underlying common stock. Stock options granted to employees generally have a maximum term of ten years and vest over four years from the date of grant, of which 25% vest at the end of one year, and 75% vest monthly over the remaining three years. We may grant options with different vesting terms from time to time. Unless an employee's termination of service is due to disability or death, upon termination of service, any unexercised vested options will be forfeited at the end of three months or the expiration of the option, whichever is earlier.

Restricted Stock Units ("RSUs")

We also grant employees RSUs, which generally vest over either a three year period with 33% of the shares subject to the RSUs vesting on each yearly anniversary of the vesting commencement date or over a four year period with 25% of the shares subject to the RSU vesting on each yearly anniversary of the vesting commencement date, in each case contingent upon such employee’s continued service on such vesting date. RSUs are generally subject to forfeiture if employment terminates prior to the release of vesting restrictions. We may grant RSUs with different vesting terms from time to time.

Performance-contingent Restricted Stock Units ("PSUs") and Performance Based Options ("PBOs")

The compensation committee of the Board approved, solely in respect of non-executive employees, delegated to our CEO the authority to approve grants of PSUs. The compensation committee of the Board also approved grants of PBOs and PSUs to our executives. The PSUs and PBOs vest based upon both the successful achievement of certain corporate operating milestones in specified timelines and continued employment through the applicable vesting date. When the performance goals are deemed to be probable of achievement for these types of awards, recognition of stock-based compensation expense commences. Once the number of shares eligible to vest is determined, those shares vest in two equal installments with 50% vesting upon achievement, as determined by the compensation committee of the Board, and the remaining 50% vesting on the first anniversary of achievement, in each case, subject to the recipient’s continued service through the applicable vesting date. If the performance goals are achieved at the threshold level, the number of shares eligible to vest in respect of the PSUs and PBOs would be equal to half the number of PSUs granted and one-quarter the number of shares underlying the PBOs granted. If the performance goals are achieved at the target level, the number of shares eligible to vest in respect of the PSUs and PBOs would be equal to the number of PSUs granted and half of the shares underlying the PBOs granted. If the performance goals are achieved at the superior level, the number of shares eligible to vest in respect of the PSUs would be equal to two times the number of PSUs granted and equal to the number of PBOs granted. The number of shares issuable upon achievement of the performance goals at the levels between the threshold and target levels for the PSUs and PBOs or between the target level and superior levels for the PSUs would be determined using linear interpolation. Achievement below the threshold level would result in no shares being eligible to vest in respect of the PSUs and PBOs.

No PSUs and PBOs were granted during the first half of 2023. In 2022, we awarded PSUs ("2022 PSUs") and PBOs ("2022 PBOs"), each of which commence vesting based upon the achievement of various weighted performance goals, including finance and corporate strategy, performance enzymes and biotherapeutics deliverables, research plans, and organizational development. In the first quarter of 2023, the compensation committee of the Board determined that the 2022 PSUs and 2022 PBOs performance goals had been achieved at 85% and 42.5% of the target level, respectively, and recognized stock-based compensation expenses accordingly. Accordingly, 50% of the shares underlying the 2022 PSUs and PBOs vested in the first quarter of 2023 and 50% of the shares underlying the 2022 PSUs and PBOs will vest in the first quarter of 2024, in each case, subject to the recipient’s continued service on each vesting date.

In 2021, we awarded PSUs ("2021 PSUs") and PBOs ("2021 PBOs"), each of which commence vesting based upon the determination by the compensation committee of the Board of the achievement of various weighted performance goals, including total revenues, product revenue, performance enzymes pipeline advancements, biotherapeutics pipeline advancements, organization and infrastructure upgrades, and significant events that can be publicly announced. In the first quarter of 2022, we determined that the 2021 PSUs and 2021 PBOs performance goals had been achieved at 146% and 73% of the target level, respectively, and recognized stock-based compensation expenses accordingly. Accordingly, 50% of the shares underlying the 2021 PSUs and PBOs vested in the first quarter of 2022 and 50% of the shares underlying the 2021 PSUs and PBOs vested in the first quarter of 2023, in each case, subject to the recipient’s continued service on each vesting date.

Stock-Based Compensation Expense

Stock-based compensation expense is included in the unaudited condensed consolidated statements of operations as follows (in thousands):

	Three Months Ended June 30,		Six Months Ended June 30,	
	2023	2022	2023	2022
Cost of product revenue	$ 83	$ 143	$ 212	$ 243
Research and development	806	1,026	1,528	2,065
Selling, general and administrative	1,827	2,062	3,785	4,761
Total	$ 2,716	$ 3,231	$ 5,525	$ 7,069

The following table presents total stock-based compensation expense by security type included in the unaudited condensed consolidated statements of operations (in thousands):

	Three Months Ended June 30,		Six Months Ended June 30,	
	2023	2022	2023	2022
Stock options	$ 1,096	$ 794	$ 2,018	$ 1,600
RSUs and RSAs	1,373	1,333	2,499	2,495
PSUs	279	442	1,116	1,314
PBOs	(32)	662	(108)	1,660
Total	$ 2,716	$ 3,231	$ 5,525	$ 7,069

As of June 30, 2023, unrecognized stock-based compensation expense, net of expected forfeitures, was $10.8 million related to unvested stock options, $8.0 million related to unvested RSUs and RSAs, $0.8 million related to unvested PSUs, and $0.1 million related to unvested PBOs based on current estimates of the level of achievement. Stock-based compensation expense for these awards will be recognized through 2027.

Note 9. Capital Stock

Exercise of Options

For the six months ended June 30, 2023 and June 30, 2022, we issued 214,284 and 174,600 shares, respectively, upon option exercises at a weighted-average exercise price of $1.97 and $2.47 per share, respectively, with net cash proceeds of $0.4 million and $0.4 million, respectively.

Equity Distribution Agreement

In May 2021, we filed a Registration Statement on Form S-3 with the SEC, that automatically became effective upon its filing, under which we may sell common stock, preferred stock, debt securities, warrants, purchase contracts, and units from time to time in one or more offerings. On February 27, 2023, we filed a post-effective amendment to that Registration on Form S-3. Pursuant to that post-effective amendment, we registered an aggregate $200.0 million of securities. In May 2021, we entered into an Equity Distribution Agreement ("EDA") with Piper Sandler & Co ("PSC"), under which PSC, as our exclusive agent, at our discretion and at such times that we may determine from time to time, may sell over a three-year period from the execution of the EDA up to a maximum of $50.0 million of shares of our common stock. Under the terms of the EDA, PSC may sell the shares at market prices by any method that is deemed to be an "at the market offering" as defined in Rule 415 under the Securities Act of 1933, as amended.

We are not required to sell any shares at any time during the term of the EDA. The EDA will terminate upon the earlier of: (i) the issuance and sale of all shares through PSC on the terms and conditions of the EDA, or (ii) the termination of the EDA in accordance with its terms. Either party may terminate the EDA at any time upon written notification to the other party in accordance with the EDA, and upon such notification, the offering will terminate. Under no circumstances shall any shares be sold pursuant to the EDA after the date which is three years after the registration statement is first declared effective by the SEC. We agreed to pay PSC a commission of 3% of the gross sales price of any shares sold pursuant to the EDA. With the exception of certain expenses, we will pay PSC up to 8% of the gross sales price of the shares sold pursuant to the EDA for a combined amount of commission and reimbursement of PSC's expenses and fees.

During the three and six months ended June 30, 2023,2,751,941 and 3,079,421 shares of our common stock, respectively, were issued and sold pursuant to the EDA. During the three and six months ended June 30, 2023, we received gross proceeds of $7.1 million and $8.7 million, or $6.8 million and $7.9 million in net proceeds after PSC's commissions and direct offering expenses of $0.3 million and $0.7 million, respectively. As of June 30, 2023, $41.3 million worth of shares remained available for sale under the EDA. During the three and six months ended June 30, 2022, no shares of our common stock were issued pursuant to the EDA.

Note 10. Commitments and Contingencies

Operating Leases

Our headquarters are located in Redwood City, California, where we occupy approximately 77,300 square feet of office and laboratory space in multiple buildings within the same business park operated by Metropolitan Life Insurance Company ("MetLife"). Our lease agreement with MetLife ("RWC Lease") includes approximately 28,200 square feet of space located at 200 and 220 Penobscot Drive, Redwood City, California (the "200/220 Penobscot Space") and approximately 37,900 square feet of space located at 400 Penobscot Drive, Redwood City, California (the "400 Penobscot Space") (the 200/220 Penobscot Space and the 400 Penobscot Space are collectively referred to as the "Penobscot Space"), and approximately 11,200 square feet of space located at 501 Chesapeake Drive, Redwood City, California (the "501 Chesapeake Space").

We entered into the initial lease with MetLife for our facilities in Redwood City in 2004 and the RWC Lease has been amended multiple times since then to adjust the leased space and terms of the Lease. In February 2019, we entered into an Eighth Amendment to the Lease (the "Eighth Amendment") with MetLife with respect to the Penobscot Space and the 501 Chesapeake Space to extend the term of the Lease for additional periods. Pursuant to the Eighth Amendment, the term of the lease of the Penobscot Space has been extended through May 2027. The lease term for the 501 Chesapeake Space has been extended to May 2029. We have one (1) option to extend the term of the lease for the Penobscot Space for five (5) years, and one (1) separate option to extend the term of the lease for the 501 Chesapeake Space for five (5) years.

Pursuant to the terms of the RWC Lease, we exercised our right to deliver a letter of credit in lieu of a security deposit. The letter of credit is collateralized by deposit balances held by the bank in the amount of $1.1 million as of June 30, 2023 and December 31, 2022, and are recorded as non-current restricted cash on the unaudited condensed consolidated balance sheets.

In January 2021, we entered into a lease agreement with ARE-San Francisco No. 63, LLC ("ARE") to lease a portion of a facility consisted of approximately 36,593 rentable square feet in San Carlos, California to serve as additional office and research and development laboratory space (the "San Carlos Space"). The lease has a 10-year term from the lease commencement date of November 30, 2021 with one option to extend the term for an additional period of 5 years. We have provided ARE with a $0.5 million security deposit in the form of a letter of credit and is recorded as non-current restricted cash on the condensed consolidated balance sheet. In July 2023, we announced that we expect to consolidate operations from our San Carlos facility to our headquarters in Redwood City. The move is expected to occur during the second half of 2023, and we are actively pursuing options to substantially offset our lease obligation, including through a sublease or assignment.

We are required to restore certain areas of the Redwood City and San Carlos facilities that we are renting to their original form. We are expensing the asset retirement obligation over the terms of the respective leases. We review the estimated obligation each reporting period and make adjustments if our estimates change. We recorded asset retirement obligations of $0.5 million as of June 30, 2023 and December 31, 2022, which are included in other liabilities on the unaudited condensed consolidated balance sheets. Accretion expense related to our asset retirement obligations was nominal in the three and six months ended June 30, 2023 and 2022.

Lease and other information

Lease costs, amounts included in measurement of lease obligations and other information related to non-cancellable operating leases and finance leases were as follows (in thousands):

	Three Months Ended June 30,		Six Months Ended June 30,	
	2023	2022	2023	2022
Finance lease costs	$ —	$ —	$ —	$ 18
Operating lease costs	1,830	1,829	3,660	3,660
Short-term lease costs [1]	—	10	—	40
Total lease costs [2]	$ 1,830	$ 1,839	$ 3,660	$ 3,718

[1] Short-term lease costs on leases with terms of over one month and less than one year.
[2] The Company had no variable lease costs.

Other information:	Operating Leases
Weighted-average remaining lease term (in years)	6.7 years
Weighted-average discount rate	5.4 %

	Six Months Ended June 30,	
Cash paid (in thousands):	2023	2022
Operating cash flows from operating leases	$ 3,775	$ 2,817

As of June 30, 2023, our maturity analysis of annual undiscounted cash flows of the non-cancellable operating leases were as follows (in thousands):

Years Ending December 31,	Operating Leases
2023 (remaining 6 months)	$ 3,793
2024	7,783
2025	8,004
2026	8,232
2027	5,835
Thereafter	14,870
Total minimum lease payments	48,517
Less: imputed interest	7,512
Lease obligations	$ 41,005

Reconciliation of operating lease liabilities as shown within the unaudited condensed consolidated balance sheets:	
Current portion of lease obligations - Operating leases	$ 5,626
Long-term lease obligations - Operating leases	35,379
Total operating lease liabilities	$ 41,005

Other Commitments

We enter into supply and service arrangements in the normal course of business. Supply arrangements are primarily for fixed-price manufacture and supply. Service agreements are primarily for the development of manufacturing processes and certain studies. Commitments under service agreements are subject to cancellation at our discretion which may require payment of certain cancellation fees. The timing of completion of service arrangements is subject to variability in estimates of the time required to complete the work.

The following table provides quantitative data regarding our other commitments. Future minimum payments reflect amounts that we expect to pay including potential obligations under services agreements subject to risk of cancellation by us (in thousands):

	Payments Due by Period		
	Total	2023 (Remaining 6 Months)	2024 and Thereafter
Development and manufacturing services agreements	$ 3,221	$ 2,313	$ 908
Facility maintenance agreement	2,491	2,491	—
Total other commitments	$ 5,712	$ 4,804	$ 908

Credit Facility

In June 30, 2017, we entered into a credit facility (the "Credit Facility") with Western Alliance Bank consisting of term loans ("Term Debt") up to $10.0 million, and advances ("Advances") under a revolving line of credit ("Revolving Line of Credit") up to $5.0 million with an accounts receivable borrowing base of 80% of eligible accounts receivable. The right to take draws on the Term Debt expired on December 31, 2022. In March 2023, we terminated the Credit Facility with Western Alliance Bank.

Legal Proceedings

We may be involved in legal actions in the ordinary course of business, including inquiries and proceedings concerning business practices and intellectual property infringement, employee relations and other claims. We will recognize a loss contingency in the unaudited condensed consolidated financial statements when it is probable a liability has been incurred and the amount of the loss can be reasonably estimated. We will disclose any loss contingencies that do not meet both conditions if there is a reasonable possibility that a material loss may have been incurred. Gain contingencies are not recorded until they are realized.

Indemnifications

We are required to recognize a liability for the fair value of any obligations we assume upon the issuance of a guarantee. We have certain agreements with licensors, licensees and collaborators that contain indemnification provisions. In such provisions, we typically agree to indemnify the licensor, licensee and collaborator against certain types of third party claims. The maximum amount of the indemnifications is not limited. We accrue for known indemnification issues when a loss is probable and can be reasonably estimated. There were no accruals for expenses related to indemnification issues for any periods presented.

Note 11. Related Party Transactions

Molecular Assemblies, Inc.

In June 2020, we entered into a Stock Purchase Agreement with MAI, a privately held life sciences company, pursuant to which we purchased 1,587,050 shares of MAI's Series A preferred stock for $1.0 million. Mr. Nicols, our former President and CEO until August 2022, also joined MAI's board of directors in June 2020. Concurrently with our initial equity investment, we entered into a Master Collaboration and Research Agreement with MAI (the "MAI Agreement"), pursuant to which performed services utilizing our CodeEvolver® protein engineering platform technology to improve DNA polymerase enzymes in exchange for compensation in the form of additional shares of MAI's Series A and B preferred stock which are valued based on the observed transaction price of similar securities that MAI issued to third parties. We completed the R&D service with MAI pursuant to the MAI Agreement during the first quarter of 2022. In addition to our initial equity investment and the shares we have received under the MAI Agreement, in April 2021, we purchased an additional 1,000,000 shares of MAI's Series A preferred stock for $0.6 million and in September 2021, we purchased 9,198,423 shares of MAI's Series B preferred stock for $7.0 million.

Revenues recognized from transactions with MAI in the three and six months ended June 30, 2023, and subsequent to the related party period which ended in August 2022, are included in the condensed consolidated statement of operations. We recognized nil and $0.2 million in research and development revenue from transactions with MAI in the three and six months ended June 30, 2022, respectively, and we recognized $0.1 million in product revenue from transactions with MAI in the three and six months ended June 30, 2022, during the related party period.

Note 12. Segment, Geographical and Other Revenue Information

Segment Information

As of June 30, 2023, we managed our business astwo business segments: Performance Enzymes and Novel Biotherapeutics. Our business segments are primarily based on our organizational structure and our operating results as used by our CODM in assessing performance and allocating resources for the Company. In July 2023, we announced that we are discontinuing investment in Novel Biotherapeutics and expect to have just one business segment, Performance Enzymes, by the end of 2023.

We report corporate-related expenses such as legal, accounting, information technology, and other costs that are not otherwise included in our reportable business segments as "corporate costs." All items not included in income (loss) from operations are excluded from the business segments.

We manage our assets on a total company basis, not by business segment, as the majority of our operating assets are shared or commingled. Our CODM does not review asset information by business segment in assessing performance or allocating resources, and accordingly, we do not report asset information by business segment. All of our long lived assets are located in the United States.

Factors considered in historically determining thetwo reportable segments of the Company include the nature of business activities, the management structure directly accountable to our CODM for operating and administrative activities, availability of discrete financial information and information presented to the Board of Directors. Our CODM regularly reviews our segments and the approach provided by management for performance evaluation and resource allocation.

Operating expenses that directly support the segment activity are allocated based on segment headcount, revenue contribution or activity of the business units within the segments, based on the corporate activity type provided to the segment. The expense allocation excludes certain corporate costs that are separately managed from the segments. This provides the CODM with more meaningful segment profitability reporting to support operating decisions and allocate resources.

The following table provides financial information by our reportable business segments along with a reconciliation to consolidated loss before income taxes (in thousands):

	Three Months Ended June 30, 2023			Three Months Ended June 30, 2022		
	Performance Enzymes	Novel Biotherapeutics	Total	Performance Enzymes	Novel Biotherapeutics	Total
Revenues:						
Product revenue	$ 11,048	$ —	$ 11,048	$ 34,645	$ —	$ 34,645
Research and development revenue	8,260	2,015	10,275	1,885	1,876	3,761
Total revenues	19,308	2,015	21,323	36,530	1,876	38,406
Costs and operating expenses:						
Cost of product revenue	3,178	—	3,178	11,270	—	11,270
Research and development [(1)]	7,856	8,240	16,096	6,929	11,078	18,007
Selling, general and administrative [(1)]	2,032	191	2,223	3,876	680	4,556
Restructuring charges	—	72	72	—	—	—
Total segment costs and operating expenses	13,066	8,503	21,569	22,075	11,758	33,833
Income (loss) from operations	$ 6,242	$ (6,488)	(246)	$ 14,455	$ (9,882)	4,573
Corporate costs [(2)]			(9,788)			(5,789)
Unallocated depreciation and amortization			(1,480)			(1,316)
Loss before income taxes			$ (11,514)			$ (2,532)

	Six Months Ended June 30, 2023			Six Months Ended June 30, 2022		
	Performance Enzymes	Novel Biotherapeutics	Total	Performance Enzymes	Novel Biotherapeutics	Total
Revenues:						
Product revenue	$ 19,412	$ —	$ 19,412	$ 65,335	$ —	$ 65,335
Research and development revenue	9,382	5,511	14,893	4,294	4,117	8,411
Total revenues	28,794	5,511	34,305	69,629	4,117	73,746
Costs and operating expenses:						
Cost of product revenue	7,698	—	7,698	19,791	—	19,791
Research and development [1]	15,955	15,552	31,507	13,051	23,424	36,475
Selling, general and administrative [1]	4,830	1,142	5,972	7,416	1,400	8,816
Restructuring charges	—	145	145	—	—	—
Total segment costs and operating expenses	28,483	16,839	45,322	40,258	24,824	65,082
Income (loss) from operations	$ 311	$ (11,328)	(11,017)	$ 29,371	$ (20,707)	8,664
Corporate costs [2]			(20,152)			(16,994)
Unallocated depreciation and amortization			(2,946)			(2,549)
Loss before income taxes			$ (34,115)			$ (10,879)

[1] Research and development expenses and selling, general and administrative expenses exclude depreciation and amortization of finance leases.
[2] Corporate costs include unallocated selling, general and administrative expenses, interest income, and other expense, net.

The following table provides stock-based compensation expense included in loss from operations (in thousands):

	Three Months Ended June 30,							
	2023				2022			
	Performance Enzymes	Novel Biotherapeutics	Corporate cost	Total	Performance Enzymes	Novel Biotherapeutics	Corporate cost	Total
Stock-based compensation	$ 924	$ (80)	$ 1,872	$ 2,716	$ 1,493	$ 358	$ 1,380	$ 3,231

	Six Months Ended June 30,							
	2023				2022			
	Performance Enzymes	Novel Biotherapeutics	Corporate cost	Total	Performance Enzymes	Novel Biotherapeutics	Corporate cost	Total
Stock-based compensation	$ 1,959	$ 333	$ 3,233	$ 5,525	$ 3,183	$ 768	$ 3,118	$ 7,069

Significant Customers

Customers that each accounted for 10% or more of our total revenues were as follows:

	Percentage of Total Revenues for the			
	Three Months Ended June 30,		Six Months Ended June 30,	
	2023	2022	2023	2022
Customer A	28 %	62 %	17 %	62 %
Customer B	18 %	*	11 %	*
Customer C	11 %	*	*	*
Customer D	*	*	11 %	*
Customer E	*	*	10 %	*

** Percentage was less than 10%*

Customers that each accounted for 10% or more of accounts receivable balances as of the periods presented as follows:

	Percentage of Accounts Receivables as of	
	June 30, 2023	December 31, 2022
Customer A	*	53 %
Customer D	11 %	*
Customer E	12 %	10 %
Customer F	17 %	*
Customer G	14 %	*
Customer H	12 %	*

** Percentage was less than 10%*

Geographical Information

Geographic revenues are identified by the location of the customer and consist of the following (in thousands):

	Three Months Ended June 30,		Six Months Ended June 30,	
	2023	2022	2023	2022
Revenues				
Americas	$ 3,937	$ 3,614	$ 6,521	$ 7,347
EMEA	8,349	4,690	11,438	8,817
APAC	9,037	30,102	16,346	57,582
Total revenues	$ 21,323	$ 38,406	$ 34,305	$ 73,746

Identifiable long-lived assets by location was as follows (in thousands):

	June 30, 2023	December 31, 2022
United States	$ 60,070	$ 61,877

Identifiable goodwill by reporting unit was as follows (in thousands):

	As of June 30, 2023 and December 31, 2022		
	Performance Enzymes	Novel Biotherapeutics	Total
Goodwill	$ 2,463	$ 778	$ 3,241

Note 13. Allowance for Credit Losses

The following table summarizes the financial assets allowance for credit losses (in thousands):

	Three and Six Months Ended June 30,	
	2023	2022
Balance at beginning of period	$ 163	$ 416
Provision for credit losses	—	—
Write-offs	(30)	(257)
Adjustment to the existing allowance	—	(50)
Balance at end of period	$ 133	$ 109

The following tables summarize accounts receivable by aging category (in thousands):

	June 30, 2023					
	Current	31-60 Days	61-90 Days	91 Days and over	Total over 31 Days	Total balance
Accounts receivable	$ 8,025	$ 141	$ 99	$ 541	$ 781	$ 8,806

	December 31, 2022					
	Current	31-60 Days	61-90 Days	91 Days and over	Total over 31 Days	Total balance
Accounts receivable	$ 28,896	$ 1,747	$ 469	$ 792	$ 3,008	$ 31,904

Note 14. Restructuring Charges

In November 2022, we announced a plan for a workforce reduction of approximaely 18% of our total employee to realign and optimize our workforce requirements in alignment with our refined corporate strategy. The plan was substantially completed in December 2022 and severance costs were paid through the second quarter of 2023. During the three and six months ended June 30, 2023, we recorded an additional restructuring charge of $0.1 million and $0.2 million, respectively, related to severance, bonus and other termination benefits in connection with the workforce reduction. We do not expect to record any future charges related to the restructuring plan initiated in 2022.

Note 15. Subsequent Events

On July 20, 2023, in alignment with our enhanced strategic focus, we announced a plan for a workforce reduction of approximately 25%. We further announced that we are discontinuing investment in our biotherapeutics business and as part of this enhanced strategic focus, we are prioritizing the advancement and commercialization of our ECO Synthesis™ Platform and our complementary pharmaceutical manufacturing business, We expect to incur approximately $2.9 million of restructuring charges, comprised mainly of severance and related benefit costs. The restructuring actions associated with this charge are expected to be substantially complete and paid by September 30, 2023. We also announced that we will consolidate operations to our headquarters in Redwood City, California in the second half of 2023.

ITEM 2. MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS

The following management's discussion and analysis of our financial condition and results of operations should be read in conjunction with the unaudited condensed consolidated financial statements and the related notes thereto included elsewhere in this Quarterly Report on Form 10-Q and the audited consolidated financial statements and notes thereto and management's discussion and analysis of financial condition and results of operations for the year ended December 31, 2022 included in our Annual Report on Form 10-K for the year ended December 31, 2022, as filed with the SEC on February 27, 2023 (the "Annual Report"). This Quarterly Report on Form 10-Q contains forward-looking statements within the meaning of Section 21E of the Securities Exchange Act of 1934, as amended (the "Exchange Act"). These statements include, but are not limited to, expectations regarding our strategy, business plans, financial performance and developments relating to our industry. These statements are often identified by the use of words such as "may," "will," "expect," "believe," "anticipate," "intend," "could," "should," "estimate," or "continue," and similar expressions or variations. Such forward-looking statements are subject to risks, uncertainties and other factors that could cause actual results and the timing of certain events to differ materially from future results expressed or implied by such forward-looking statements. Factors that could cause or contribute to such differences include, but are not limited to, those discussed in Part II, Item 1A: "Risk Factors" of this Quarterly Report on Form 10-Q and Part I, Item 1A: "Risk Factors" of our Annual Report, as incorporated herein and referenced in Part II, Item 1A: "Risk Factors" of this Quarterly Report on Form 10-Q and elsewhere in this report. 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.

Business Overview

We are a leading enzyme engineering company leveraging our proprietary CodeEvolver® technology platform to discover, develop, enhance, and commercialize novel, high performance enzymes and other classes of proteins. Enzymes are naturally occurring biological molecules critical to almost all biochemical reactions that sustain life. They can be precisely engineered and optimized for specific functions, and to have particular characteristics, such as an ability to survive environments in which natural enzymes cannot, or to perform (bio)chemical transformations different than those for which they naturally evolved. The capacity to enhance the properties and performance of enzymes has led to pivotal improvements across three healthcare industry pillars: pharmaceutical manufacturing, life sciences, and biotherapeutics. The enzymes we produce solve for real-world challenges associated with small molecule pharmaceuticals manufacturing and nucleic acid synthesis. We are currently developing our proprietary ECO Synthesis™ Platform to enable the commercial scale manufacture of RNAi therapeutics through an enzymatic route. We expect to demonstrate gram-scale synthesis using the ECO Synthesis™ Platform by the end of 2023, enabling per-commercial customer testing to begin in 2024, all with a goal of commercialization beginning in 2025. Our unique enzymes drive improvements such as higher yields, reduced energy usage and waste generation, improved efficiency in manufacturing and greater sensitivity in genomic and diagnostic applications.

As of June 30, 2023, we managed our business as two business segments: Performance Enzymes and Novel Biotherapeutics. However, in July 2023, we announced that we are discontinuing investment in Novel Biotherapeutics and expect to have just one business segment, Performance Enzymes, by the end of 2023. See Note 12, "Segment, Geographical and Other Revenue Information" in the Notes to Unaudited Condensed Consolidated Financial Statements included in this Quarterly Report.

Performance Enzymes

Our performance enzymes business consists primarily of two focus areas: biocatalysts for the sustainable manufacturing of pharmaceuticals and enzymes for life science applications, including genomic sequencing and nucleic acid synthesis. In our pharmaceutical manufacturing business, we utilize our CodeEvolver® directed evolution platform to develop optimized enzymes that are used by some of the world's largest pharmaceutical companies to reduce their costs and improve the efficiency and productivity of their manufacturing processes for some small molecule therapeutics. In life science markets, we use our platform technology to develop enzymes for customers using next generation sequencing ("NGS"), a parallel sequencing technology used to identify genomic information in the study of biological systems, and PCR/qPCR for in vitro molecular diagnostic and molecular biology research applications, as well as for synthesis of nucleic acids such as DNA/RNA, including our ECO Synthesis™ Platform, which is in development to enable the commercial scale manufacture of RNAi therapeutics.

Novel Biotherapeutics

In July 2023, we announced that we are discontinuing investment in our biotherapeutics business, including our partnered product candidate CDX-7108 for the treatment of exocrine pancreatic insufficiency ("EPI"), which has completed Phase 1 clinical trials. We are in active negotiations with Nestlé Health Science to advance the program without our financial support. In addition, we previously licensed CDX-6114 for the treatment of phenylketonuria ("PKU"). We have also engineered a series of transgenes that code for enzymes that may be used as gene therapies to treat rare lysosomal storage disorders with our partner Takeda, such as Fabry Disease and Pompe Disease, as well as a blood factor disorder. Takeda previously announced that they are discontinuing development of these programs.

Recent Developments

In July 2023, we announced an update to our business strategy to focus resources on programs with the strongest probability of creating significant value in the near-term and beyond. As part of this enhanced strategic focus, we are prioritizing the advancement and commercialization of our ECO Synthesis™ Platform and our highly complementary Pharmaceutical manufacturing business. We also streamlined operations, including the discontinuation of investment in certain development programs, primarily in our biotherapeutics business, consolidated operations to our headquarters in Redwood City, California and reduced headcount by approximately 25%.

Business Update Regarding COVID-19

In March 2020, the World Health Organization declared COVID-19 a global pandemic and recommended containment and mitigation measures worldwide. The spread of COVID-19 has affected segments of the global economy and may affect our operations, including the potential interruption of our supply chain. We are monitoring this situation closely, and although operations have not been materially affected by the COVID-19 outbreak to date, the ultimate duration and severity of the outbreak and its impact on the economic environment and our business is uncertain.

As a result of the COVID-19 pandemic, in 2021 and 2022 we received purchase orders from Pfizer Inc. ("Pfizer") for large quantities of our proprietary enzyme product, CDX-616, for use by Pfizer in the manufacture of a critical intermediate for its proprietary API, nirmatrelvir, used by Pfizer in combination with the API ritonavir, as its PAXLOVID™ (nirmatrelvir tablets; ritonavir tablets) product for the treatment of COVID-19 infections in humans. We are a party to an Enzyme Supply Agreement with Pfizer Ireland Pharmaceuticals, a subsidiary of Pfizer, Inc. (the "Pfizer Supply Agreement"), covering the manufacture, sale and purchase of CDX-616 for use by Pfizer in the manufacture of nirmatrelvir. Under the terms of the Pfizer Supply Agreement, Pfizer paid us a fee of $25.9 million in August 2022 which was recorded as deferred revenue. Pursuant to the agreement, 90% of the fee ($23.3 million) is creditable against (i) future orders of CDX-616 used to manufacture its PAXLOVID™ with shipment dates prior to December 31, 2023, and (ii) fees associated with any new development and licensing agreements with Pfizer entered into prior to April 4, 2023. On March 31, 2023, we entered into a license agreement whereby Pfizer utilized a portion of the $23.3 million credit towards a license to develop future product candidates, for which we recognized $5.0 million as non-cash research and development revenue for the three and six months ended June 30, 2023. Pfizer's ability to utilize the credit under item (ii) above expired on April 4, 2023. Up to 50% of any portion of the $25.9 million which has not been credited under items (i) and (ii) is creditable against future orders of CDX-616 used to manufacture PAXLOVID™ with shipment dates in 2024. The sale of CDX-616 to Pfizer had a substantial impact on our revenues in 2021 and 2022. Revenues in 2023 and in future years from our sales of CDX-616 to Pfizer and other potential customers (including sublicensees of Pfizer technology from The Medicine Patent Pool) are subject to a number of factors which are outside of our control and could reduce or eliminate our sales of CDX-616, and therefore materially and adversely affect our business, results of operations and financial conditions.

Significant Collaborative Arrangements Update

Merck Sitagliptin Catalyst Supply Agreement

In February 2012, we entered into a five-year Sitagliptin Catalyst Supply Agreement ("Sitagliptin Supply Agreement") with Merck whereby Merck may obtain commercial scale enzyme for use in the manufacture of Januvia®, its product based on the active ingredient sitagliptin. In December 2015, Merck exercised its option under the terms of the Sitagliptin Catalyst Supply Agreement to extend the agreement for an additional five years through February 2022. In September 2021, the Sitagliptin Catalyst Supply Agreement was amended to extend the agreement through December 2026.

We recognized $0.8 million and $3.8 million under this agreement for the three and six months ended June 30, 2023, respectively, compared to $0.7 million and $2.4 million for the three and six months ended June 30, 2022, respectively. This represented 4% and 11% of our total revenues for the three and six months ended June 30, 2023, respectively, compared to 2% and 3% for the three and six months ended June 30, 2022, respectively. As of June 30, 2023, we recorded revenue of $2.2 million from sitagliptin enzyme sales that were recognized over time based on the progress of the manufacturing process. These products will be shipped within the six-month period following the end of the second quarter of 2023.

Global Development, Option and License Agreement and Strategic Collaboration Agreement

In October 2017, we entered into the Nestlé License Agreement with Nestlé Health Science and, solely for the purpose of the integration and the dispute resolution clauses of the Nestlé License Agreement, Nestlé Health Science S.A., to advance CDX-6114, our enzyme biotherapeutic product candidate for the potential treatment of PKU.

In January 2019, we received notice from the U.S. Food and Drug Administration ("FDA") that it had completed its review of our IND for CDX-6114 and concluded that we may proceed with the proposed Phase 1b multiple ascending dose study in healthy volunteers in the United States. In February 2019, Nestlé Health Science exercised its option to obtain an exclusive, worldwide, royalty-bearing, sub-licensable license for the global development and commercialization of CDX-6114 for the management of PKU. Upon exercising its option, Nestlé Health Science made an option payment and assumed all responsibilities for future clinical development and commercialization of CDX-6114. We are also eligible to receive payments from Nestlé Health Science under the Nestlé License Agreement that include (i) development and approval milestones of up to $85.0 million, (ii) sales-based milestones of up to $250.0 million in the aggregate, which aggregate amount is achievable if net sales exceed $1.0 billion in a single year, and (iii) tiered royalties, at percentages ranging from the mid-single digits to low double-digits of net sales of product.

In October 2017, we entered into the Nestlé Strategic Collaboration Agreement ("SCA") pursuant to which we and Nestlé Health Science are collaborating to leverage the CodeEvolver® protein engineering technology platform to develop novel enzymes for Nestlé Health Science's established Consumer Care and Medical Nutrition business areas. The term of the Nestlé SCA has been extended through December 2023 with an automatic renewal through December 2024

In January 2020, we entered into a development agreement with Nestlé Health Science pursuant to which we and Nestlé Health Science are collaborating to advance a lead candidate discovered through our Nestlé SCA, CDX-7108, targeting EPI, into preclinical and early clinical studies. We, together with Nestlé Health Science, initiated a Phase 1 clinical trial of CDX-7108 in the fourth quarter of 2021 and on February 23, 2023, we and Nestlé Health Science announced interim results. Interim data from the proof-of-concept arm showed improved lipid absorption when patients were administered CDX-7108 versus placebo. Importantly, no notable safety issues were noted in the 48 subjects that participated in the single ascending dose and multiple ascending dose portion of the study. In July 2023, we announced plans to discontinue our development support of CDX-7108 and are in active negotiations with Nestlé Health Science to advance the program without our financial support.

Under the Nestlé SCA and the development agreement, we recognzed $1.7 million and $3.6 million in research and development fees for the three and six months ended June 30, 2023, respectively, compared to $0.6 million and $1.6 million for the three and six months ended June 30, 2022, respectively.

Platform Technology Transfer and License Agreement

In May 2019, we entered into the Novartis CodeEvolver® Agreement with Novartis. The Agreement allows Novartis to use our proprietary CodeEvolver® protein engineering platform technology in the field of human healthcare. In July 2021, we announced the completion of the technology transfer period during which we transferred our proprietary CodeEvolver® protein engineering platform technology to Novartis (the "Technology Transfer Period"). As a part of this technology transfer, we provided to Novartis our proprietary enzymes, proprietary protein engineering protocols and methods, and proprietary software algorithms. In addition, our teams and Novartis scientists participated in technology training sessions and collaborative research projects at our laboratories in Redwood City, California and at a designated Novartis laboratory in Basel, Switzerland. Novartis has now installed the CodeEvolver® protein engineering platform technology at its designated laboratory.

Pursuant to the agreement, we received an upfront payment of $5.0 million shortly after the effective date of the Novartis CodeEvolver® Agreement. We completed the second technology milestone transfer under the agreement in 2020 and received a milestone payment of $4.0 million. We have also received an aggregate of $5.0 million for the completion of the third technology milestone in 2021. In consideration for the continued disclosure and license of improvements to the technology and materials during a multi-year period that began on the conclusion of the Technology Transfer Period ("Improvements Term"), Novartis will pay Codexis annual payments over four years which amount to an additional $8.0 million in aggregate. We received the first annual payment of $2.0 million in the fourth quarter of 2022. The Company also has the potential to receive quantity-dependent, usage payments for each API that is manufactured by Novartis using one or more enzymes that have been developed or are in development using the CodeEvolver® protein engineering platform technology during the period that began on the conclusion of the Technology Transfer Period and ends on the expiration date of the last to expire licensed patent. Revenue for the combined initial license and technology transfer performance obligation was recognized using a single measure of progress that depicted our performance in transferring control of the services. Revenue allocated to improvements made during the Improvements Term are being recognized during the Improvements Term.

We recognized $0.2 million and $0.6 million in research and development revenue for the three and six months ended June 30, 2023, respectively, compared to $0.3 million and $0.5 million for the three and six months ended June 30, 2022, respectively.

Strategic Collaboration and License Agreement

In March 2020, we entered into the Takeda Agreement with Shire Human Genetic Therapies, Inc., a wholly-owned subsidiary of Takeda Pharmaceutical Co. Ltd. ("Takeda"), under which we are collaborating to research and develop protein sequences for use in gene therapy products for certain diseases in accordance with each applicable program plan.

On execution of the Takeda Agreement, we received an upfront non-refundable cash payment of $8.5 million and we initiated activities under three program plans for Fabry Disease, Pompe Disease, and an undisclosed blood factor deficiency, respectively (the "Initial Programs"). In May 2021, Takeda elected to exercise its option to initiate an additional program for a certain undisclosed rare genetic disorder; as a result we received the option exercise fee during the third quarter of 2021. We completed the research and development services relating to the fourth program with Takeda during the second quarter of 2023.

On February 22, 2023, we announced that Takeda presented pre-clinical data from the Fabry Disease transgene program, part of its Strategic Collaboration and License Agreement with Codexis, at the 19th Annual WORLD*Symposium*™. The gene therapy candidate is being developed to encode the codon optimized, CodeEvolver® engineered-GAL enzyme, which is designed to have improved serum and lysosomal stability and a predicted reduced immunogenicity.

Pursuant to the Takeda Agreement, we are eligible to receive other payments that include (i) reimbursement of research and development fees and preclinical development milestones for the Initial Programs of $12.0 million, in aggregate, and $4.0 million for the fourth program, (ii) clinical development and commercialization-based milestones, per target gene, of up to $104.0 million and (iii) tiered royalty payments based on net sales of applicable products at percentages ranging from the mid-single digits to low single-digits. However, Takeda recently announced that they are discontinuing development of these programs. We continue to engage in discussions with Takeda about the foregoing but we and Takeda has not terminated the Takeda Agreement as of the date of this report.

Revenue recognized relating to the functional licenses provided to Takeda was recognized at a point in time when the control of the license transferred to the customer. We recognized research and development revenue related to the Takeda Agreement of $0.3 million and $1.9 million for the three and six months ended June 30, 2023, respectively, compared to $1.3 million and $2.5 million for the three and six months ended June 30, 2022, respectively.

Pfizer Enzyme Supply Agreement

We are a party to the Pfizer Supply Agreement, covering the manufacture, sale and purchase of CDX-616 for use by Pfizer in the manufacture of nirmatrelvir. Under the terms of the Pfizer Supply Agreement, Pfizer paid us a fee of $25.9 million in August 2022 which was recorded as deferred revenue.Pursuant to the agreement, 90% of the fee ($23.3 million) is creditable against (i) future orders of CDX-616 used to manufacture its PAXLOVID™ with shipment dates prior to December 31, 2023, and (ii) fees associated with any new development and licensing agreements with Pfizer entered into prior to April 4, 2023. On March 31, 2023, we entered into a license agreement whereby Pfizer utilized a portion of the $23.3 million credit towards a license to develop future product candidates, for which we recognized $5.0 million as non-cash research and development revenue for the three and six months ended June 30, 2023. Pfizer's ability to utilize the credit under item (ii) above expired on April 4, 2023. Up to 50% of any portion of the $25.9 million which has not been credited under items (i) and (ii) is creditable against future orders of CDX-616 used to manufacture PAXLOVID™ with shipment dates in 2024.

No revenue was recognized from the Pfizer Supply Agreement during the three and six months ended June 30, 2023. We recognized product revenue of $23.8 million and $45.1 million for the three and six months ended June 30, 2022, respectively, from the sale of quantities of CDX-616 to Pfizer which comprised 62% and 61% of our total revenues for the three and six months ended June 30, 2022, respectively. As of June 30, 2023 and December 31, 2022, we had $18.9 million and $24.4 million, respectively, in deferred revenue related to the $25.9 million fee received from Pfizer.

Results of Operations

The following table shows the amounts from our unaudited condensed consolidated statements of operations for the periods presented (in thousands, except percentages):

	Three Months Ended June 30,		Change		Six Months Ended June 30,		Change	
	2023	2022	$	%	2023	2022	$	%
Revenues:								
Product revenue	$ 11,048	$ 34,645	$ (23,597)	(68) %	$ 19,412	$ 65,335	$ (45,923)	(70) %
Research and development revenue	10,275	3,761	6,514	173 %	14,893	8,411	6,482	77 %
Total revenues	21,323	38,406	(17,083)	(44) %	34,305	73,746	(39,441)	(53) %
Costs and operating expenses:								
Cost of product revenue	3,178	11,270	(8,092)	(72) %	7,698	19,791	(12,093)	(61) %
Research and development	17,334	19,089	(1,755)	(9) %	33,988	38,590	(4,602)	(12) %
Selling, general and administrative	13,365	10,656	2,709	25 %	28,765	26,360	2,405	9 %
Restructuring charges	72	—	72	100 %	145	—	145	100 %
Total costs and operating expenses	33,949	41,015	(7,066)	(17) %	70,596	84,741	(14,145)	(17) %
Loss from operations	(12,626)	(2,609)	(10,017)	384 %	(36,291)	(10,995)	(25,296)	230 %
Interest income	1,121	140	981	701 %	2,209	182	2,027	1,114 %
Other expense, net	(9)	(63)	54	(86) %	(33)	(66)	33	(50) %
Loss before income taxes	(11,514)	(2,532)	(8,982)	355 %	(34,115)	(10,879)	(23,236)	214 %
Provision for income taxes	9	108	(99)	(92) %	25	117	(92)	(79) %
Net loss	$ (11,523)	$ (2,640)	$ (8,883)	336 %	$ (34,140)	$ (10,996)	$ (23,144)	210 %

Revenues

Our revenues consisted of product revenue and research and development revenue as follows:

- Product revenue consist of sales of biocatalysts, pharmaceutical intermediates, and Codex® biocatalyst panels and kits.
- Research and development revenue include license, technology access and exclusivity fees, research services fees, milestone payments, royalties, optimization and screening fees.

Revenues are as follows (in thousands, except percentages):

	Three Months Ended June 30,		Change		Six Months Ended June 30,		Change	
	2023	2022	$	%	2023	2022	$	%
Product revenue	$ 11,048	$ 34,645	$ (23,597)	(68) %	$ 19,412	$ 65,335	$ (45,923)	(70) %
Research and development revenue	10,275	3,761	6,514	173 %	14,893	8,411	6,482	77 %
Total revenues	$ 21,323	$ 38,406	$ (17,083)	(44) %	$ 34,305	$ 73,746	$ (39,441)	(53) %

Revenues typically fluctuate on a quarterly basis due to the variability in our customers' manufacturing schedules and the timing of our customers' clinical trials. In addition, we have limited internal capacity to manufacture enzymes. As a result, we are dependent upon the performance and capacity of third-party manufacturers for the commercial scale manufacturing of the enzymes used in our pharmaceutical and fine chemicals business.

We accept purchase orders for deliveries covering periods from one day up to 14 months from the date on which the order is placed. However, some of our purchase orders can be revised or cancelled by the customer without penalty. Considering these industry practices and our experience, we do not believe the total of customer purchase orders outstanding (backlog) provides meaningful information that can be relied on to predict actual sales for future periods.

Total revenues decreased by $17.1 million and $39.4 million in thethree and six months ended June 30, 2023, respectively, compared to the same periods in 2022, primarily due to lower product revenue, which was partially offset by higher research and development revenue.

Product revenue, decreased by $23.6 million and $45.9 million in the three and six months ended June 30, 2023, respectively, compared to the same periods in 2022, primarily due to decreased sales of CDX-616 to Pfizer. This decrease was partially offset by $2.9 million release of prior periods' product revenue deferrals during the second quarter of 2023 due to early termination of the enzyme supply obligations to a customer.

Research and development revenue increased by $6.5 million and $6.5 million in the three and six months ended June 30, 2023, respectively, compared to the same periods in 2022, primarily due to higher revenue from Pfizer license agreement and from Nestlé Health Science under the Nestlé SCA and development agreement, which was offset by lower research and development fees from existing collaboration agreements being recognized in 2023 as compared to the same periods in the prior year.

Cost and Operating Expenses

The following table shows the amounts of our cost of product revenue, research and development expense, selling, general and administrative expense, and restructuring charges from our unaudited condensed consolidated statements of operations for the periods presented (in thousands, except percentages):

	Three Months Ended June 30,		Change		Six Months Ended June 30,		Change	
	2023	2022	$	%	2023	2022	$	%
Cost of product revenue	$ 3,178	$ 11,270	$ (8,092)	(72) %	$ 7,698	$ 19,791	$ (12,093)	(61) %
Research and development	17,334	19,089	(1,755)	(9) %	33,988	38,590	(4,602)	(12) %
Selling, general and administrative	13,365	10,656	2,709	25 %	28,765	26,360	2,405	9 %
Restructuring charges	72	—	72	100 %	145	—	145	100 %
Total costs and operating expenses	$ 33,949	$ 41,015	$ (7,066)	(17) %	$ 70,596	$ 84,741	$ (14,145)	(17) %

Cost of Product Revenue and Product Gross Margin

Our product revenues are derived entirely from our Performance Enzymes segment. Revenues from the Novel Biotherapeutics segment are derived entirely from collaborative research and development activities as we have no approved products available for sale.

The following table shows the amounts of our product revenue, cost of product revenue, product gross profit and product gross margin from our unaudited condensed consolidated statements of operations for the periods presented (in thousands, except percentages):

	Three Months Ended June 30,		Change		Six Months Ended June 30,		Change	
	2023	2022	$	%	2023	2022	$	%
Product revenue	$ 11,048	$ 34,645	$ (23,597)	(68) %	$ 19,412	$ 65,335	$ (45,923)	(70) %
Cost of product revenue [1]	3,178	11,270	(8,092)	(72) %	7,698	19,791	(12,093)	(61) %
Product gross profit	$ 7,870	$ 23,375	$ (15,505)	(66) %	$ 11,714	$ 45,544	$ (33,830)	(74) %
Product gross margin (%) [2]	71 %	67 %			60 %	70 %		

[1] Cost of product revenue consist of both internal and third-party fixed and variable costs, including materials and supplies, labor, facilities and other overhead costs associated with our product revenue.
[2] Product gross margin is used as a performance measure to provide additional information regarding our results of operations on a consolidated basis.

Cost of product revenue decreased by $8.1 million and $12.1 million in the three and six months ended June 30, 2023, respectively, compared to the same periods in 2022, primarily due to lower volume of product sales as compared to the same periods in prior year.

Product gross margins were 71% and 60% in the three and six months ended June 30, 2023, respectively, compared to 67% and 70% in the corresponding periods in 2022 due to variability in the product mix which was partially offset by revenue recognized with no related cost in the second quarter of 2023.

Research and Development Expenses

Research and development expenses consist of costs incurred for internal projects as well as collaborative research and development activities. These costs primarily consist of (i) employee-related costs, which include salaries and other personnel-related expenses (including stock-based compensation), (ii) various allocable expenses, which include occupancy-related costs, supplies, depreciation of facilities and laboratory equipment, and (iii) external costs. Research and development expenses are expensed when incurred.

Research and development expenses decreased by $1.8 million, or 9%, during the three months ended June 30, 2023 compared to the same period in 2022 was primarily due to a $1.5 million decrease in costs associated with lower headcount, and $0.3 million from lower stock-based compensation costs, lower lab supply costs and lower outside services related to Chemistry, Manufacturing and Controls ("CMC") and regulatory expenses. The decrease in research and development expenses of $4.6 million, or 12%, in the six months ended June 30, 2023, compared to the same period in 2022, was primarily due to $3.2 million decrease in costs associated with lower headcount, $0.5 million lower stock-based compensation costs and $0.7 million lower lab supply costs and lower outside services.

Selling, General and Administrative Expenses

Selling, general and administrative expenses consist of employee-related costs, which include salaries and other personnel-related expenses (including stock-based compensation), hiring and training costs, consulting and outside services expenses (including audit and legal counsel related costs), marketing costs, building lease costs, and depreciation expenses and amortization expenses.

Selling, general and administrative expenses increased by $2.7 million, or 25%, during the three months ended June 30, 2023, compared to the same period in 2022 was primarily due to $1.4 million higher payroll-based expenses and $1.4 million of higher fees for outside services. The increase in selling, general and administrative expenses of $2.4 million, or 9%, in the six months ended June 30, 2023, compared to the same period in 2022 was primarily due to $2.9 million higher payroll-based expenses, partially offset by $0.9 million in lower stock-based compensation costs and lower legal fees.

Restructuring Charges

Restructuring charges consist of one-time employee severance and other termination benefits due to a workforce reduction plan that was initiated in the fourth quarter of 2022. Restructuring charges were $0.1 million and $0.2 million for the three and six months ended June 30, 2023, respectively.

Interest Income and Other Expense, net (in thousands, except percentages):

	Three Months Ended June 30,		Change		Six Months Ended June 30,		Change	
	2023	2022	$	%	2023	2022	$	%
Interest income	$ 1,121	$ 140	$ 981	701 %	$ 2,209	$ 182	$ 2,027	1,114 %
Other expense, net	(9)	(63)	54	(86) %	(33)	(66)	33	(50) %
Total other income, net	$ 1,112	$ 77	$ 1,035	1,344 %	$ 2,176	$ 116	$ 2,060	1,776 %

Interest Income

Interest income increased by $1.0 million and $2.0 million in the three and six months ended June 30, 2023, respectively, compared to the same periods in 2022, primarily due to higher average interest rates on cash balances.

Provision for Income Taxes (in thousands, except percentages):

	Three Months Ended June 30,		Change		Six Months Ended June 30,		Change	
	2023	2022	$	%	2023	2022	$	%
Provision for income taxes	$ 9	$ 108	$ (99)	(92) %	$ 25	$ 117	$ (92)	(79) %

The provision for income taxes for the three and six months ended June 30, 2023, was primarily for current year state income taxes and the accrual of interest and penalties on historic uncertain tax positions. The three and six months ended June 30, 2022,were primarily due to the income tax withholding imposed by foreign taxing authorities on income earned in certain countries outside of the United States and remitted to the United States and the accrual of interest and penalties on historic uncertain tax positions.

Net Loss

Net loss for the three months ended June 30, 2023, was $11.5 million, or a net loss per basic and diluted share of $0.17. This compared to a net loss of $2.6 million, or a net loss per basic and diluted share of $0.04 for the three months ended June 30, 2022. Net loss for the six months ended June 30, 2023, was $34.1 million, or a net loss per basic and diluted share of $0.51. This compared to a net loss of $11.0 million, or a net loss per basic and diluted share of $0.17 for the six months ended June 30, 2022. The increase in net loss for both the three and six months ended June 30, 2023, was primarily related to lower product revenues from CDX-616, which was partially offset by higher research and development revenues and lower operating expenses.

RESULTS OF OPERATIONS BY SEGMENT (in thousands, except percentages):

Revenues by segment

	Three Months Ended June 30,						Change			
	2023			2022			Performance Enzymes		Novel Biotherapeutics	
	Performance Enzymes	Novel Biotherapeutics	Total	Performance Enzymes	Novel Biotherapeutics	Total	$	%	$	%
Revenues:										
Product revenue	$ 11,048	$ —	$ 11,048	$ 34,645	$ —	$ 34,645	$ (23,597)	(68) %	$ —	— %
Research and development revenue	8,260	2,015	10,275	1,885	1,876	3,761	6,375	338 %	139	7 %
Total revenues	$ 19,308	$ 2,015	$ 21,323	$ 36,530	$ 1,876	$ 38,406	$ (17,222)	(47) %	$ 139	7 %

	Six Months Ended June 30,						Change			
	2023			2022			Performance Enzymes		Novel Biotherapeutics	
	Performance Enzymes	Novel Biotherapeutics	Total	Performance Enzymes	Novel Biotherapeutics	Total	$	%	$	%
Revenues:										
Product revenue	$ 19,412	$ —	$ 19,412	$ 65,335	$ —	$ 65,335	$ (45,923)	(70)%	$ —	— %
Research and development revenue	9,382	5,511	14,893	4,294	4,117	8,411	5,088	118 %	1,394	34 %
Total revenues	$ 28,794	$ 5,511	$ 34,305	$ 69,629	$ 4,117	$ 73,746	$ (40,835)	(59)%	$ 1,394	34 %

Revenues from the Performance Enzymes segment decreased by $17.2 million, or 47%, for the three months ended June 30, 2023, and by $40.8 million, or 59%, for the six months ended June 30, 2023 compared to the same periods in 2022. The decrease in product revenue of $23.6 million, or 68%, in the three months ended June 30, 2023, and $45.9 million, or 70%, in the six months ended June 30, 2023, compared to the same periods in 2022, was primarily due to decreased sales of CDX-616 to Pfizer which was partially offset by $2.9 million release of prior periods' product revenue deferrals during the second quarter of 2023 due to early termination of the enzyme supply obligations to a customer. The increase in research and development revenue of $6.4 million, or 338%, for the three months ended June 30, 2023, and of $5.1 million, or 118%, in the six months ended June 30, 2023, compared to the same periods in 2022, was primarily due to higher revenue from Pfizer license agreement.

Revenues from the Novel Biotherapeutics segment increased by $0.1 million, or 7%, for the three months ended June 30, 2023 and by $1.4 million, or 34%, for the six months ended June 30, 2023 compared to the same periods in 2022, primarily due to higher research and development revenue from Nestlé Health Science under the Nestlé SCA and development agreement, which was partially offset by lower research and development fees from Takeda under the Takeda Agreement.

Costs and operating expenses by segment

	Three Months Ended June 30,						Change			
	2023			2022			Performance Enzymes		Novel Biotherapeutics	
	Performance Enzymes	Novel Biotherapeutics	Total	Performance Enzymes	Novel Biotherapeutics	Total	$	%	$	%
Cost of product revenue	$ 3,178	$ —	$ 3,178	$ 11,270	$ —	$ 11,270	$ (8,092)	(72) %	$ —	— %
Research and development [1]	7,856	8,240	16,096	6,929	11,078	18,007	927	13 %	(2,838)	(26) %
Selling, general and administrative [1]	2,032	191	2,223	3,876	680	4,556	(1,844)	(48) %	(489)	(72) %
Restructuring charges	—	72	72	—	—	—	—	— %	72	100 %
Total segment costs and operating expenses	$ 13,066	$ 8,503	21,569	$ 22,075	$ 11,758	33,833	$ (9,009)	(41) %	$ (3,255)	(28) %
Corporate costs [2]			10,900			5,866				
Unallocated depreciation and amortization			1,480			1,316				
Total costs and operating expenses			$ 33,949			$ 41,015				

	Six Months Ended June 30,						Change			
	2023			2022			Performance Enzymes		Novel Biotherapeutics	
	Performance Enzymes	Novel Biotherapeutics	Total	Performance Enzymes	Novel Biotherapeutics	Total	$	%	$	%
Cost of product revenue	$ 7,698	$ —	$ 7,698	$ 19,791	$ —	$ 19,791	$ (12,093)	(61)%	$ —	— %
Research and development [1]	15,955	15,552	31,507	13,051	23,424	36,475	2,904	22 %	(7,872)	(34)%
Selling, general and administrative [1]	4,830	1,142	5,972	7,416	1,400	8,816	(2,586)	(35)%	(258)	(18)%
Restructuring charges	—	145	145	—	—	—	—	— %	145	100 %
Total segment costs and operating expenses	$ 28,483	$ 16,839	45,322	$ 40,258	$ 24,824	65,082	$ (11,775)	(29)%	$ (7,985)	(32)%
Corporate costs [2]			22,328			17,110				
Unallocated depreciation and amortization			2,946			2,549				
Total costs and operating expenses			$ 70,596			$ 84,741				

[1] Research and development expenses and selling, general and administrative expenses exclude depreciation and amortization of finance leases.
[2] Corporate costs include unallocated selling, general and administrative expenses.

For a discussion of product cost of revenue, see *"Results of Operations"*.

Research and development expense in the Performance Enzymes segment increased by $0.9 million, or 13%, in the three months ended June 30, 2023, compared to the same period in 2022 primarily due to $3.0 million higher allocable expenses, partially offset by $2.2 million decrease in costs associated with lower headcount and lower lab supply costs. The increase in research and development expense by $2.9 million, or 22%, in the six months ended June 30, 2023, as compared to the same period in 2022 was primarily due to $6.0 million in higher allocable expenses, partially offset by $3.4 million decrease in costs associated with lower headcount and lower lab supply costs.

Selling, general and administrative expense in the Performance Enzymes segment decreased by $1.8 million, or 48%, in the three months ended June 30, 2023, and by $2.6 million, or 35%, in the six months ended June 30, 2023, as compared to the same periods in 2022, primarily due to lower payroll-based expenses.

Research and development expense in the Novel Biotherapeutics segment decreased by $2.8 million, or 26%, in the three months ended June 30, 2023, as compared to the same period in 2022, was primarily due to $0.8 million decrease in costs associated with lower headcount and $2.2 million in lower fees related to outside services and lower allocable expenses. The decrease in research and development expenses by $7.9 million, or 34% in the six months ended June 30, 2023, as compared to the same period in 2022, was primarily due to $2.7 million decrease in costs associated with lower headcount and $5.3 million decrease in outside services related to CMC and regulatory expenses, lower lab supply costs and lower allocable expenses.

Selling, general and administrative expense in the Novel Biotherapeutics segment decreased by $0.5 million, or 72%, in the three months ended June 30, 2023 and by $0.3 million, or 18%, in the six months ended June 30, 2023, as compared to the same periods in 2022. The decrease was primarily due to lower payroll-based expenses.

LIQUIDITY AND CAPITAL RESOURCES

Liquidity is the measurement of our ability to meet working capital needs and to fund capital expenditures. We have historically funded our operations primarily through cash generated from operations, stock option exercises and public and private offerings of our common stock. We actively manage our cash usage and investment of liquid cash to ensure the maintenance of sufficient funds to meet our working capital needs. Our cash and cash equivalents are held in U.S. banks. Our primary uses of capital are, and we expect will continue to be for the near future, compensation and related expenses, research and development expenses including costs related to the potential clinical development of our product candidates, manufacturing costs, laboratory and related supplies, legal and other regulatory expenses, and general overhead costs. We expect our cash requirements to increase in the near term as we complete the reduction in force and restructuring that we announced in July 2023.

The following summarizes our cash and cash equivalents balance and working capital as of June 30, 2023 and December 31, 2022 (in thousands):

	June 30, 2023	December 31, 2022
Cash and cash equivalents	$ 92,093	$ 113,984
Working capital	$ 84,308	$ 113,828

Sources of Capital

In addition to our existing cash and cash equivalents and revenue generated through our existing operations, we are eligible to earn milestone and other contingent payments for the achievement of defined collaboration objectives and certain royalty payments under our collaboration agreements with Merck, Novartis and Nestlé Health Science of up to $439.0 million in the aggregate. Further, under the GSK CodeEvolver® Agreement, we have the potential to receive additional contingent payments that range from $5.8 million to $38.5 million per project. Our ability to earn these milestone and contingent payments and the timing of achieving these milestones is primarily dependent upon the outcome of our collaborators' research and development activities and is uncertain at this time.

In addition, pursuant to the terms of the Pfizer Supply Agreement, Pfizer paid us a fee of$25.9 million in August 2022 which was recorded as deferred revenue. Pursuant to the agreement, 90% of the fee ($23.3 million) is creditable against (i) future orders of CDX-616 used to manufactureits PAXLOVID™ with shipment dates prior to December 31, 2023, and (ii) fees associated with any new development and licensing agreements with Pfizer entered into prior to April 4, 2023. Subsequent to the end of the first quarter of 2023, we entered into a license agreement whereby Pfizer utilized a portion of the $23.3 million credit towards a license to develop future product candidates, for which we recognized $5.0 million as non-cash research and development revenue for the three months ended June 30, 2023. Pfizer's ability to utilize the credit under item (ii) above expired on April 4, 2023. Up to 50% of any portion of the $25.9 million which has not been credited under items (i) and (ii) is creditable against future orders of CDX-616 used to manufacture PAXLOVID™ with shipment dates in 2024.

We have historically experienced negative cash flows from operations as we continue to invest in key technology development projects and improvements to our CodeEvolver® protein engineering technology platform and expand our business development and collaboration with new customers. Our cash flows from operations will continue to be affected principally by product sales and product gross margins, sales from licensing our technology to major pharmaceutical companies, and collaborative research and development services provided to customers, as well as our headcount costs, primarily in research and development. Our primary source of cash flows from operating activities is cash receipts from our customers for purchases of products, collaborative research and development services, and licensing our technology to major pharmaceutical companies. Our largest uses of cash from operating activities are for employee-related expenditures, rent payments, inventory purchases to support our product sales and non-payroll research and development costs.

Equity Distribution Agreement

In May 2021, we entered into an Equity DistributionAgreement ("EDA") with Piper Sandler & Co ("PSC'), under which PSC, as our exclusive agent, at our discretion and at such times that we may determine from time to time, may sell over a three-year period from the execution of the EDA up to a maximum of $50.0 million of shares of our common stock. During the three and six months ended June 30, 2023, 2,751,941 and 3,079,421 shares of our common stock, respectively, were issued and sold pursuant to the EDA and we received net proceeds of $6.8 million and $7.9 million, respectively. As of June 30, 2023, $41.3 million worth of shares remained available for sale under the EDA. There have been no additional sales of common stock under the EDA since the last sale occurred in June 2023. Sales of our common stock under this arrangement could be subject to business, economic or competitive uncertainties and contingencies, many of which may be beyond our control, and which could cause actual results from the sale of our common stock to differ materially from expectations.

We believe that our existing cash and cash equivalents, combined with our future expectations for product revenues, research and development revenue, and expense management will provide adequate funds for ongoing operations, planned capital expenditures and working capital requirements for at least the next 12 months.We have based this estimate on assumptions that may prove to be wrong, and we could utilize our capital resources sooner than we expect.

However, we may need additional capital if our current plans and assumptions change. In addition, we may choose to seek other sources of capital even if we believe we have generated sufficient cash flows to support our operating needs. Our need for additional capital will depend on many factors, including the financial success of our business, the spending required to develop and commercialize new and existing products including our ECO Synthesis™ platform, the effect of any acquisitions of other businesses, technologies or facilities that we may make or develop in the future, our spending on new market opportunities, and the potential costs for the filing, prosecution, enforcement and defense of patent claims, if necessary. If our capital resources are insufficient to meet our capital requirements, and we are unable to enter into or maintain collaborations with partners that are able or willing to fund our development efforts or commercialize any products that we develop or enable, we will have to raise additional funds to continue the development of our technology and products and complete the commercialization of products, if any, resulting from our technologies. If future financings involve the issuance of equity securities, our existing stockholders would suffer dilution. If we raise debt financing or enter into credit facilities, we may be subject to restrictive covenants that limit our ability to conduct our business. We may not be able to raise sufficient additional funds on terms that are favorable to us, if at all. If we fail to raise sufficient funds and fail to generate sufficient revenues to achieve planned gross margins and to control operating costs, our ability to fund our operations, take advantage of strategic opportunities, develop products or technologies, or otherwise respond to competitive pressures could be significantly limited. If this happens, we may be forced to delay or terminate development of new products or services, such as our ECO Synthesis™ Platform, or the commercialization of products resulting from our technologies, curtail or cease operations or obtain funds through collaborative and licensing arrangements that may require us to relinquish commercial rights, or grant licenses on terms that are not favorable to us. If adequate funds are not available, we will not be able to successfully execute our business plan or continue our business.

Cash Flows

The following is a summary of cash flows for six months ended June 30, 2023 and 2022 (in thousands):

	Six Months Ended June 30,	
	2023	**2022**
Net cash used in operating activities	$ (25,299)	$ (13,367)
Net cash used in investing activities	(4,855)	(12,302)
Net cash provided by (used in) financing activities	8,275	(1,047)
Net decrease in cash, cash equivalents and restricted cash	$ (21,879)	$ (26,716)

Cash Flows from Operating Activities

Cash used in operating activities for the six months ended June 30, 2023 of $25.3 million consisted of net loss adjusted for certain non-cash items and changes in operating assets and liabilities.

The $11.9 million increase in net cash used operating activities for the six months ended June 30, 2023 as compared to the same period in 2022, was primarily due to the net effect of decreases in cash received from revenue, increases in cash paid for cost of revenues and operating expenses and changes in operating assets and liabilities.

Cash Flows from Investing Activities

Cash used in investing activities for the six months ended June 30, 2023 was primarily attributable to $0.8 million for the purchase of additional shares of MAI's Series B preferred stock in March 2023 and $4.1 million for purchases of property and equipment during the period.

The $7.4 million decrease in net cash used in investing activities for the six months ended June 30, 2023 as compared to the same period in 2022, was primarily due to higher cash utilized for additional investments in equity securities and purchases of property and equipment in prior year.

Cash Flows from Financing Activities

Cash provided by financing activities for the six months ended June 30, 2023 included $8.7 million gross proceeds from issuance of common stock and $0.4 million of proceeds from exercises of stock options, and was partially offset by $0.4 million for taxes paid related to net share settlement of equity awards.

The $9.3 million increase in net cash provided by financing activities for the six months ended June 30, 2023 as compared to the same period in 2022 was primarily due to proceeds from issuance of common stock and lower cash paid on taxes related to net share settlement of equity awards.

CRITICAL ACCOUNTING POLICIES AND ESTIMATES

The preparation of financial statements in conformity with generally accepted accounting principles requires management to make judgments, estimates and assumptions in the preparation of our consolidated financial statements and accompanying notes. Actual results could differ from those estimates. There have been no material changes to our critical accounting policies or estimates during the three and six months ended June 30, 2023 from those discussed in our Annual Report.

ITEM 3. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

Market Risk Management

Our cash flows and earnings are subject to fluctuations due to changes in foreign currency exchange rates, interest rates and other factors. These market risk exposures are disclosed in Part II, Item 7A of our Annual Report on Form 10-K.

Interest Rate Sensitivity

Our unrestricted cash and cash equivalents total $92.1 million at June 30, 2023. We primarily invest these amounts in money market funds which are held for working capital purposes. We do not enter into investments for trading or speculative purposes. As of June 30, 2023, the effect of a hypothetical 10% decrease in market interest rates would have a $0.4 million impact on a potential loss in future interest income and cash flows.

Foreign Currency Risk

Our results of operations and cash flows are subject to fluctuations due to changes in foreign currency exchange rates. In periods when the USD declines in value as compared to the foreign currencies in which we incur expenses, our foreign-currency based expenses increase when translated into United States dollars. Although substantially all of our sales are denominated in United States dollars, future fluctuations in the value of the USD may affect the price competitiveness of our products outside the United States. Our most significant foreign currency exposure is due to non-functional currency denominated monetary assets, primarily currencies denominated in other than their functional currency. These non-functional currency denominated monetary assets are subject to re-measurement which may create fluctuations in other expense, net, a component in our consolidated statement of operations and in the fair value of the assets in the consolidated balance sheets. As of June 30, 2023, the effect of a hypothetical 10% unfavorable change in exchange rates on currencies denominated in other than their functional currency would result in a potential loss in future earnings in our consolidated statement of operations and a reduction in the fair value of the assets of approximately $42 thousand.

Investment in Non-Marketable Equity Securities

We own investments in non-marketable equity securities without readily determinable fair values. We may value these equity securities based on significant recent arms-length equity transactions with sophisticated non-strategic unrelated investors, providing the terms of these security transactions are substantially similar to the security transactions terms between the investors and us. The impact of the difference in transaction terms on the market value of the portfolio company may be difficult or impossible to quantify.

ITEM 4. CONTROLS AND PROCEDURES

Evaluation of Disclosure Controls and Procedures

We maintain disclosure controls and procedures and internal controls that are designed to provide reasonable assurance that information required to be disclosed in our Exchange Act reports 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 principal executive officer and our principal financial and accounting officer, as appropriate, to allow timely decisions regarding required disclosure.

Our management, including our principal executive officer and our principal financial and accounting officer, evaluated the effectiveness of our disclosure controls and procedures as defined by Rules 13a-15(e) and 15d-15(e) of the Exchange Act. Based on this review, our principal executive officer and our principal financial and accounting officer concluded that these disclosure controls and procedures were effective as of June 30, 2023 at a reasonable assurance level.

Changes in Internal Control over Financial Reporting

There were no changes in our internal control over financial reporting identified in connection with the evaluation required by paragraph (d) of Exchange Act Rules 13a-15 or 15d-15 that occurred during our last fiscal quarter that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting. There were no significant changes to our internal control over financial reporting due to the adoption of new standards.

Inherent Limitations on Effectiveness of Controls

In designing and evaluating the disclosure controls and procedures, management recognizes that any controls and procedures, even if determined effective and no matter how well designed and operated, can provide only reasonable assurance of achieving the desired control objectives to prevent or detect misstatements. In addition, the design of disclosure controls and procedures must reflect the fact that there are resource constraints, and that management is required to apply judgment in evaluating the benefits of possible controls and procedures relative to their costs. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

PART II. OTHER INFORMATION

ITEM 1. LEGAL PROCEEDINGS

We are not currently a party to any material pending litigation or other material legal proceedings.

ITEM 1A. RISK FACTORS

You should carefully consider the risks described below together with the other information set forth in this Quarterly Report, which could materially affect our business, financial condition or future results. The risks described below are not the only risks facing our company. Risks and uncertainties not currently known to us or that we currently deem to be immaterial also may materially adversely affect our business, financial condition and/or operating results. Additional discussion of the material risks and uncertainties summarized in this risk factor summary, as well as other risks and uncertainties that we face, can be found in this section.

RISK FACTORS SUMMARY

The following is a summary of the principal factors that cause an investment in the company to be speculative or risky:

- We have a history of net losses and we may not achieve or maintain profitability.
- Biotherapeutic programs are highly regulated and expensive.
- We are dependent on a limited number of customers.
- Our product supply agreements with customers have finite duration and may not be extended or renewed.
- With respect to customers purchasing our products for the manufacture of API, the termination or expiration of such patent protection may materially and adversely affect our revenues, financial condition or results of operations.
- We are dependent on a limited number of contract manufacturers for large scale production of substantially all of our enzymes.
- We are dependent on our collaborators, and our failure to successfully manage these relationships could prevent us from developing and commercializing many of our products.
- If we are unable to develop and commercialize new products for the target markets, our business and prospects will be harmed.
- Future revenues from our sales of CDX-616 to Pfizer are subject to a number of factors which are outside of our control and may not materialize.
- Ethical, legal and social concerns about genetically engineered products and processes could limit or prevent the use of our products, processes, and technologies and limit our revenues.
- We have recently enhanced our strategic focus to concentrate of certain programs and business lines. As a result of this refined focus, we may fail to capitalize on other opportunities that may be more profitable or for which there is a greater likelihood of success.
- Given our recent change in strategic direction, we may receive limited revenue or no future value from certain of our existing license agreements.
- In connection with our recently announced change in strategic direction, we are closing operations at our San Carlos office and while we are looking to sublease such space, we may ultimately be unable to do so and still be obligated to pay the balance of the lease, which is substantial.
- We use hazardous materials in our business, and we must comply with environmental laws and regulations.
- As a public reporting company, we are subject to rules and regulations established from time to time by the Securities and Exchange Commission and Nasdaq regarding our internal controls over financial reporting. We may not complete needed improvements to our internal controls over financial reporting in a timely manner, or these internal controls may not be determined to be effective, which may adversely affect investor confidence in our company and, as a result, the value of our common stock and your investment.

- We may need additional capital in the future in order to expand our business.
- Our ongoing efforts to deploy our technology in the life science tools market may fail.
- Even if our customers or collaborators obtain regulatory approval for any products utilizing our enzymes, such products will remain subject to ongoing regulatory requirements, which may result in significant additional expense.
- If we or our customers fail to comply with certain healthcare laws, including fraud and abuse laws, we could face substantial penalties and our business, results of operations, financial condition and prospects could be adversely affected.
- We contract with third parties for the manufacturing and supply of our performance enzymes, which supply may become limited or interrupted or may not be of satisfactory quality and quantity.
- Our efforts to prosecute, maintain, protect and/or defend our intellectual property rights may not be successful.
- Our ability to compete may decline if we do not adequately prosecute, maintain, protect and/or defend our proprietary technology, products or services or our intellectual property rights.
- Third parties may claim that we are infringing, violating or misappropriating their intellectual property rights, which may subject us to costly and time-consuming litigation and prevent us from developing or commercializing our technology, products or services.
- We may be involved in lawsuits to protect or enforce our intellectual property rights, which could be expensive, time-consuming and unsuccessful.
- We may not be able to enforce our intellectual property rights throughout the world.
- If our biocatalysts are stolen, misappropriated or reverse engineered, others could use these biocatalysts to produce competing products.
- We are subject to anti-takeover provisions in our certificate of incorporation and bylaws and under Delaware law that could delay or prevent an acquisition of our company.
- Market and economic conditions may negatively impact our business, financial condition, and share price.
- Business interruptions resulting from disasters or other disturbances could delay us in the process of developing our products and could disrupt our sales.
- Evolving expectations around environmental, social and governance matters may expose us to reputational and other risks.

Risks Relating to Our Business and Strategy

We have a history of net losses and we may not achieve or maintain profitability.

We have incurred net losses since our inception, including losses of $33.6 million, $21.3 million, and $24.0 million for the years ended December 31, 2022, 2021, and 2020, respectively, and $34.1 million and $11.0 million for the six months ended June 30, 2023 and 2022, respectively. As of June 30, 2023 and December 31, 2022, we had an accumulated deficit of $455.4 million and $421.3 million, respectively. If we are unable to continue to successfully develop and commercialize products in our pharmaceutical manufacturing business, increase sales of existing products and services, develop and commercialize our ECO Synthesis™ Platform, and or develop new products or services, or otherwise expand our business, whether through new or expanded collaborations or other products and services, our net losses may increase and we may never achieve profitability. In addition, some of our agreements, including the agreements with GSK, Merck and Novartis, provide for milestone payments, usage payments, and/or future royalty payments, which we will only receive if we and our collaborators develop and commercialize products. We also intend to continue to fund the development of additional proprietary performance enzyme products and advance new technologies like our ECO Synthesis™ Platform. There can be no assurance that any of these products or services will become commercially viable or that we will ever achieve profitability on a quarterly or annual basis. If we fail to achieve profitability, or if the time required to achieve profitability is longer than we anticipate, we may not be able to continue our business. Even if we do achieve profitability, we may not be able to sustain or increase profitability on a quarterly or annual basis.

Biotherapeutic programs are highly regulated and expensive. The ability of our customers, future customers of partners, including any company developing RNAi therapeutics, to advance product candidates utilizing our products to clinical trials and to ultimately receive regulatory approvals is highly uncertain.

Although we are no longer developing our own portfolio of biotherapeutics product candidates, we continue to develop enzyme products, including our ECO Synthesis™ Platform, that may be used by our customers, future customers or partners in connection with their biotherapeutic product candidates, The successful development of biotherapeutic candidates involves many risks and uncertainties, requires long timelines and may lead to uncertain results. In addition, drug development is highly regulated and requires areas of expertise and capital resources we do not currently possess. In order to market a biologic product in the United States, our customers, future customers or partners must undergo the following process required by the United States Food and Drug Administration ("FDA"):

- completion of extensive preclinical laboratory tests and preclinical animal studies, all performed in accordance with the FDA's Good Laboratory Practice requirements;
- submission to the FDA of an Investigational New Drug Application ("IND"), which must become effective before human clinical studies may begin in the United States;
- approval by an independent institutional review board ("IRB") representing each clinical site before the clinical study may be initiated at the site;
- performance of adequate and well-controlled human clinical studies in accordance with Good Clinical Practice ("GCP") requirements to establish the safety, purity and potency (or efficacy) of the product candidate for each proposed indication;
- preparation of and submission to the FDA of a Biologics License Application ("BLA") after completion of all clinical studies;
- potential review of the product candidate by an FDA advisory committee;
- satisfactory completion of an FDA pre-approval inspection of the manufacturing facilities where the product candidate is produced to assess compliance with current Good Manufacturing Practice ("cGMP") requirements; and
- FDA review and approval of a BLA prior to any commercial marketing or sale of the product in the United States.

The regulatory approval processes of the FDA and comparable foreign authorities are lengthy, time consuming and the results are inherently unpredictable. If our customers, future customers or partners are ultimately unable to obtain regulatory approval for their biotherapeutic product candidates utilizing our enzyme products, our business will be harmed. In addition, if we or our customers, future customers or partners fail to comply with applicable FDA or other regulatory requirements at any time during the drug development process, clinical testing, the approval process or after approval, we or they may become subject to administrative or judicial penalties, including the FDA's refusal to approve a pending application, withdrawal of an approval, warning letters, product recalls and additional enforcement actions, any of which may have an adverse effect on our financial condition.

We are dependent on a limited number of customers.

Our current revenues are derived from a limited number of key customers. For the six months ended June 30, 2023 and 2022, customers that each individually contributed 10% or more of our total revenue accounted for 49% and 62% of our total revenues, respectively. We expect a limited number of customers to continue to account for a significant portion of our revenues for the foreseeable future. This customer concentration increases the risk of quarterly fluctuations in our revenues and operating results. The loss or reduction of business from one or a combination of our significant customers could, materially adversely affect our revenues, financial condition and results of operations.

Our product supply agreements with customers have finite duration, may not be extended or renewed and generally do not require the customer to purchase any particular quantity or quantities of our products.

Our product supply agreements with customers generally have a finite duration, may not be extended or renewed and generally do not require the customer to purchase any particular quantity or quantities of our products. While our products are not considered commodities and may not be easily substituted for by our customers, particularly when our products are used in the manufacture of active pharmaceutical ingredients, our customers may nevertheless terminate or fail to renew their product supply agreements with us or significantly curtail their purchases thereunder under certain circumstances. Any such termination or reduction could materially adversely affect our revenues, financial condition and results of operations. For the six months ended June 30, 2023, we derived a majority of our product revenue from these product supply agreements.

With respect to customers purchasing our products for the manufacture of active pharmaceutical ingredients ("API") for which they have exclusivity due to patent protection, the termination or expiration of such patent protection and any resulting generic competition may materially and adversely affect our revenues, financial condition or results of operations.

With respect to customers purchasing our products for the manufacture of API, or lead to the manufacture of API, for which exclusivity due to patent protection has or is about to expire, we can expect that the quantity of our products sold to such customers for such products may decline as generic competition for the API increases. While we anticipate that we may, in some cases, also be able to sell products to these generic competitors for the manufacture of these APIs, or lead to the manufacture of these APIs, the overall effect on our revenues, financial condition and results of operations could be materially adverse.

We are dependent on a limited number of contract manufacturers for large scale production of substantially all of our enzymes. We are working to qualify new contract manufacturers to produce certain of our enzymes, however those efforts may not be successful and therefore we may experience limitations on our ability to supply our enzymes to customers.

Manufacturing of our enzymes is conducted primarily in four locations: our in-house facility in Redwood City, California, and at three third-party contract manufacturing organizations, Lactosan GmbH & Co. KG ("Lactosan"), in Kapfenberg, Austria, ACS Dobfar S.p.A. ("ACSD") (formerly known as DPhar S.p.A.), in Anagni, Italy, and Alphazyme LLC in Florida, United States. Generally, we perform smaller scale manufacturing in-house and outsource the larger scale manufacturing to these contract manufacturers. We have limited internal capacity to manufacture enzymes. As a result, we are dependent upon the performance and capacity of third-party manufacturers for the larger scale manufacturing of the enzymes used in our pharmaceutical and life sciences businesses.

Accordingly, we face risks of difficulties with, and interruptions in, performance by third party manufacturers, the occurrence of which could adversely impact the availability, launch and/or sales of our enzymes in the future. Enzyme manufacturing capacity limitations at our third-party manufacturers and manufacturing delays could negatively affect our business, reputation, results of operations and financial condition. The failure of any contract manufacturer to supply us our required volumes of enzyme on a timely basis, or to manufacture our enzymes in compliance with our specifications or applicable quality requirements or in volumes sufficient to meet demand, would adversely affect our ability to sell pharmaceutical and fine and complex chemicals products, could harm our relationships with our customers or collaborators and could negatively affect our revenues and operating results. We may be forced to secure alternative sources of supply, which may be unavailable on commercially acceptable terms, and could cause delays in our ability to deliver products to our customers, increase our costs and decrease our profit margins.

We currently have supply agreements in place with Lactosan, ACSD and Alphazyme. In the absence of a supply agreement, a contract manufacturer will be under no obligation to manufacture our enzymes and could elect to discontinue their manufacture at any time. If we require additional manufacturing capacity and are unable to obtain it in sufficient quantity, we may not be able to increase our product sales, or we may be required to make substantial capital investments to build that capacity or to contract with other manufacturers on terms that may be less favorable than the terms we currently have with our suppliers. If we choose to build our own additional manufacturing facility, it could take two years or longer before our facility is able to produce commercial volumes of our enzymes. Any resources we expend on acquiring or building internal manufacturing capabilities could be at the expense of other potentially more profitable opportunities. In addition, if we contract with other manufacturers, we may experience delays of several months in qualifying them, which could harm our relationships with our customers or collaborators and could negatively affect our revenues or operating results.

We are dependent on our collaborators, and our failure to successfully manage these relationships could prevent us from developing and commercializing many of our products and achieving or sustaining profitability, and could lead to disagreements with our current or former collaborators.

Our ability to maintain and manage collaborations in our markets is fundamental to the success of our business. We currently have license agreements, research and development agreements, supply agreements and/or distribution agreements with various collaborators. For example, we have ongoing collaborations and agreements with GSK, Merck and Novartis that are important to our business and financial results. We may have limited or no control over the amount or timing of resources that any collaborator is able or willing to devote to our partnered products or collaborative efforts. Any of our collaborators may fail to perform its obligations. These collaborators may breach or terminate their agreements with us or otherwise fail to conduct their collaborative activities successfully and in a timely manner. Further, our collaborators may not develop products arising out of our collaborative arrangements or devote sufficient resources to the development, manufacture, marketing or sale of these products. Moreover, disagreements with a collaborator could develop, and any conflict with a collaborator could lead to litigation and could reduce our ability to enter into future collaboration agreements and negatively impact our relationships with one or more existing collaborators. If any of these events occur, especially if they occur in our collaborations with GSK, Merck or Novartis, or if we fail to maintain our agreements with our collaborators, we may not be able to commercialize our existing and potential products or grow our business or generate sufficient revenues to support our operations, we may not receive contemplated milestone payments and royalties under the collaboration, and we may be involved in litigation. Our collaboration opportunities could be harmed and our financial condition and results of operations could be negatively affected if:

- we do not achieve our research and development objectives under our collaboration agreements in a timely manner or at all;
- we develop products and processes or enter into additional collaborations that conflict with the business objectives of our other collaborators;
- we, our collaborators and/or our contract manufacturers do not receive the required regulatory and other approvals necessary for the commercialization of the applicable product;
- we disagree with our collaborators as to rights to intellectual property that are developed during the collaboration, or their research programs or commercialization activities;
- we are unable to manage multiple simultaneous collaborations;
- our collaborators or licensees are unable or unwilling to implement or use the technology or products that we provide or license to them;
- our collaborators become competitors of ours or enter into agreements with our competitors;
- our collaborators become unable or less willing to expend their resources on research and development or commercialization efforts due to general market conditions, their financial condition or other circumstances beyond our control; or
- our collaborators experience business difficulties, which could eliminate or impair their ability to effectively perform under our agreements.

Takeda recently confirmed that it will end research, discovery and preclinical work in certain rare disease areas that may overlap with the programs on which we collaborateWe continue to engage in discussions with Takeda about the foregoing but we and Takeda has not terminated the Takeda Agreement as of the date of this report.

Even after collaboration relationships expire or terminate, some elements of the collaboration may survive. For instance, certain rights, licenses and obligations of each party with respect to intellectual property and program materials may survive the expiration or termination of the collaboration. Disagreements or conflicts between and among the parties could develop even though the collaboration has ended. These disagreements or conflicts could result in expensive arbitration or litigation, which may not be resolved in our favor.

Finally, our business could be negatively affected if any of our collaborators or suppliers undergoes a change of control or were to otherwise assign the rights or obligations under any of our agreements.

If we are unable to develop and commercialize new products for the pharmaceutical, biotherapeutics, diagnostics and life science tools markets, our business and prospects will be harmed.

We plan to launch new products for the pharmaceutical, biotherapeutics, diagnostics and other life science tools markets such as our ECO Synthesis™ Platform. These efforts are subject to numerous risks, including the following:

- customers in these markets may be reluctant to adopt new manufacturing processes that use our enzymes;
- we may be unable to successfully develop the enzymes or manufacturing processes for our products in a timely and cost-effective manner, if at all;
- we may face difficulties in transferring the developed technologies to our customers and the contract manufacturers that we may use for commercial scale production of intermediates and enzymes in these markets;
- the biotherapeutics products we are designing our technologies for may not receive regulatory approval or be commercially viable;
- the contract manufacturers that we may use may be unable to scale their manufacturing operations to meet the demand for these products and we may be unable to secure additional manufacturing capacity;
- customers may not be willing to purchase these products for these markets from us on favorable terms, if at all;
- we may face product liability litigation, unexpected safety or efficacy concerns and product recalls or withdrawals;
- our customers' products may experience adverse events or face competition from new products, which would reduce demand for our products;
- we may face pressure from existing or new competitive products; and
- we may face pricing pressures from existing or new competitors, some of which may benefit from government subsidies or other incentives.

Competitors and potential competitors who have greater resources and experience than we do may develop products and technologies that make ours obsolete or may use their greater resources to gain market share at our expense.

The biocatalysis and performance enzyme industries and each of our target markets are characterized by rapid technological change. Our future success will depend on our ability to maintain a competitive position with respect to technological advances. In addition, as we enter new markets, we will face new competition and will need to adapt to competitive factors that may be different from those we face today.

We are aware that other companies, including Royal DSM, N.V. ("DSM"), BASF, Bayer and Novozymes have alternative methods for obtaining and generating genetic diversity or use mutagenesis techniques to produce genetic diversity. Academic institutions such as the California Institute of Technology, the Max Planck Institute and the Austrian Centre of Industrial Biotechnology are also working in this field. Technological development by others may result in our technology, products and services, as well as products developed by our customers using our biocatalysts, becoming obsolete.

Our primary competitors in the performance enzymes for pharmaceutical productsare companies marketing either conventional, non-enzymatic processes or biocatalytic enzymes to manufacturers of pharmaceutical intermediates and APIs, and also existing in-house technologies (both biocatalysts and conventional catalysts) within our client and potential client companies. The principal methods of competition and competitive differentiation in this market are price, product quality and performance, including manufacturing yield, safety and environmental benefits, and speed of delivery of product. Pharmaceutical manufacturers that use biocatalytic processes can face increased competition from manufacturers that use more conventional processes and/or manufacturers that are based in regions (such as India and China) with lower regulatory, safety and environmental costs.

The market for the manufacture and supply of APIs and intermediates is large with many established companies. These companies include many of our large innovator and generic pharmaceutical customers, such as Merck, GSK, Novartis, Pfizer, Bristol-Myers, Kyorin, Urovant and Teva which have significant internal research and development efforts directed at developing processes to manufacture APIs and intermediates. The processes used by these companies include classical conventional organic chemistry reactions, chemo catalytic reactions, biocatalytic reactions or combinations thereof. Our biocatalytic based manufacturing processes must compete with these internally developed routes. Additionally, we also face competition from companies developing and marketing conventional catalysts such as Solvias Inc., BASF and Takasago International Corporation.

The market for supplying enzymes for use in pharmaceutical manufacturing is quite fragmented. There is competition from large industrial enzyme companies, such as Novozymes and DuPont, as well as subsidiaries of larger contract research/contract manufacturing organizations, such as DSM, Cambrex Corporation, Lonza, WuXi STA and Almac Group Ltd. Some fermentation pathway design companies, like Ginkgo Bioworks (who recently acquired Zymergen), whose traditional focus has been to design microorganisms that express small molecule chemicals, could extend into designing organisms that express enzymes. There is also competition in the enzyme customization and optimization area from several smaller companies, such as BRAIN AG, Arzeda, c-LEcta GmbH and Evocatal GmbH.

Our ability to compete successfully in any of these markets will depend on our ability to develop proprietary products that reach the market in a timely manner and are technologically superior to and/or are less expensive than other products on the market. Many of our competitors have substantially greater production, financial, research and development, personnel and marketing resources than we do. They also started developing products earlier than we did, which may allow them to establish blocking intellectual property positions or bring products to market before we can. In addition, certain of our competitors may also benefit from local government subsidies and other incentives that are not available to us. As a result, 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 than we could. Our technologies and products may be rendered obsolete or uneconomical by technological advances or entirely different approaches developed by one or more of our competitors. We cannot be certain that any products we develop in the future will compare favorably to products offered by our competitors or that our existing or future products will compare favorably to any new products that are developed by our competitors. As more companies develop new intellectual property in our markets, the possibility of a competitor acquiring patent or other rights that may limit our products or potential products increases, which could lead to litigation.

Our limited resources relative to many of our competitors may cause us to fail to anticipate or respond adequately to new developments and other competitive pressures. This failure could reduce our competitiveness and market share, adversely affect our results of operations and financial position, and prevent us from obtaining or maintaining profitability.

The COVID-19 pandemic has adversely affected and may continue in the future to, directly or indirectly, adversely affect our business, results of operations and financial condition.

The COVID-19 pandemic has had a significant impact globally, prompting governments and businesses to take unprecedented measures in response. In the United States, the COVID-19 pandemic has and may continue in the future to, directly or indirectly, adversely affect our business, results of operations and financial condition.

In the future, our business could be materially adversely affected, directly or indirectly, by the widespread outbreak of contagious disease, such as COVID-19. If, similar to the response to COIVD-19, national, state and local governments in affected regions implement safety precautions, including quarantines, border closures, increased border controls, travel restrictions, governmental orders and shutdowns, business closures, cancellations of public gatherings and other measures, which could, and for COVID-19 did, disrupt normal business operations both in and outside of affected areas and could have significant negative impacts on businesses and financial markets worldwide.

The potential impact of COVID-19, or another pandemic or public health crisis, has had and could continue to have, significant repercussions across regional, national and global economies and financial markets, and could trigger a period of regional, national and global economic slowdown or regional, national or global recessions. The outbreak of COVID-19 in many countries adversely impacted regional, national and global economic activity and has contributed to significant volatility and negative pressure in financial markets. As a result, we may experience difficulty accessing debt and equity capital on attractive terms, or at all, due to the severe disruption and instability in the global financial markets. In addition, our customers may terminate or amend their agreements for the purchase of our technology, products and services due to bankruptcy, lack of liquidity, lack of funding, operational failures or other reasons.

Revenues in future years from our sales of CDX-616 to Pfizer are subject to a number of factors which are outside of our control and may not materialize.

Starting the first and second quarters of 2021, we began to receive purchase orders from Pfizer for large quantities of our proprietary enzyme product, CDX-616, for use by Pfizer in the manufacture of a critical intermediate for its proprietary active pharmaceutical ingredient, nirmatrelvir. Pfizer markets, sells and distributes nirmatrelvir, in combination with the active pharmaceutical ingredient ritonavir, as its PAXLOVID™ (nirmatrelvir tablets; ritonavir tablets) product, which received FDA approval in May 2023 for the treatment of mild-to-moderate COVID-19 in adults who are at high risk for progression to severe COVID-19, including hospitalization or death.

Revenues in 2023 and in future years from our sales of CDX-616 to Pfizer and other potential customers (including sublicensees of Pfizer technology from The Medicines Patent Pool (the "MPP")) are subject to a number of factors which are outside of our control, including, without limitation, the following, all of which could reduce or eliminate our sales of CDX-616, and therefore materially and adversely affect our business, results of operations and financial condition:

- Pfizer has no future binding commitment to purchase any particular quantity or quantities of CDX-616 from us, and we are dependent upon Pfizer continuing to place orders with us (whether on a spot basis or under a long term agreement, when and if executed) for their requirements, if any, for CDX-616;
- to our knowledge, sublicensees of Pfizer technology from the MPP have no obligation to purchase CDX-616 from us under their sublicenses with the MPP;
- future vaccine development and usage and the development and usage of other new therapies for the treatment or elimination of COVID-19 may eliminate or reduce demand for PAXLOVID™;
- new variants of COVID-19 may emerge which PAXLOVID™ is not effective in treating;
- Pfizer may not ultimately receive full marketing authorization for PAXLOVID™ from the FDA and other international regulatory authorities;
- Pfizer could reformulate or make changes in the manufacturing process for nirmatrelvir which would eliminate or reduce demand for the use of CDX-616 in its manufacture;
- sublicensees of Pfizer technology for the manufacture, sale and distribution of PAXLOVID™ from the MPP may not utilize CDX-616 in the manufacture of nirmatrelvir;
- national and regional governmental authorities (including those of the United States government) may mandate that raw materials and intermediates used in the manufacture of PAXLOVID™ to be marketed, sold and distributed within the borders of that country be domestically produced, which could eliminate or reduce demand for the use of CDX-616 in such country; and
- we may be unable (because of lack of available manufacturing capacity at our contract manufacturers, supply chain disruptions or an inability to obtain applicable regulatory approvals) to manufacture the quantities of CDX-616 that Pfizer may desire to purchase from us.

We have investments in non-marketable securities, which may subject us to significant impairment charges.

We have investments in illiquid non-marketable equity securities acquired in private transactions. As of June 30, 2023, 10.3% of our consolidated assets consisted of investment securities, which are illiquid investments. Investments in illiquid, or non-marketable, securities are inherently risky and difficult to value. We account for our non-marketable equity securities under the measurement alternative. Under the measurement alternative, the carrying value of our non-marketable equity investments is adjusted to fair value for observable transactions for identical or similar investments of the same issuer or impairment. We evaluate our investment in non-marketable securities when circumstances indicate that we may not be able to recover the carrying value. We may impair these securities and establish an allowance for a credit loss when we determine that there has been an "other-than-temporary" decline in estimated fair value of the equity security compared to its carrying value. The impairment analysis requires significant judgment to identify events or circumstances that would likely have a material adverse effect on the fair value of the investment. Because over 5% of our total assets consisted of non-marketable investment securities, any future impairment charges from the write down in value of these securities could have a material adverse effect on our financial condition or results of operations.

Ethical, legal and social concerns about genetically engineered products and processes could limit or prevent the use of our technology, products and processes and limit our revenues.

Some of our technology, products and services, such as our ECO Synthesis™ Platform, are genetically engineered or involve the use of genetically engineered products or genetic engineering technologies. If we and/or our collaborators are not able to overcome the ethical, legal, and social concerns relating to genetic engineering, our technology, products and services may not be accepted. Any of the risks discussed below could result in increased expenses, delays, or other impediments to our programs or the public acceptance and commercialization of products and processes dependent on our technologies or inventions. Our ability to develop and commercialize one or more of our technologies, products, or processes could be limited by the following factors:

- public attitudes about the safety and environmental hazards of, and ethical concerns over, genetic research and genetically engineered products and processes, which could influence public acceptance of our technologies, products and processes;
- public attitudes regarding, and potential changes to laws governing ownership of genetic material, which could harm our intellectual property rights with respect to our genetic material and discourage collaborators from supporting, developing, or commercializing our technology, products and services; and
- governmental reaction to negative publicity concerning genetically modified organisms, which could result in greater government regulation of genetic research and derivative products.

The subject of genetically modified organisms has received negative publicity, which has aroused public debate. This adverse publicity could lead to greater regulation and trade restrictions on imports of genetically altered products. The biocatalysts that we develop have significantly enhanced characteristics compared to those found in naturally occurring enzymes or microbes. While we produce our biocatalysts only for use in a controlled industrial environment, the release of such biocatalysts into uncontrolled environments could have unintended consequences. Any adverse effect resulting from such a release could have a material adverse effect on our business and financial condition, and we may have exposure to liability for any resulting harm.

We have recently enhanced our strategic focus to concentrate of certain programs and business lines. As a result of this refined focus, we may fail to capitalize on other opportunities that may be more profitable or for which there is a greater likelihood of success.

Because we have limited financial and managerial resources, we have recently focused our efforts on developing certain programs and business lines. As a result, we may forego or delay pursuit of opportunities with business opportunities that later prove to have greater commercial potential. Further our resource allocation decisions may cause us to fail to capitalize on viable commercial products or profitable market opportunities. In addition, our spending on current and future research and development programs, such as ECO Synthesis™ Platform that is in development, may not yield any commercially viable products. If we do not accurately evaluate the commercial potential or target market for a particular program or business line, our business and results of operations could be harmed.

Given our recent change in strategic direction, we may receive limited revenue or no future value from certain of our existing license agreements

While we have historically invested significant time and financial resources in the development of CDX-7108 for the treatment of exocrine pancreatic insufficiency, now included in the Nestlé Strategic Collaboration Agreement, and CDX-6114 for the treatment of hyperphenylalaninemia, now included in the Nestlé License Agreement, as well as in the development of candidates for the treatment of Fabry disease and Pompe disease, which are now included in the Takeda Agreement, we recently announced we are terminating investment in our Biotherapeutics business and in other programs. As a result, we are renegotiating these, along with other license agreements for product candidates in our Biotherapeutics business and food business. While we are working to amend these agreements or enter into new agreements in such a way that we may be able to receive future revenue or other benefits, we may be unsuccessful in doing so. As a result, it remains uncertain as to whether we will receive any value or benefit from these license agreements going forward. Further, renegotiating these agreements may be costly and could divert management attention, which could have an adverse impact on our business and results of operations.

In connection with our recently announced change in strategic direction, we are closing operations at our San Carlos office and while we are looking to sublease such space, we may ultimately be unable to do so and still be obligated to pay the balance of the lease, which is substantial.

As previously announced in July 2023, we made significant changes to our strategic direction and partially due to those changes, we have determined to cease our operations at our San Carlos site and consolidate operations from our Redwood City office. While we are actively looking to execute a sublease for our San Carlos office, such sublease will likely not cover the entire amount we owe. As a result, we are likely to incur additional rent obligations for this location. Further, we may not be able to successfully execute a sublease covering any meaningful amount, or any at all, of the outstanding lease for a variety of reasons, including many of which are outside of our control such as the office real estate market being depressed and our landlord not approving a particular subtenant. If that were to occur, we would be exposed to substantial liabilities as the remaining balance under the lease is significant. In addition, searching for a potential subtenant is time consuming and could harmfully divert management's attention from our business and operations. If we are unable to execute a sublease covering a meaningful amount of the outstanding balance, or execute a sublease at all, our results of operations could be seriously harmed.

Irrespective of our ability to execute a sublease, we anticipate we may have to incur material impairment charges in connection with such relocation due to the expected write-down of certain long-lived assets. Currently, we are not able to provide an estimate of the timing or the amount, if any, of these material impairments.

We use hazardous materials in our business and we must comply with environmental laws and regulations. Any claims relating to improper handling, storage or disposal of these materials or noncompliance of applicable laws and regulations could be time consuming and costly and could adversely affect our business and results of operations.

Our research and development and commercial processes involve the use of hazardous materials, including chemical, radioactive and biological materials. Our operations also produce hazardous waste. We cannot eliminate entirely the risk of accidental contamination or discharge and any resultant injury from these materials. Federal, state, local and foreign laws and regulations govern the use, manufacture, storage, handling and disposal of, and human exposure to, these materials. We may be sued for any injury or contamination that results from our use or the use by third parties of these materials, and our liability may exceed our total assets. Although we believe that our activities comply in all material respects with environmental laws, there can be no assurance that violations of environmental, health and safety laws will not occur in the future as a result of human error, accident, equipment failure 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, 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 can be joint and several and without regard to comparative fault. Environmental laws could become more stringent over time imposing greater compliance costs and increasing risks and penalties associated with violations, which could impair our research, development or production efforts and harm our business. In addition, we may have to indemnify some of our customers or suppliers for losses related to our failure to comply with environmental laws, which could expose us to significant liabilities.

Our ability to use our net operating loss carryforwards to offset future taxable income may be subject to certain limitations.

In general, under Section 382 of the Internal Revenue Code of 1986, as amended (the "Code"), a corporation that undergoes an "ownership change" is subject to limitations on its ability to utilize its pre-change net operating loss carryforwards ("NOLs"), to offset future taxable income. If the Internal Revenue Service challenges our analysis that our existing NOLs are not subject to limitations arising from previous ownership changes, our ability to utilize NOLs could be limited by Section 382 of the Code. Future changes in our stock ownership, some of which are outside of our control, could result in an ownership change under Section 382 of the Code. Furthermore, our ability to utilize NOLs of companies that we may acquire in the future may be subject to limitations. For these reasons, we may not be able to utilize a material portion of the NOLs reflected in our financial statements, even if we attain profitability.

As a public reporting company, we are subject to rules and regulations established from time to time by the Securities and Exchange Commission and Nasdaq regarding our internal controls over financial reporting. We may not complete needed improvements to our internal controls over financial reporting in a timely manner, or these internal controls may not be determined to be effective, which may adversely affect investor confidence in our company and, as a result, the value of our common stock and your investment.

We are subject to the rules and regulations established from time to time by the Securities and Exchange Commission, and Nasdaq. These rules regulations require, among other things, that we establish and periodically evaluate procedures with respect to our internal controls over financial reporting. As part of these evaluations, material weaknesses in our internal controls over financial reporting may be identified. A material weakness is a deficiency, or a combination of deficiencies, in internal controls over financial reporting such that there is a reasonable possibility that a material misstatement of a company's annual or interim consolidated financial statements will not be prevented or detected on a timely basis. While we were able to remediate previously identified material weaknesses in our internal controls over financial reporting, there can be no guarantee we will not identify similar or other material weaknesses in the future and if such material weaknesses are identified, there can be no guarantee we would be able to remediate such material weaknesses. Any material weaknesses in our internal controls may adversely affect our ability to record, process, summarize and accurately report timely financial information and, as a result, our consolidated financial statements may contain material misstatements or omissions.

Reporting obligations as a public company place a considerable strain on our financial and management systems, processes and controls, as well as on our personnel. In addition, as a public company we are required to document and test our internal controls 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 controls over financial reporting. Likewise, our independent registered public accounting firm is required to provide an attestation report on the effectiveness of our internal controls over financial reporting in our Annual Reports on Form 10-K. If our management is unable to certify the effectiveness of our internal controls or if our independent registered public accounting firm cannot deliver a report attesting to the effectiveness of our internal controls over financial reporting, or if we identify or fail to remediate material weaknesses in our internal controls, we could be subject to regulatory scrutiny and a loss of public confidence, which could seriously harm our reputation and the market price of our common stock. In addition, if we do not maintain adequate financial and management personnel, processes and controls, we may not be able to manage our business effectively or accurately report our financial performance on a timely basis, which could cause a decline in our common stock price and may seriously harm our business.

We may need additional capital in the future in order to expand our business.

Our future capital requirements may be substantial, particularly as we continue to develop our business. Although we believe that, based on our current level of operations, our existing cash, cash equivalents and equity securities will provide adequate funds for ongoing operations, planned capital expenditures and working capital requirements for at least the next 12 months, we may need additional capital if our current plans and assumptions change. Our need for additional capital will depend on many factors, including the financial success of our performance enzyme business, our spending to develop and commercialize new and existing enzyme products and the amount of collaboration funding we may receive to help cover the cost of such expenditures, the effect of any acquisitions of other businesses, technologies or facilities that we may make or develop in the future, our spending on new market opportunities, including the ongoing commercialization of our ECO Synthesis™ Platform, and the filing, prosecution, enforcement and defense of patent claims. If our capital resources are insufficient to meet our capital requirements, and we are unable to enter into or maintain collaborations with partners that are able or willing to fund our development efforts or commercialize any enzyme products that we develop or enable, we will have to raise additional funds to continue the development of our technology and products and complete the commercialization of products, if any, resulting from our technologies.

In addition, we may choose to raise additional capital due to market conditions or strategic considerations, such as funding the ongoing commercialization of our ECO Synthesis™ Platform, even if we believe we have sufficient funds for our current or future operating plans. We may seek to obtain such additional capital through equity offerings, debt financings, credit facilities and/or strategic collaborations. If future financings involve the issuance of equity securities, our existing stockholders would suffer dilution. If we raise debt financing or enter into credit facilities, we may be subject to restrictive covenants that limit our ability to conduct our business. Strategic collaborations may also place restrictions on our business. We may not be able to raise sufficient additional funds on terms that are favorable to us, if at all. If we fail to raise sufficient funds and fail to generate sufficient revenues to achieve planned gross margins and to control operating costs, our ability to fund our operations, take advantage of strategic opportunities, develop products or technologies, or otherwise respond to competitive pressures could be significantly limited. If this happens, we may be forced to delay or terminate research or development programs or the commercialization of products resulting from our technologies, curtail or cease operations or obtain funds through collaborative and licensing arrangements that may require us to relinquish commercial rights, or grant licenses on terms that are not favorable to us. If adequate funds are not available, we will not be able to successfully execute our business plan or continue our business.

If we engage in any acquisitions, we will incur a variety of costs and may potentially face numerous risks that could adversely affect our business and operations.

We have made acquisitions in the past, and if appropriate opportunities become available, we expect to acquire additional businesses, assets, technologies, or products to enhance our business in the future. For example, in October 2010, we acquired substantially all of the patents and other intellectual property rights associated with Maxygen's directed evolution technology.

In connection with any future acquisitions, we could:

- issue additional equity securities, which would dilute our current stockholders;
- incur substantial debt to fund the acquisitions;
- use our cash to fund the acquisitions; or
- assume significant liabilities including litigation risk.

Acquisitions involve numerous risks, including problems integrating the purchased operations, technologies or products, unanticipated costs and other liabilities, diversion of management's attention from our core businesses, adverse effects on existing business relationships with current and/or prospective collaborators, customers and/or suppliers, risks associated with entering markets in which we have no or limited prior experience and potential loss of key employees. We do not have extensive experience in managing the integration process and we may not be able to successfully integrate any businesses, assets, products, technologies or personnel that we might acquire in the future without a significant expenditure of operating, financial and management resources, if at all. The integration process could divert management's time from focusing on operating our business, result in a decline in employee morale and cause retention issues to arise from changes in compensation, reporting relationships, future prospects or the direction of the business. Acquisitions may also require us to record goodwill and non-amortizable intangible assets that will be subject to impairment testing on a regular basis and potential periodic impairment charges, incur amortization expenses related to certain intangible assets, and incur large and immediate write offs and restructuring and other related expenses, all of which could harm our operating results and financial condition. In addition, we may acquire companies that have insufficient internal financial controls, which could impair our ability to integrate the acquired company and adversely impact our financial reporting. If we fail in our integration efforts with respect to any of our acquisitions and are unable to efficiently operate as a combined organization, our business and financial condition may be adversely affected.

Risks Related to Government Regulation

We or our customers may not be able to obtain regulatory approval for the use of our products in food and food ingredients, if required, and, even if approvals are obtained, complying on an ongoing basis with the numerous regulatory requirements applicable to these products will be time-consuming and costly.

The products that we develop for our food and food ingredient customers are, and any other products that we may develop for the food and food ingredients market will likely be, subject to regulation by various government agencies, including the FDA, state and local agencies and similar agencies outside the United States, as well as religious compliance certifying organizations. Food ingredients are regulated by the FDA either as food additives or as substances generally recognized as safe ("GRAS"). A substance can be listed or affirmed as GRAS by the FDA or self-affirmed by its manufacturer upon determination that independent qualified experts would generally agree that the substance is GRAS for a particular use. While we generally self-affirm GRAS status for the ingredients used in the products that we develop for the food market, our customer(s) may be required to submit a GRAS notification to FDA to establish that ingredients in a final commercial product may be considered GRAS. There can be no assurance that our customer(s) will not receive any objections from the FDA with respect to any GRAS notification our customer(s) may submit. If the FDA were to disagree with our customer's determination that their commercial product and/or its ingredients are GRAS or otherwise compliant, the FDA could ask such customer to voluntarily withdraw the final commercial product from the market or could initiate legal action to halt its sale. Such actions by the FDA could have an adverse effect on our business, financial condition, and results of our operations. Food ingredients that are not GRAS are regulated as food additives and require FDA approval prior to commercialization or must be the subject of an existing food additive regulation. The food additive petition process for ingredients that are not already authorized by regulation is generally expensive and time consuming, with approval, if secured, potentially taking years.

Our ongoing efforts to deploy our technology in the life science tools markets may fail.

We have used our CodeEvolver® protein engineering technology platform to develop new products for customers using NGS and PCR/qPCR for*in vitro* molecular diagnostic applications. While we have entered into some license agreements for products in this market, we do not know if we can successfully compete in this new market. This new market is well established and consists of numerous large, well-funded entrenched market participants who have long and established track records and customer relationships.

We have also developed a newly engineered ligase designed to address sequencing challenges. These enzymes, and any additional products that we may develop in the future for this market, may not succeed in displacing current products. If we succeed in commercializing new products for this market, we may not generate significant revenues and cash flows from these activities. The failure to successfully deploy products on timely basis in this space may limit our growth and have a material adverse effect on our financial condition, operating results and business prospects.

Even if our customers, future customers or collaborators obtain regulatory approval for any products utilizing our enzymes, such products will remain subject to ongoing regulatory requirements, which may result in significant additional expense.

Any products that receive FDA approval will remain subject to ongoing regulatory requirements for manufacturing, labeling, packaging, distribution, storage, advertising, promotion, sampling, record-keeping and submission of safety and other post-market information, among other things. Any regulatory approvals received for such products may also be subject to limitations on the approved indicated uses for which they may be marketed or to the conditions of approval, or contain requirements for potentially costly post-marketing testing and surveillance studies. For example, the holder of an approved BLA in the United States is obligated to monitor and report adverse events and any failure of a product to meet the specifications in the BLA. In the United States, the holder of an approved BLA must also submit new or supplemental applications and obtain FDA approval for certain changes to the approved product, product labeling or manufacturing process. Similar provisions apply in the European Union (the "EU"). Advertising and promotional materials must comply with FDA rules and are subject to FDA review, in addition to other potentially applicable federal and state laws. Similarly, in the EU any promotion of medicinal products is highly regulated and, depending on the specific jurisdiction involved, may require prior vetting by the competent national regulatory authority. In addition, product manufacturers and their facilities are subject to payment of user fees and continual review and periodic inspections by the FDA and other regulatory authorities for compliance with cGMP requirements and adherence to commitments made in the BLA or foreign marketing application.

If our customers, future customers or our collaborators or a regulatory agency discovers previously unknown problems with a product such as adverse events of unanticipated severity or frequency or problems with the facility where the product is manufactured or disagrees with the promotion, marketing or labeling of that product, a regulatory agency may impose restrictions relative to that product, the manufacturing facility or our customers or collaborators, including requiring recall or withdrawal of the product from the market or suspension of manufacturing.

In addition, if we or our customers or collaborators fail to comply with applicable regulatory requirements, the FDA and other regulatory authorities may:

- issue an untitled enforcement letter or a warning letter asserting a violation of the law;
- seek an injunction, impose civil and criminal penalties, and impose monetary fines, restitution or disgorgement of profits or revenues;
- suspend or withdraw regulatory approval;
- suspend or terminate any ongoing clinical trials or implement requirements to conduct post-marketing studies or clinical trials;
- refuse to approve a pending BLA or comparable foreign marketing application (or any supplements thereto);
- restrict the labeling, marketing, distribution, use or manufacturing of products;
- seize or detain products or otherwise require the withdrawal or recall of products from the market;
- refuse to approve pending applications or supplements to approved applications;
- refuse to permit the import or export of products; or
- refuse government contracts.

Any government investigation of alleged violations of law could require us to expend significant time and resources in response and could generate negative publicity. The occurrence of any event or penalty described above may also inhibit our customers or collaborators' ability to commercialize products and our ability to generate revenues.

In addition, the FDA's policies, and policies of foreign regulatory agencies, may change, and additional regulations may be enacted that could prevent, limit or delay regulatory approval of product candidates. We cannot predict the likelihood, nature or extent of government regulation that may arise from future legislation or administrative or executive action, either in the United States or abroad. If we are slow or unable to adapt to changes in existing requirements or the adoption of new requirements or policies, or if we are not able to maintain regulatory compliance, we may be subject to enforcement action and we may not achieve or sustain profitability.

If we or our customers fail to comply with certain healthcare laws, including fraud and abuse laws, we could face substantial penalties and our business, results of operations, financial condition and prospects could be adversely affected.

Our business operations and future arrangements with investigators, healthcare professionals, and consultants may expose us and our customers to broadly applicable fraud and abuse and other healthcare laws and regulations. These laws may constrain the business or financial arrangements and relationships through which we will conduct our operations, including how we and our customers research, market, sell and distribute our product candidates, if approved. Because of the breadth of these laws and narrowness of available statutory and regulatory exceptions, it is possible that some of our business activities could be subject to challenge under one or more of such laws. If we or our operations are found to be in violation of any of the laws described above or any other governmental regulations that apply to us, we may be subject to penalties, including civil and criminal penalties, damages, fines, imprisonment and the curtailment or restructuring of our operations, any of which could materially adversely affect our ability to operate our business and our financial results.

Compliance with European Union chemical regulations could be costly and adversely affect our business and results of operations.

Some of our products are subject to the EU regulatory regime known as The Registration, Evaluation and Authorization of Chemicals ("REACH"). REACH mandates that certain chemicals manufactured in, or imported into, the EU be registered and evaluated for their potential effects on human health and the environment. Under REACH, we and our contract manufacturers located in the EU are required to register certain of our products based on the quantity of such product imported into or manufactured in the EU and on the product's intended end-use. The registration, evaluation and authorization process under REACH can be costly and time consuming. Problems or delays in the registration, evaluation or authorization process under REACH could delay or prevent the manufacture of some of our products in, or the importation of some of our products into, the EU, which could adversely affect our business and results of operations. In addition, if we or our contract manufacturers fail to comply with REACH, we may be subject to penalties or other enforcement actions, which could have a material adverse effect on our business and results of operations.

Risks Related to Intellectual Property and Information Technology

Our efforts to prosecute, maintain, protect and/or defend our intellectual property rights may not be successful.

We will continue to file and prosecute patent applications and maintain trade secrets in an ongoing effort to protect our intellectual property rights. It is possible that our current patents, or patents which we may later acquire, may be successfully challenged or invalidated, in whole or in part. It is also possible that we may not obtain issued patents from our pending patent applications. We sometimes permit certain patents or patent applications to lapse or go abandoned under appropriate circumstances. Due to uncertainties inherent in prosecuting patent applications, sometimes patent applications are rejected, and we subsequently abandon them. It is also possible that we may develop proprietary technology, products or services in the future that are not patentable or that the patents of others will limit or altogether preclude our ability to conduct business. In addition, any patent issued to us or to our licensor may provide us with little or no competitive advantage, in which case we may abandon such patent or license it to another entity or terminate the license agreement.

Our means of protecting our proprietary rights may not be adequate and our competitors may independently develop technologies, products or services that are identical or similar to ours or that compete with ours. Patent, trademark, copyright and trade secret laws afford only limited protection for our technology, products and services . The laws of many countries do not protect our proprietary rights to as great an extent as do the laws of the United States. Despite our efforts to protect our proprietary rights, unauthorized parties have in the past attempted, and may in the future attempt, to operate under the aspects of our intellectual property rights, or proprietary technology, products or services or products, or to obtain and use information that we regard as proprietary. Third parties may also design around our proprietary rights, which may render our protected technology, services and products less valuable, if the design around is favorably received in the marketplace. In addition, if any of our technology, products and services is covered by third-party patents or other intellectual property rights, we could be subject to various legal actions. We cannot assure that our technology products and/or services do not infringe, violate or misappropriate any patents or other intellectual property rights owned or controlled by others or that they will not in the future.

Litigation may be necessary to enforce our intellectual property rights, to protect our trade secrets, to determine the validity and scope of the proprietary rights of others, or to defend against claims of infringement, invalidity, misappropriation, or other claims.

Any such litigation could result in substantial costs and diversion of our resources. Moreover, any settlement of or adverse judgment resulting from litigation relating to intellectual property rights could require us to obtain a license to continue to make, use, import, sell or offer for sale the technology, products or services that is the subject of the claim, or otherwise restrict or prohibit our use of the technology, products or services.

Our ability to compete may decline if we do not adequately prosecute, maintain, protect and/or defend our proprietary technology, products or services or our intellectual property rights.

Our success depends in part on our ability to obtain patents and maintain adequate protection of our intellectual property rights directed to our technology, products and services in the United States and other countries. We have adopted a strategy of seeking patent protection in the United States and in foreign countries with respect to certain of the technology used in or relating to our products, services, and processes. As such, as of June 30, 2023, we owned or controlled approximately 2,090 issued patents and pending patent applications in the United States and in various foreign jurisdictions. Our patents and patent applications, if issued, as of June 30, 2023, have terms that expire between 2023 and approximately 2044. We also have license rights to a number of issued patents and pending patent applications in the United States and in various foreign jurisdictions. Our owned and licensed patents and patent applications include those directed to our enabling technology and to the methods and products that support our business in the pharmaceutical manufacturing, life sciences and other markets. We intend to continue to apply for patents relating to our technology, methods, services and products as we deem appropriate.

Issuance of claims in patent applications and enforceability of such claims once issued involve complex legal and factual questions and, therefore, we cannot predict with any certainty whether any of our issued patents will survive invalidity claims asserted by third parties. Issued patents and patents issuing from pending applications may be challenged, invalidated, circumvented, rendered unenforceable or substantially narrowed in scope. In addition, the inventorship and ownership of the patents and patent applications may be challenged by others. Moreover, the United States Leahy-Smith America Invents Act ("AIA"), enacted in September 2011, brought significant changes to the United States patent system, which include a change to a "first to file" system from a "first to invent" system and changes to the procedures for challenging issued patents and disputing patent applications during the examination process, among other things. While interference proceedings are possible for patent claims filed prior to March 16, 2013, many of our filings will be subject to the post- and pre-grant proceedings set forth in the AIA, including citation of prior art and written statements by third parties, third party pre-issuance submissions, ex parte reexamination, inter partes review, post-grant review, and derivation proceedings. We may need to utilize the processes provided by the AIA for supplemental examination or patent reissuance. These proceedings could result in substantial cost to us even if the outcome is favorable. Even if successful, any proceeding may result in loss of certain claims. Any litigation or proceedings could divert our management's time and efforts. Even unsuccessful claims brought by third parties could result in significant legal fees and other expenses, diversion of management time, and disruption in our business. Uncertainties resulting from initiation and continuation of any patent or related litigation could harm our ability to compete.

Additional uncertainty may result from legal precedent handed down by the United States Federal Circuit Court and Supreme Court as they determine legal issues concerning the scope and construction of patent claims and inconsistent interpretation of patent laws by the lower courts. Accordingly, we cannot ensure that any of our pending patent applications will result in issued patents, or even if issued, predict the breadth of the claims upheld in our and other companies' patents. Given that the degree of future protection for our proprietary rights is uncertain, we cannot ensure that: (i) we were the first to invent the inventions covered by each of our pending applications, (ii) we were the first to file patent applications for these inventions, or (iii) the proprietary technology, products or services we develop will be patentable. In addition, unauthorized parties may attempt to copy or otherwise obtain and use our technology, products and services. Monitoring unauthorized use of our intellectual property rights is difficult, and we cannot be certain that the steps we have taken will prevent unauthorized use of our technology, products or services, particularly in certain foreign countries where the local laws may not protect our proprietary rights as fully as in the United States. Moreover, third parties could practice our inventions in territories where we do not have patent protection. Such third parties may then try to import products made using our inventions into the United States or other countries. If competitors are able to use our proprietary technology, products or services, our ability to compete effectively could be harmed. In addition, others may independently develop and obtain patents for technologies, products or services that are similar to or superior to our technologies, products or services. If that happens, we may need to license these technologies, products or services, and we may not be able to obtain licenses on reasonable terms, if at all, which could cause harm to our business.

Similarly, foreign courts have made, and will likely continue to make, changes in how the patent laws in their respective jurisdictions are interpreted. Changes in patent laws and regulations in other countries or jurisdictions, changes in the governmental bodies that enforce them, or changes in how the relevant governmental authority enforces patent laws or regulations may weaken our ability to obtain new patents or to enforce patents that we own or may obtain in the future. Further, the laws of some foreign countries do not protect proprietary rights to the same extent or in the same manner as the laws of the United States. For example, in some foreign jurisdictions, governments have the right to compel patent owners to grant others licenses to their intellectual property under certain circumstances. In addition, any protection afforded by foreign patents may be more limited than that provided under U.S. patent and intellectual property laws. We may encounter significant problems in enforcing and defending our intellectual property both in the United States and abroad. For example, if the issuance in a given country of a patent covering an invention is not followed by the issuance in other countries of patents covering the same invention, or if any judicial interpretation of the validity, enforceability or scope of the claims or the written description or enablement in a patent issued in one country is not similar to the interpretation given to the corresponding patent issued in other countries, our ability to protect our intellectual property rights in those countries may be limited. Changes in either patent laws or in interpretations of patent laws in the United States and other countries may materially diminish the value of our intellectual property rights or narrow the scope of our patent protection. We cannot predict future changes in the interpretation of patent laws or changes to patent laws that might be enacted into law by U.S. and foreign legislative bodies. Those changes may materially affect our patents or patent applications and our ability to obtain additional patent protection in the future. Any of the foregoing could have a material adverse effect on our competitive position, business, financial condition, results of operations and prospects.

Third parties may claim that we are infringing, violating or misappropriating their intellectual property rights, which may subject us to costly and time-consuming litigation and prevent us from developing or commercializing our technology, products or services.

Our commercial success also depends in part on our ability to operate without infringing, violating or misappropriating patents and other intellectual property rights of third parties, and without breaching any licenses or other agreements that we have entered into with regard to our technologies, products or services. We cannot ensure that patents have not been issued, or will not be issued, to third parties that could block our ability to obtain patents or to operate as we would like. There may be patents in some countries that, if valid, may block our ability to make, use, sell, or offer for sale our technology, products or services in those countries, or import our products into those countries, if we are unsuccessful in circumventing or acquiring rights to these patents. There also may be claims in patent applications filed in some countries that, if granted and valid, may also block our ability to commercialize technology, products, services or processes in these countries if we are unable to circumvent or obtain rights to them.

The industries in which we operate and the biotechnology industry, in particular, are characterized by frequent and extensive litigation regarding patents and other intellectual property rights. Many biotechnology companies have employed intellectual property litigation as a way to gain a competitive advantage. Any involvement in litigation or other intellectual property proceedings inside and outside of the United States to defend against claims that we infringe, misappropriate or violate the intellectual property of the rights of others may divert our management's time from focusing on business operations and could cause us to spend significant amounts of money. Any potential intellectual property litigation also could force us to do one or more of the following:

- stop making, using, selling or importing our technologies, products and services that use the subject intellectual property;
- pay monetary damages to the third party asserting claims against us;
- grant or transfer rights to third parties relating to our patents or other intellectual property rights;
- obtain from the third party asserting its intellectual property rights a license to make, sell, offer for sale, import or use the relevant technology, product or service, which license may not be available on reasonable terms, or at all; or
- redesign those technologies, products, services or processes that use any allegedly infringing, misappropriating or violating intellectual property rights, or relocate the operations relating to the allegedly infringing misappropriating or violating intellectual property rights to another jurisdiction, which may result in significant cost or delay to us, could be technically infeasible or could prevent us from making, selling, offering for sale, using or importing some of our technologies, products or services in the United States or other jurisdictions.

We are aware of some patents and patent applications relating to aspects of our technologies, products or services filed by, and issued to, third parties. We cannot assure that if such third party patents rights are asserted against us that we would ultimately prevail.

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

Competitors may infringe, violate or misappropriate our intellectual property rights or those of our licensors. To prevent infringement, violation, misappropriation or other unauthorized use, we have in the past filed, and may in the future be required to file, enforcement claims, which can be expensive and time-consuming. In addition, in an enforcement proceeding, a court may decide that the intellectual property right that we own or control is not valid, is unenforceable and/or is not infringed, violated or misappropriated. In addition, in legal proceedings against a third party to enforce a patent directed at one of our technologies, products or services, the defendant could counterclaim that our patent is invalid and/or unenforceable in whole or in part. In patent enforcement litigation in the United States, defendant counterclaims alleging invalidity and/or unenforceability are commonplace. Grounds for a patent validity challenge include an alleged failure to meet any of several statutory requirements, including lack of novelty, obviousness or non-enablement. Grounds for an unenforceability assertion could include an allegation that someone connected with prosecution of the patent withheld relevant information from the United States Patent and Trademark Office ("USPTO") or made a misleading statement during prosecution. Third parties may also raise similar claims before the USPTO, even outside the context of enforcement litigation. The outcome following legal assertions of invalidity and unenforceability is unpredictable, and prior art could render our patents or those of our licensors invalid. If a defendant were to prevail on a legal assertion of invalidity and/or unenforceability, we would lose at least part, and perhaps all, of the patent protection on the respective technology, products or services. Such a loss of patent protection could have a material adverse impact on our business.

Even if resolved in our favor, litigation or other legal proceedings relating to our intellectual property rights may cause us to incur significant expenses and could distract our technical and management personnel from their normal responsibilities. In addition, there could be public announcements of the results of hearings, motions or other interim proceedings or developments and 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. Such litigation or proceedings could substantially increase our expenses and reduce the resources available for operations and research and development activities. We may not have sufficient financial or other resources to conduct such litigation or proceedings adequately. Some of our competitors may be able to sustain the costs of such litigation or proceedings more effectively than we can because of their greater financial resources. Uncertainties resulting from the initiation and continuation of patent litigation or other proceedings could compromise our ability to compete in the marketplace. Furthermore, because of the substantial amount of discovery required in connection with U.S. intellectual property litigation, there is a risk that some of our confidential information could be compromised by disclosure during this type of litigation.

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

The laws of some foreign countries where we do business do not protect intellectual property rights to the same extent as the laws of the United States. Many companies have encountered significant problems in protecting and enforcing intellectual property rights in certain foreign jurisdictions. The legal systems of certain countries, particularly certain developing countries, do not favor the enforcement of patents and other intellectual property rights, particularly those relating to biotechnology technologies. Accordingly, our efforts to protect and enforce our intellectual property rights in such countries may be inadequate. This could make it difficult for us to stop the infringement, violation or misappropriation of our patents or other intellectual property rights. Additionally, 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.

If our biocatalysts, or the genes that code for our biocatalysts, are stolen, misappropriated or reverse engineered, others could use these biocatalysts or genes to produce competing products.

Third parties, including our contract manufacturers, customers and those involved in shipping our biocatalysts, often have custody or control of our biocatalysts. If our biocatalysts, or the genes that code for our biocatalysts, were stolen, misappropriated or reverse engineered, they could be used by other parties who may be able to reproduce these biocatalysts for their own commercial gain. If this were to occur, it may be difficult for us to challenge this type of use, especially in countries with limited intellectual property rights protection or in countries in which we do not have patents covering the misappropriated biocatalysts.

Confidentiality and non-use agreements with employees, consultants, advisors and other third parties may not adequately prevent disclosures and non-use of trade secrets and other proprietary information.

In addition to patent protection, we also rely on other intellectual property rights, including protection of copyright, trade secrets, know-how and/or other proprietary information that is not patentable or that we elect not to patent. However, trade secrets can be difficult to protect, and some courts are less willing or unwilling to protect trade secrets. To maintain the confidentiality of our trade secrets and proprietary information, we rely in part on trade secret law and contractual agreements to protect our confidential and proprietary information and processes. We generally enter into confidentiality and invention assignment agreements with our employees, consultants and third parties working on our behalf upon their commencement of a relationship with us. However, trade secrets and confidential information are difficult to protect and we cannot guarantee that we have entered into such agreements with each party that may have or have had access to our trade secrets or proprietary technology and processes and we may not enter into such agreements with all employees, consultants and third parties who have been involved in the development of our intellectual property rights. Nevertheless, without our permission or awareness, our confidential and proprietary information may be disclosed to third parties, used by the respective individuals for purposes other than for the Company's business, or obtained through illegal means, such that third parties could reverse engineer our biocatalysts, enzyme products and processes, to attempt to develop the same technology or develop substantially equivalent technology.

Costly and time-consuming litigation could be necessary to enforce and determine the scope of our confidential and proprietary rights, and failure to protect our trade secrets could adversely affect our competitive business position. If any of our trade secrets were lawfully obtained, we may be unable to prevent them, or those to whom they communicate it, from using that technology or information to compete with us or disclosing it publicly. Therefore, these events could have a material adverse effect on our business, financial condition and results of operations. In particular, a failure to protect our proprietary rights may allow competitors to copy our technology, which could adversely affect our pricing and market share.

In addition to contractual measures, we try to protect the confidential nature of our proprietary information by maintaining physical security of our premises and electronic security of our information technology systems. Such security measures may not, for example, in the case of misappropriation of a trade secret by an employee, consultant or other third party with authorized access or with unauthorized access but an intent to steal, provide adequate protection for our proprietary information. Our security measures may not prevent such employee, consultant or other third party from misappropriating our trade secrets and using them or providing them to a competitor, and recourse we take against such misconduct may not provide an adequate remedy to protect our interests fully. While we use commonly accepted security measures, trade secret violations are often a matter of state law in the United States, and the criteria for protection of trade secrets can vary among different jurisdictions. If the steps we have taken to maintain our trade secrets are deemed inadequate, we may have insufficient recourse against third parties for misappropriating the trade secret.

Risks Related to Owning our Common Stock

We are subject to anti-takeover provisions in our certificate of incorporation and bylaws and under Delaware law that could delay or prevent an acquisition of our company, even if the acquisition would be beneficial to our stockholders.

Provisions in our amended and restated certificate of incorporation and our bylaws may delay or prevent an acquisition of us. Among other things, our amended and restated certificate of incorporation and bylaws provide for a board of directors which is divided into three classes, with staggered three-year terms and provide that all stockholder action must be effected at a duly called meeting of the stockholders and not by a consent in writing, and further provide that only our board of directors, the chairman of the board of directors, our chief executive officer or president may call a special meeting of the stockholders. In addition, our amended and restated certificate of incorporation allows our board of directors, without further action by our stockholders, to issue up to 5,000,000 shares of preferred stock in one or more series and to fix the rights, preferences, privileges and restrictions thereof. These provisions may also frustrate or prevent any attempts by our stockholders to replace or remove our current management by making it more difficult for stockholders to replace members of our board of directors, who are responsible for appointing the members of our management team. Furthermore, because we are incorporated in Delaware, we are governed by the provisions of Section 203 of the Delaware General Corporation Law which prohibits, with some exceptions, stockholders owning in excess of 15% of our outstanding voting stock from merging or combining with us. Finally, our charter documents establish advanced notice requirements for nominations for election to our board of directors and for proposing matters that can be acted upon at stockholder meetings. Although we believe these provisions together provide for an opportunity to receive higher bids by requiring potential acquirers to negotiate with our board of directors, they would apply even if an offer to acquire our company may be considered beneficial by some stockholders.

Our quarterly or annual operating results may fluctuate in the future. As a result, we may fail to meet or exceed the expectations of research analysts or investors, which could cause our stock price to decline.

Our financial condition and operating results have varied significantly in the past and may continue to fluctuate from quarter to quarter and year to year in the future due to a variety of factors, many of which are beyond our control. Factors relating to our business that may contribute to these fluctuations include the following factors, as well as other factors described elsewhere in this report:

- our ability to achieve or maintain profitability;
- our dependence on a limited number of customers,;
- our product supply agreements with customers have finite duration, may not be extended or renewed and generally do not require the customer to purchase any particular quantity or quantities of our products;
- with respect to customers purchasing our products for the manufacture of active pharmaceutical ingredients for which they have exclusivity due to patent protection, the termination or expiration of such patent protection and any resulting generic competition may materially and adversely affect our revenues, financial condition or results of operations;
- our dependence on a limited number of products in our performance enzymes business;
- our reliance on a limited number of contract manufacturers for large scale production of substantially all of our enzyme products;
- our relationships with, and dependence on, collaborators in our principal markets;
- our ability to develop and successfully commercialize new products for the markets we serve;
- potential of GSK, Merck, Novartis or any other performance enzyme customer terminating their agreements with us;
- the success of our customers' products in the market and the ability of such customers to obtain regulatory approvals for products and processes;
- our ability to deploy our technology platform in life science tools markets;
- our dependence on our collaborators or customers' product candidates which could unexpectedly fail at any stage of preclinical or clinical development;
- our dependence on our collaborators or customers' product candidates which may lack the ability to work as intended or cause undesirable side effects;
- our ability to successfully prosecute and protect our intellectual property;
- our ability to compete if we do not adequately protect our proprietary technologies or if we lose some of our intellectual property rights;
- our ability to avoid infringing the intellectual property rights of third parties;
- our involvement in lawsuits to protect or enforce our patents or other intellectual property rights;
- our ability to enforce our intellectual property rights throughout the world;
- our dependence on, and the need to attract and retain, key management and other personnel;
- our ability to prevent the theft or misappropriation of our biocatalysts, the genes that code for our biocatalysts, know-how or technologies;
- our ability to protect our trade secrets and other proprietary information from disclosure by employees and others;
- our ability to obtain substantial additional capital that may be necessary to expand our business;
- our ability to comply with the terms of our credit facility;
- our ability to timely pay debt service obligations;

- our customers' ability to pay amounts owed to us in a timely manner;
- our ability to avoid charges to earnings as a result of any impairment of goodwill, intangible assets or other long-lived assets;
- changes in financial accounting standards or practices may cause adverse, unexpected financial reporting fluctuations and affect our reported results of operations;
- our ability to maintain effective internal control over financial reporting;
- our dependency on information technology systems, infrastructure and data;
- our ability to control and to improve product gross margins;
- our ability to protect against risks associated with the international aspects of our business;
- the cost of compliance with EU chemical regulations;
- potential advantages that our competitors and potential competitors may have in securing funding or developing products;
- our ability to accurately report our financial results in a timely manner;
- results of regulatory tax examinations;
- market and economic conditions may negatively impact our business, financial condition, and share price;
- business interruptions due to natural disasters, disease outbreaks or other events beyond our control;
- public concerns about the ethical, legal and social ramifications of genetically engineered products and processes;
- our ability to integrate our current business with any businesses that we may acquire in the future;
- our ability to properly handle and dispose of hazardous materials in our business;
- potential product liability claims;
- changes to tax law and related regulations could materially affect our tax obligations and effective tax rate; and
- our ability to use our NOLs to offset future taxable income.

Due to the various factors mentioned above, and others, the results of any prior quarterly or annual periods should not be relied upon as indications of our future operating performance.

We do not intend to pay cash dividends for the foreseeable future.

We currently intend to retain our future earnings, if any, to finance the further development and expansion of our business and do not intend to pay cash dividends in the foreseeable future. Any future determination to pay dividends will be at the discretion of our board of directors and will depend on our financial condition, results of operations, capital requirements, restrictions contained in future agreements and financing instruments, business prospects and such other factors as our board of directors deems relevant.

General Risk Factors

If securities or industry analysts do not publish research or reports about our business, or publish negative reports about our business, our stock price and trading volume could decline.

The trading market for our common stock will be influenced by the research and reports that securities or industry analysts publish about us or our business. We do not have any control over these analysts. If one or more of the analysts who cover us downgrade our stock or change their opinion of our stock in a negative manner, our stock price would likely decline. 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 stock price or trading volume to decline.

We face risks associated with our international business.

While we have a limited number of employees located outside of the United States, we are and will continue to be dependent upon contract manufacturers located outside of the United States. In addition, we have customers and partners located outside of the United States. Conducting business internationally exposes us to a variety of risks, including:

- changes in or interpretations of foreign regulations that may adversely affect our ability to sell our products, repatriate profits to the United States or operate our foreign-located facilities;
- the imposition of tariffs;
- the imposition of limitations on, or increase of, withholding and other taxes on remittances and other payments by foreign subsidiaries or joint ventures;
- the imposition of limitations on genetically-engineered products or processes and the production or sale of those products or processes in foreign countries;
- currency exchange rate fluctuations;
- uncertainties relating to foreign laws, regulations and legal proceedings including tax, import/export, anti-corruption and exchange control laws;
- the availability of government subsidies or other incentives that benefit competitors in their local markets that are not available to us;
- increased demands on our limited resources created by our operations may constrain the capabilities of our administrative and operational resources and restrict our ability to attract, train, manage and retain qualified management, technicians, scientists and other personnel;
- economic or political instability in foreign countries;
- difficulties associated with staffing and managing foreign operations; and
- the need to comply with a variety of United States and foreign laws applicable to the conduct of international business, including import and export control laws and anti-corruption laws.

Market and economic conditions may negatively impact our business, financial condition, and share price.

Concerns about inflation, energy costs, geopolitical issues, the United States mortgage market and a declining real estate market, unstable global credit markets and financial conditions, and volatile oil prices have led to periods of significant economic instability, diminished liquidity and credit availability, declines in consumer confidence and discretionary spending, diminished expectations for the global economy and expectations of slower global economic growth going forward, increased unemployment rates, and increased credit defaults in recent years. Our general business strategy may be adversely affected by any such economic downturns, volatile business environments and continued unstable or unpredictable economic and market conditions. Recently, the closures of Silicon Valley Bank ("SVB") and Signature Bank ("Signature") and their placement into receivership with the Federal Deposit Insurance Corporation, and the government-brokered sale of the deposits and majority of assets of First Republic Bank to JPMorgan Chase, created bank-specific and broader financial institution liquidity risk and concerns. Although government intervention ensured that depositors at these banks have access to their funds, future adverse developments with respect to specific financial institutions or the broader financial services industry may lead to market-wide liquidity shortages, impair the ability of companies to access near-term working capital needs, and create additional market and economic uncertainty. There can be no assurance that future credit and financial market instability and a deterioration in confidence in economic conditions will not occur, and we cannot predict the impact or follow-on effects of these insolvencies more broadly or on our business in particular. Further, we cannot guarantee that the government will intervene to provide depositors with access to funds if similar events occur in the future. If other banks and financial institutions enter receivership or become insolvent in the future, our ability to access our existing cash, cash equivalents, and investments may be threatened, which could have a material adverse effect on our business and financial condition. In addition, if the market and economic conditions described above continue to deteriorate or do not improve, it may make any necessary debt or equity financing more difficult to complete, more costly, and more dilutive. Failure to secure any necessary financing in a timely manner and on favorable terms could have a material adverse effect on our growth strategy, financial performance, and stock price. Additionally, rising rates of inflation have increased the costs associated with conducting our business, including by causing substantial increases in the costs of materials, including raw materials and consumables, equipment, services, and labor.

Moreover, given the unpredictable nature of the current economic climate, including future changes in rates of inflation, it may be increasingly difficult for us to predict and control our future expenses, which may harm our ability to conduct our business.

Business interruptions resulting from disasters or other disturbances could delay us in the process of developing our products and could disrupt our sales. Our business continuity and disaster recovery plans may not adequately protect us from a serious disaster or other disturbance.

Our headquarters and other facilities are located in the San Francisco Bay Area, which in the past has experienced both severe earthquakes and wildfires. Earthquakes, wildfires or other natural disasters could severely disrupt our operations, and have a material adverse effect on our business, results of operations, financial condition and prospects. We are also vulnerable to other types of disasters and other events that could disrupt our operations, such as riot, civil disturbances, war, terrorist acts, infections in our laboratory or production facilities or those of our customers or contract manufacturers and other events beyond our control. If a natural disaster or other event occurred that prevented us from using all or a significant portion of our headquarters, that damaged critical infrastructure, such as our enterprise financial systems or manufacturing resource planning and enterprise quality systems, or that otherwise disrupted operations, it may be difficult or, in certain cases, impossible, for us to continue our business for a substantial period of time. The disaster recovery and business continuity plans we have in place currently are limited and are unlikely to prove adequate in the event of a serious disaster or similar event. We may incur substantial expenses as a result of the limited nature of our disaster recovery and business continuity plans. We do not carry insurance for earthquakes and we may not carry sufficient business interruption insurance to compensate us for losses that may occur. Any losses or damages we incur could have a material adverse effect on our cash flows and success as an overall business.

We are dependent on information technology systems, infrastructure and data, and any failure of these systems could harm our business. Security breaches, loss of data and other disruptions could compromise sensitive information related to our business or prevent us from accessing critical information and expose us to liability, which could adversely affect our business, results of operations and financial condition.

Information technology helps us operate efficiently, interface with customers, maintain financial accuracy and efficiency and accurately produce our financial statements. If we do not allocate and effectively manage the resources necessary to build and sustain the proper technology infrastructure, we could be subject to transaction errors, processing inefficiencies, the loss of customers, business disruptions or the loss of or damage to intellectual property through security breach. If our information technology systems do not effectively collect, store, process and report relevant data for the operation of our business, whether due to equipment malfunction or constraints, software deficiencies, or human error, our ability to effectively plan, forecast and execute our business plan and comply with applicable laws and regulations will be impaired, perhaps materially. Our information technology systems and those of our external vendors, strategic partners and other contractors or consultants are vulnerable to attack and damage or interruption from computer viruses and malware (e.g. ransomware), malicious code, natural disasters, terrorism, war, telecommunication and electrical failures, hacking, cyberattacks, phishing attacks and other social engineering schemes, employee theft or misuse, human error, fraud, denial or degradation of service attacks, sophisticated nation-state and nation-state-supported actors or unauthorized access or use by persons inside our organization, or persons with access to systems inside our organization. Any such impairment could materially and adversely affect our financial condition, results of operations, cash flows and the timeliness with which we report our internal and external operating results.

Our business may require us to use and store personal information of our customers, employees, and business partners. This may include names, addresses, phone numbers, email addresses, contact preferences, tax identification numbers and payment account information. We require usernames and passwords in order to access our information technology systems. We also use encryption and authentication technologies to secure the transmission and storage of data. However, these security measures may be compromised as a result of security breaches by unauthorized persons, employee error, malfeasance, faulty password management or other irregularity, and result in persons obtaining unauthorized access to our data or accounts. Third parties may attempt to fraudulently induce employees or customers into disclosing usernames, passwords or other sensitive information, which may in turn be used to access our information technology systems. For example, our employees have received “phishing” emails and phone calls attempting to induce them to divulge passwords and other sensitive information.

In addition, unauthorized persons may attempt to hack into our products or systems to obtain personal data relating to employees and other individuals, our confidential or proprietary information or confidential information we hold on behalf of third parties. We also rely on external vendors to supply and/or support certain aspects of our information technology systems. The systems of these external vendors may contain defects in design or manufacture or other problems that could unexpectedly compromise information security of our own systems, and we are dependent on these third parties to deploy appropriate security programs to protect their systems. If we or our third-party vendors were to experience a significant cybersecurity breach of our or their information systems or data, the costs associated with the investigation, remediation and potential notification of the breach to counterparties and data subjects could be material. Our remediation efforts may not be successful. Further, if such an event were to occur and cause interruptions in our operations, it could result in a material disruption of our development programs and our business operations, whether due to a loss, corruption or unauthorized disclosure of our trade secrets, personal information or other proprietary or sensitive information or other similar disruptions. Attacks upon information technology systems are also increasing in their frequency, levels of persistence, sophistication and intensity, and are being conducted by sophisticated and organized groups and individuals with a wide range of motives and expertise. As a result of the COVID-19 pandemic, and continued hybrid working environment, we may also face increased cybersecurity risks due to our reliance on internet technology and the number of our employees who are working remotely, which may create additional opportunities for cybercriminals to exploit vulnerabilities. We have programs in place to detect, contain and respond to data security incidents, and we make ongoing improvements to our information-sharing products in order to minimize vulnerabilities, in accordance with industry and regulatory standards. However, because the techniques used to obtain unauthorized access to or sabotage systems change frequently and may be difficult to detect, we may not be able to anticipate and prevent these intrusions or mitigate them when and if they occur. Even if identified, we may be unable to adequately investigate or remediate incidents or breaches due to attackers increasingly using tools and techniques that are designed to circumvent controls, to avoid detection and to remove or obfuscate forensic evidence.

We and certain of our external vendors are from time to time subject to cyberattacks and security incidents. While we do not believe that we have experienced any significant system failure, accident, or security breach to date, if such an event were to occur, it could result in the unauthorized access to or unauthorized use, disclosure, release or other processing of personal information, it may be necessary to notify individuals, governmental authorities, supervisory bodies, the media and other parties pursuant to privacy and security laws. Any security compromise affecting us, our service providers, vendors, strategic partners, other contractors, consultants or our industry, whether real or perceived, could harm our reputation, erode confidence in the effectiveness of our security measures and lead to regulatory scrutiny. To the extent that any disruption or security breach were to result in a loss of, or damage to, our data or systems, or inappropriate disclosure of confidential or proprietary or personal information, we could incur liability, including litigation exposure, penalties and fines, we could become the subject of regulatory action or investigation, our competitive position could be harmed and the further development of our products could be delayed. If such an event were to occur and cause interruptions in our operations, it could result in a material disruption of our business. Furthermore, federal, state and international laws and regulations can expose us to enforcement actions and investigations by regulatory authorities, and potentially result in regulatory penalties, fines and significant legal liability, if our information technology security efforts fail. We may also be exposed to a risk of loss or litigation and potential liability, which could materially and adversely affect our business, results of operations and financial condition.

Actual or perceived failures to comply with applicable data protection, privacy and security laws, regulations, standards and other requirements could adversely affect our business, results of operations and financial condition.

The global data protection landscape is rapidly evolving, and we are or may become subject to state, federal and foreign laws, regulations, decisions and directives governing the privacy, security, collection, storage, transmission, use, processing, retention and disclosure of personal information. Any failure or perceived failure by us to comply with applicable laws or regulations, our internal policies and procedures or our contracts governing our processing of personal information could result in negative publicity, government investigations and enforcement actions, claims by third parties and damage to our reputation, any of which could have a material adverse effect on our operations, financial performance and business.

In the United States, HIPAA imposes, among other things, certain standards relating to the privacy, security, transmission and breach reporting of individually identifiable health information. Certain states have also adopted comparable privacy and security laws and regulations, which govern the privacy, processing and protection of health-related and other personal information. Such laws and regulations will be subject to interpretation by various courts and other governmental authorities, thus creating potentially complex compliance issues for us and our future customers and strategic partners. For example, the California Consumer Privacy Act ("CCPA") went into effect on January 1, 2020. The CCPA creates individual privacy rights for California consumers and increases the privacy and security obligations of entities handling certain personal information. The CCPA also provides for civil penalties for violations, as well as a private right of action for data breaches that has increased the likelihood of, and risks associated with data breach litigation. Further, the California Privacy Rights Act ("CPRA") significantly amends the CCPA, and generally went into effect in January 2023. It imposes additional data protection obligations on covered businesses, including additional consumer rights processes, limitations on data uses, new audit requirements for higher risk data and opt outs for certain uses of sensitive data. It has also created a new California data protection agency authorized to issue substantive regulations and could result in increased privacy and information security enforcement. Additional compliance investment and potential business process changes may also be required. Similar laws have passed in Virginia, Colorado, Connecticut, Iowa and Utah and have been proposed in other states and at the federal level, reflecting a trend toward more stringent privacy legislation in the United States. These developments increase our compliance burden and our risk, including risks of regulatory fines, litigation and associated reputational harm. Any liability from failure to comply with the requirements of these laws could adversely affect our financial condition.

Furthermore, the Federal Trade Commission ("FTC") and many state Attorneys General continue to enforce federal and state consumer protection laws against companies for online collection, use, dissemination and security practices that appear to be unfair or deceptive. For example, according to the FTC, failing to take appropriate steps to keep consumers' personal information secure can constitute unfair acts or practices in or affecting commerce in violation of Section 5(a) of the Federal Trade Commission Act. The FTC expects a company's data security measures to be reasonable and appropriate in light of the sensitivity and volume of consumer information it holds, the size and complexity of its business, and the cost of available tools to improve security and reduce vulnerabilities.

In Europe, the General Data Protection Regulation ("GDPR") went into effect in May 2018 and imposes strict requirements for processing the personal data of individuals within the European Economic Area ("EEA"). The GDPR imposes stringent requirements for controllers and processors of personal data and provides that EEA member states may make their own additional laws and regulations limiting the processing of genetic, biometric or health data, which could limit our ability to use and share personal data or could cause our costs to increase and harm our business and financial condition. Failure to comply with the requirements of the GDPR can result in fines of up to the greater of €20 million and 4% of the total worldwide annual turnover of the preceding financial year and other administrative penalties. If we are required to comply with the GDPR, such compliance may be onerous and adversely affect our business, financial condition, and results of operations. Among other requirements, the GDPR regulates transfers of personal data subject to the GDPR to third countries that have not been found to provide adequate protection to such personal data, including the United States, and the efficacy and longevity of current transfer mechanisms between the EU and the United States remains uncertain. For example, in July 2020, the Court of Justice of the EU ("CJEU") limited how organizations could lawfully transfer personal data from the EU/EEA to the United States by invalidating the Privacy Shield for purposes of international transfers and imposing further restrictions on the use of standard contractual clauses ("SCCs"). In March 2022, the United States and EU announced a new regulatory regime intended to replace the invalidated regulations; however, this new EU-US Data Privacy Framework has not been implemented beyond an executive order signed by President Biden on October 7, 2022, on Enhancing Safeguards for United States Signals Intelligence Activities. European court and regulatory decisions subsequent to the CJEU decision of July 2020 have taken a restrictive approach to international data transfers. As supervisory authorities issue further guidance on personal data export mechanisms, including circumstances where the SCCs cannot be used, and/or start taking enforcement action, we could suffer additional costs, complaints and/or regulatory investigations or fines, and/or if we are otherwise unable to transfer personal data between and among countries and regions in which we operate, it could affect the manner in which we provide our services, the geographical location or segregation of our relevant systems and operations, and could adversely affect our financial results.

Further, from January 1, 2021, companies have had to comply with the GDPR and also the United Kingdom GDPR ("UK GDPR"), which, together with the amended UK Data Protection Act 2018, retains the GDPR in UK national law. The UK GDPR mirrors the fines under the GDPR, i.e., fines up to the greater of €20 million (or up to £17.5 million for UK) or 4% of global turnover. As we continue to expand into other foreign countries and jurisdictions, we may be subject to additional laws and regulations that may affect how we conduct business.

Although we work to comply with applicable laws, regulations and standards, our contractual obligations and other legal obligations, these requirements are evolving and may be modified, interpreted and applied in an inconsistent manner from one jurisdiction to another, and may conflict with one another or other legal obligations with which we must comply. Various federal, state and foreign legislative or regulatory bodies may enact new or additional laws and regulations concerning privacy, data-retention and data-protection issues, including laws or regulations mandating disclosure to domestic or international law enforcement bodies, which could adversely impact our business or our reputation with customers. For example, some countries have adopted laws mandating that certain personal information regarding customers in their country be maintained solely in their country. Having to maintain local data centers and redesign product, service and business operations to limit processing of personal information to within individual countries could increase our operating costs significantly. Any failure, or perceived failure, by us to comply with federal, state or international privacy, data-retention or data-protection-related laws, regulations, orders or industry self-regulatory principles could result in proceedings or actions against us by governmental entities or others, a loss of customer confidence, damage to our brand and reputation and a loss of customers, any of which could have an adverse effect on our business.

Evolving expectations around corporate responsibility practices, specifically related to environmental, social and governance ("ESG") matters, may expose us to reputational and other risks.

Investors, stockholders, customers, suppliers and other third parties are increasingly focusing on ESG and corporate social responsibility endeavors and reporting. Companies that do not adapt to or comply with the evolving investor or stakeholder expectations and standards, or which are perceived to have not responded appropriately, may suffer from reputational damage and result in the business, financial condition and/or stock price of a company being materially and adversely affected. Further, this increased focus on ESG issues may result in new regulations and/or third-party requirements that could adversely impact our business, or certain shareholders reducing or eliminating their holdings of our stock. Additionally, an allegation or perception that we have not taken sufficient action in these areas could negatively harm our reputation.

ITEM 2. UNREGISTERED SALES OF EQUITY SECURITIES AND USE OF PROCEEDS

None.

ITEM 3. DEFAULTS UPON SENIOR SECURITIES

None.

ITEM 4. MINE SAFETY DISCLOSURES

Not applicable.

ITEM 5. OTHER INFORMATION

During the three months ended June 30, 2023, none of the directors or executive officers of the Companyadopted or terminated any contracts, instructions, or written plans for the purchase or sale of our securities that were intended to meet the affirmative defense conditions of Rule 10b5-1(c) or any other "non-Rule 10b5-1 trading arrangement."

ITEM 6. EXHIBITS

3.1		Amended and Restated Certificate of Incorporation of Codexis, Inc. filed with the Secretary of the State of the State of Delaware on April 27, 2010 and effective as of April 27, 2010 (incorporated by reference to Exhibit 3.1 to the Company's Quarterly Report on Form 10-Q for the quarter ended March 31, 2010, filed on May 28, 2010).
3.2		Certificate of Designations of Series A Junior Participating Preferred Stock of Codexis, Inc., filed with the Secretary of State of the State of Delaware on September 4, 2012 (incorporated by reference to Exhibit 3.1 to the Company's Current Report on Form 8-K, filed on September 4, 2012).
3.3		Certificate of Amendment to the Amended and Restated Certificate of Incorporation of Codexis, Inc., filed with the Secretary of the State of the State of Delaware on June 14, 2023 (incorporated by reference to Exhibit 3.1 to the Company's Current Report on Form 8-K, filed on June 16, 2023).
3.4		Amended and Restated Bylaws of Codexis, Inc. effective as of April 27, 2010 (incorporated by reference to Exhibit 3.2 to the Company's Quarterly Report on Form 10-Q for the quarter ended March 31, 2010, filed on May 28, 2010).
4.1		Reference is made to Exhibits 3.1 through 3.4.
10.1	+	Codexis, Inc. 2023 Employee Stock Purchase Plan (incorporated by reference to Exhibit 3.1 to the Company's Current Report on Form 8-K, filed on June 16, 2023).
10.2	+	Amendment to the Codexis, Inc. 2019 Incentive Award Plan (incorporated by reference to Exhibit 3.1 to the Company's Current Report on Form 8-K, filed on June 16, 2023).
31.1		Certification of Principal Executive Officer Required Under Rule 13a-14(a) and 15d-14(a) of the Securities Exchange Act of 1934, as amended.
31.2		Certification of Principal Financial Officer Required Under Rule 13a-14(a) and 15d-14(a) of the Securities Exchange Act of 1934, as amended.
32.1		Certification of Principal Executive Officer and Principal Financial Officer Required Under Rule 13a-14(b) of the Securities Exchange Act of 1934, as amended, and 18 U.S.C. §1350.
101		The following materials from the Company's Quarterly Report on Form 10-Q for the quarter ended June 30, 2023, formatted in Inline Extensible Business Reporting Language ("iXBRL") includes: (i) Unaudited Condensed Consolidated Balance Sheets at June 30, 2023 and December 31, 2022 (ii) Unaudited Condensed Consolidated Statements of Operations for the Three and Six Months Ended June 30, 2023 and 2022, (iii) Unaudited Condensed Consolidated Statements of Stockholders' Equity for the Three and Six Months Ended June 30, 2023 and 2022, (iv) Unaudited Condensed Consolidated Statements of Cash Flows for the Six Months Ended June 30, 2023 and 2022 and (v) Notes to Unaudited Condensed Consolidated Financial Statements.
101.SCH		Inline XBRL Taxonomy Extension Schema Document
101.CAL		Inline XBRL Taxonomy Extension Calculation Linkbase Document
101.DEF		Inline XBRL Taxonomy Extension Definition Linkbase Document
101.LAB		Inline XBRL Taxonomy Extension Label Linkbase Document
101.PRE		Inline XBRL Taxonomy Extension Presentation Linkbase Document
104		The cover page from the Company's Quarterly Report on Form 10-Q for the quarter ended June 30, 2023, formatted in Inline XBRL and contained in Exhibit 101.
	+	Indicates a management contract or compensatory plan or arrangement.

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.

Codexis, Inc.

Date: August 3, 2023

By: /s/ Stephen Dilly

Stephen Dilly
President and Chief Executive Officer
(principal executive officer)

Date: August 3, 2023

By: /s/ Sriram Ryali

Sriram Ryali
Chief Financial Officer
(principal financial and accounting officer)

CERTIFICATE OF AMENDMENT
TO
NINTH AMENDED AND RESTATED CERTIFICATE OF INCORPORATION OF CODEXIS, INC.

The undersigned duly authorized officer of Codexis, Inc., a Delaware corporation, hereby certifies the following:

ONE: The original name of this corporation is Codexis, Inc. and the date of filing the original Certificate of Incorporation of this corporation with the Secretary of State of the State of Delaware was January 31, 2002.

TWO: The Corporation's Ninth Amended and Restated Certificate of Incorporation (the "Restated Certificate of Incorporation") shall be amended by replacing Article IV Section A with the following:

ARTICLE IV

"A. This Corporation is authorized to issue two classes of stock to be designated, respectively, "Common Stock" and "Preferred Stock." The total number of shares that the Corporation is authorized to issue is two hundred five million (205,000,000) shares, two hundred million (200,000,000) shares of which shall be Common Stock and five million (5,000,000) shares of which shall be Preferred Stock. The Common Stock shall have a par value of one-hundredth of one cent ($0.0001) per share and the Preferred Stock shall have a par value of one-hundredth of one cent ($0.0001) per share."

THREE: This Certificate of Amendment of the Restated Certificate of Incorporation has been duly adopted in accordance with the provisions of Sections 242 of the DGCL.

FOURTH: This Certificate of Amendment of the Restated Certificate of Incorporation shall become effective immediately upon filing of this Certificate of Amendment with the Secretary of State of the State of Delaware.

IN WITNESS WHEREOF, the Corporation has caused this Certificate of Amendment to be executed on its behalf on this 1th day of June, 2023.

CODEXIS, INC.

By: /s/ Sriram Rvali
Sriram Rvali,
Chief Financial Officer

CODEXIS, INC.
2023 EMPLOYEE STOCK PURCHASE PLAN

ARTICLE 1
PURPOSE

The Plan's purpose is to assist employees of the Company and its Designated Subsidiaries in acquiring a stock ownership interest in the Company, and to help such employees provide for their future security and to encourage them to remain in the employment of the Company and its Subsidiaries.

The Plan consists of two components: the Section 423 Component and the Non-Section 423 Component. The Section 423 Component is intended to qualify as an "employee stock purchase plan" under Section 423 of the Code and shall be administered, interpreted and construed in a manner consistent with the requirements of Section 423 of the Code. In addition, this Plan authorizes the grant of Options under the Non-Section 423 Component, which need not qualify as Options granted pursuant to an "employee stock purchase plan" under Section 423 of the Code; such Options granted under the Non-Section 423 Component shall be granted pursuant to separate Offerings containing such sub-plans, appendices, rules or procedures as may be adopted by the Administrator and designed to achieve tax, securities laws or other objectives for Eligible Employees, Eligible Consultants and the Designated Subsidiaries in locations outside of the United States. Except as otherwise provided herein, the Non-Section 423 Component will operate and be administered in the same manner as the Section 423 Component. Offerings intended to be made under the Non-Section 423 Component will be designated as such by the Administrator at or prior to the time of such Offering.

For purposes of this Plan, the Administrator may designate separate Offerings under the Plan, the terms of which need not be identical, in which Eligible Employees and Eligible Consultants will participate, even if the dates of the applicable Offering Period(s) in each such Offering is identical, provided that the terms of participation are the same within each separate Offering under the Section 423 Component as determined under Section 423 of the Code, *provided*, that no Eligible Consultants shall be permitted to participate in any Offering under the Section 423 Component. Solely by way of example and without limiting the foregoing, the Company could, but shall not be required to, provide for simultaneous Offerings under the Section 423 Component and the Non-Section 423 Component of the Plan.

ARTICLE 2
DEFINITIONS

As used in the Plan, the following words and phrases have the meanings specified below, unless the context clearly indicates otherwise:

2.1 "***Administrator***" means the Committee, or such individuals to which authority to administer the Plan has been delegated under Section 7.1 hereof.

2.2 "***Agent***" means the brokerage firm, bank or other financial institution, entity or person(s), if any, engaged, retained, appointed or authorized to act as the agent of the Company or an Employee with regard to the Plan.

2.3 "***Board***" means the Board of Directors of the Company.

2.4 "***Code***" means the U.S. Internal Revenue Code of 1986, as amended, and all regulations, guidance, compliance programs and other interpretative authority issued thereunder.

2.5 "***Committee***" means the Compensation Committee of the Board.

2.6 "***Common Stock***" means the common stock of the Company.

2.7 "***Company***" means Codexis, Inc., a Delaware corporation, or any successor.

2.8 "***Compensation***" of an Employee means the regular earnings or base salary paid to the Employee from the Company on each Payday as compensation for services to the Company or any Designated Subsidiary, before deduction for any salary deferral contributions made by the Employee to any tax-qualified or nonqualified deferred compensation plan, including overtime, shift differentials, vacation pay, salaried production schedule premiums, holiday pay, jury duty pay, funeral leave pay, paid time off, military pay, and prior week adjustments, but excluding bonuses, education or tuition reimbursements, imputed income arising under any group insurance or benefit program, travel expenses, business and moving reimbursements, including tax gross ups and taxable mileage allowance, income received in connection with any stock options, restricted stock, restricted stock units or other compensatory equity awards and all contributions made by the Company or any Designated Subsidiary for the Employee's benefit under any employee benefit plan now or hereafter established. Such Compensation shall be calculated before deduction of any income or employment tax withholdings, but shall be withheld from the Employee's net income.

2.9 "***Consultant***" means any person, including any adviser, engaged by the Company or its parent or Designated Subsidiary to render services to such entity if the consultant or adviser: (i) renders bona fide services to the Company; (ii) renders services not in connection with the offer or sale of securities in a capital-raising transaction and does not directly or indirectly promote or maintain a market for the Company's securities; and (iii) is a natural person.

2.10 "***Designated Subsidiary***" means each Subsidiary, including any Subsidiary in existence on the Effective Date and any Subsidiary formed or acquired following the Effective Date, that has been designated by the Board or Committee from time to time in its sole discretion as eligible to participate in the Plan, in accordance with Section 7.2 hereof, such designation to specify whether such participation is in the Section 423 Component or Non-Section 423 Component. A Designated Subsidiary may participate in either the Section 423 Component or Non-Section 423 Component, but not both, *provided* that a Subsidiary that, for U.S. tax purposes, is disregarded from the Company or any Subsidiary that participates in the Section 423 Component shall automatically constitute a Designated Subsidiary that participates in the Section 423 Component.

2.11 "***Effective Date***" means the later of the date the Board has adopts the Plan or the approval of the Plan by the Company's stockholders.

2.12 "***Eligible Consultant***" means a Consultant designated by the Committee to participate in the Non-Section 423 Component. In no event shall a Consultant be eligible to participate in the Section 423 Component.

2.13 "***Eligible Employee***" means an Employee:

(a) who is customarily scheduled to work at least 20 hours per week;

(b) whose customary employment is more than five months in a calendar year; and

(c) who, after the granting of the Option, would not be deemed for purposes of Section 423(b)(3) of the Code to possess 5% or more of the total combined voting power or value of all classes of stock of the Company or any Subsidiary.

For purposes of clause (c), the rules of Section 424(d) of the Code with regard to the attribution of stock ownership shall apply in determining the stock ownership of an individual, and stock which an Employee may purchase under outstanding options shall be treated as stock owned by the Employee.

Notwithstanding the foregoing, the Administrator may exclude from participation in the Section 423 Component as an Eligible Employee:

(x) any Employee that is a "highly compensated employee" of the Company or any Designated Subsidiary (within the meaning of Section 414(q) of the Code), or that is such a "highly compensated employee" (A) with compensation above a specified level, (B) who is an officer or (C) who is subject to the disclosure requirements of Section 16(a) of the Exchange Act; or

(y) any Employee who is a citizen or resident of a foreign jurisdiction (without regard to whether they are also a citizen of the United States or a resident alien (within the meaning of Section 7701(b)(1)(A) of the Code)) if either (A) the grant of the Option is prohibited under the laws of the jurisdiction governing such Employee, or (B) compliance with the laws of the foreign jurisdiction would cause the Section 423 Component, any Offering thereunder or an Option granted thereunder to violate the requirements of Section 423 of the Code; *provided* that any exclusion in clauses (x) or (y) shall be applied in an identical manner under each Offering to all Employees of the Company and all Designated Subsidiaries, in accordance with Treas. Reg. § 1.423-2(e). Notwithstanding the foregoing, with respect to the Non-Section 423 Component, the first sentence in this definition shall apply in determining who is an "Eligible Employee," except (a) the Administrator may limit eligibility further within the Company or a Designated Subsidiary so as to only designate some Employees of the Company or a Designated Subsidiary as Eligible Employees, and (b) to the extent the restrictions in the first sentence in this definition are not consistent with applicable local laws, the applicable local laws shall control.

2.14 "***Employee***" means any person who renders services to the Company or a Designated Subsidiary in the status of an employee within the meaning of Section 3401(c) of the Code. "Employee" shall not include any director of the Company or a Designated Subsidiary who does not render services to the Company or a Designated Subsidiary in the status of an employee within the meaning of Section 3401(c) of the Code. For purposes of the Plan, the employment relationship shall be treated as continuing intact while the individual is on military leave, sick leave or other leave of absence approved by the Company or a Designated Subsidiary and meeting the requirements of Treas. Reg. § 1.421-1(h)(2). Where the period of leave exceeds three months, or such other period specified in Treas. Reg. § 1.421-1(h)(2), and the individual's right to reemployment is not guaranteed either by statute or by contract, the employment relationship shall be deemed to have terminated on the first day immediately following such three-month period, or such other period specified in Treas. Reg. § 1.421-1(h)(2).

2.15 "***Enrollment Date***" means the first date of each Offering Period.

2.16 "***Exercise Date***" means the last day of each Purchase Period, except as provided in Section 5.2 hereof.

2.17 "***Exchange Act***" means the Securities Exchange Act of 1934, as amended.

2.18 "***Fair Market Value***" means, as of any date, the value of Common Stock determined as follows:

(a) If the Common Stock is (i) listed on any established securities exchange (such as the New York Stock Exchange or Nasdaq Stock Market), (ii) listed on any national market system or (iii) listed, quoted or traded on any automated quotation system, its Fair Market Value shall be the closing sales price for a share of Common Stock as quoted on such exchange or system for such date or, if there is no closing sales price for a share of Common Stock on the date in question, the closing sales price for a share of Common Stock on the last preceding date for which such quotation exists, as reported in *The Wall Street Journal* or such other source as the Administrator deems reliable;

(b) If the Common Stock is not listed on an established securities exchange, national market system or automated quotation system, but the Common Stock is regularly quoted by a recognized securities dealer, its Fair Market Value shall be the mean of the high bid and low asked prices for such date or, if there are no high bid and low asked prices for a share of Common Stock on such date, the high bid and low asked prices for a share of Common Stock on the last preceding date for which such information exists, as reported in *The Wall Street Journal* or such other source as the Administrator deems reliable; or

(c) If the Common Stock is neither listed on an established securities exchange, national market system or automated quotation system nor regularly quoted by a recognized securities dealer, its Fair Market Value shall be established by the Administrator in good faith.

2.19 "***Grant Date***" means the first day of an Offering Period.

2.20 "***New Exercise Date***" has the meaning set forth in Section 5.2(b) hereof.

2.21 "***Non-Section 423 Component***" means those Offerings under the Plan, together with the sub-plans, appendices, rules or procedures, if any, adopted by the Administrator as a part of this Plan, in each case, pursuant to which Options may be granted to non-U.S. Eligible Employees and Eligible Consultants that need not satisfy the requirements for Options granted pursuant to an "employee stock purchase plan" that are set forth under Section 423 of the Code.

2.22 "***Offering***" means an offer under the Plan of an Option that may be exercised during an Offering Period as further described in Section 4 hereof. Unless otherwise specified by the Administrator, each Offering to the Eligible Employees of the Company or a Designated Subsidiary shall be deemed a separate Offering, even if the dates and other terms of the applicable Exercise Periods of each such Offering are identical and the provisions of the Plan will separately apply to each Offering. To the extent permitted by Treas. Reg. § 1.423-2(a)(1), the terms of each separate Offering under the Section 423 Component need not be identical, provided that the terms of the Section 423 Component and an Offering thereunder together satisfy Treas. Reg. § 1.423-2(a)(2) and (a)(3).

2.23 "***Offering Period***" means each consecutive, overlapping twenty-four (24) month period commencing on such date(s) as determined by the Board or Committee, in its sole discretion, and with respect to which Options shall be granted to Participants. The duration and timing of Offering Periods may be established or changed by the Board or Committee at any time, in its sole discretion. Notwithstanding the foregoing, in no event may an Offering Period exceed twenty-seven (27) months.

2.24 "***Option***" means the right to purchase shares of Common Stock pursuant to the Plan during each Offering Period.

2.25 "***Option Price***" means the purchase price of a share of Common Stock hereunder as provided in Section 4.2 hereof.

2.26 "***Parent***" means any entity that is a parent corporation of the Company within the meaning of Section 424 of the Code.

2.27 "***Participant***" means any Eligible Employee who elects to participate in the Plan and any Eligible Consultant who elects to participate in the Non-Section 423 Component of the Plan.

2.28 "***Payday***" means the regular and recurring established day for payment of Compensation to an Employee of the Company or any Designated Subsidiary.

2.29 "***Plan***" means this 2023 Employee Stock Purchase Plan, including both the Section 423 Component and Non-Section 423 Component and any other sub-plans or appendices hereto, as amended from time to time.

2.30 "***Plan Account***" means a bookkeeping account established and maintained by the Company in the name of each Participant.

2.31 "***Purchase Period***" means each consecutive six (6) month period commencing on such date(s) as determined by the Board or Committee, in its sole discretion, within each Offering Period. The first Purchase Period of each Offering Period shall commence on the Grant Date and end with the next Exercise Date. The duration and timing of Purchase Periods may be established or changed by the Board or Committee at any time, in its sole discretion. Notwithstanding the foregoing, in no event may a Purchase Period exceed the duration of the Offering Period under which it is established.

2.32 "***Section 409A***" means Section 409A of the Code.

2.33 "***Section 423 Component***" means those Offerings under the Plan that are intended to meet the requirements under Section 423(b) of the Code.

2.34 "***Subsidiary***" means any entity that is a subsidiary corporation of the Company within the meaning of Section 424 of the Code. In addition, with respect to the Non-Section 423 Component, Subsidiary shall include any corporate or noncorporate entity in which the Company has a direct or indirect equity interest or significant business relationship.

2.35 "***Treas. Reg.***" means U.S. Department of the Treasury regulations.

2.36 "***Withdrawal Election***" has the meaning set forth in Section 6.1(a) hereof.

ARTICLE 3
PARTICIPATION

3.1 Eligibility.

(a) Any Eligible Employee who is employed by the Company or a Designated Subsidiary on a given Enrollment Date for an Offering Period shall be eligible to participate in the Plan during such Offering Period, subject to the requirements of Articles 4 and 5 hereof, and, for the Section 423 Component, the limitations imposed by Section 423(b) of the Code. Any Eligible Consultant who is engaged by the Company or a Designated Subsidiary, including, without limitation, through a professional employer organization, on a given Enrollment Date for an Offering Period shall be eligible to participate in the Non-Section 423 Component of the Plan during such Offering Period, subject to the requirements of Article 4 and 5 hereof.

(b) No Eligible Employee shall be granted an Option under the Section 423 Component which permits the Participant's rights to purchase shares of Common Stock under the Plan, and to purchase stock under all other employee stock purchase plans of the Company, any Parent or any Subsidiary subject to Section 423 of the Code, to accrue at a rate which exceeds $25,000 of fair market value of such stock (determined at the time such Option is granted) for each calendar year in which such Option is outstanding at any time. The limitation under this Section 3.1(b) shall be applied in accordance with Section 423(b)(8) of the Code. No Eligible Consultant shall be granted an Option under the Section 423 Component.

3.2 Election to Participate; Payroll Deductions

(a) Except as provided in Sections 3.2(e) and 3.3 hereof, an Eligible Employee may become a Participant in the Plan only by means of payroll deduction. Each individual who is an Eligible Employee as of an Offering Period's Enrollment Date may elect to participate in such Offering Period and the Plan by delivering to the Company a payroll deduction authorization no later than the period of time prior to the applicable Enrollment Date that is determined by the Administrator, in its sole discretion. Except as provided in Sections 3.2(e) and 3.3 hereof, an Eligible Consultant may become a Participant in the Non-Section 423 Component of the Plan only by means of a deduction from fees payable by the Company or a Designated Subsidiary to such Eligible Consultant. Each individual who is an Eligible Consultant as of an Offering Period's Enrollment Date may elect to participate in the Non-Section 423 Component of such Offering Period and the Plan by delivering to the Company a fee deduction authorization no later than the period of time prior to the applicable Enrollment Date that is determined by the Administrator, in its sole discretion.

(b) Subject to Section 3.1(b) hereof and except as may otherwise be determined by the Administrator, payroll deductions (i) shall equal at least 1% of the Participant's Compensation as of each Payday of the Offering Period following the Enrollment Date, but not more than 15% of the Participant's Compensation as of each Payday of the Offering Period following the Enrollment Date; and (ii) may be expressed either as (A) a whole number percentage, or (B) a fixed dollar amount. Amounts deducted from a Participant's Compensation with respect to an Offering Period pursuant to this Section 3.2 shall be deducted each Payday through payroll deduction and credited to the Participant's Plan Account; provided that for the first Offering Period under this Plan, payroll deductions shall not begin until such date determined by the Board or Committee, in its sole discretion.

(c) Following at least one payroll or fee deduction, a Participant may decrease (to as low as zero) the amount deducted from such Participant's Compensation only once during an Offering Period upon ten calendar days' prior written notice to the Company. A Participant may not increase the amount deducted from such Participant's Compensation during an Offering Period.

(d) Upon the completion of an Offering Period, each Participant in such Offering Period shall automatically participate in the immediately following Offering Period at the same payroll or fee deduction percentage or fixed amount as in effect at the termination of such Offering Period, unless such Participant delivers to the Company a different election with respect to the successive Offering Period in accordance with Section 3.2(a) hereof, or unless such Participant becomes ineligible for participation in the Plan.

(e) Notwithstanding any other provisions of the Plan to the contrary, in non-U.S. jurisdictions where participation in the Plan through payroll or fee deductions is prohibited, the Administrator may provide that an Eligible Employee may elect to participate through contributions to the Participant's account under the Plan in a form acceptable to the Administrator in lieu of or in addition to payroll or fee deductions; provided, however, that, for any Offering under the Section 423 Component, the Administrator must determine that any alternative method of contribution is applied on an equal and uniform basis to all Eligible Employees in the Offering.

3.3 Leave of Absence. During leaves of absence approved by the Company meeting the requirements of Treas. Reg. § 1.421-1(h)(2), a Participant may continue participation in the Plan by making cash payments to the Company on the Participant's normal payday equal to the Participant's authorized payroll deduction.

ARTICLE 4
PURCHASE OF SHARES

4.1 Grant of Option. The Company may make one or more Offerings under the Plan, which may be successive or overlapping with one another, until the earlier of: (i) the date on which the Shares available under the Plan have been sold or (ii) the date on which the Plan is suspended or terminates. The Administrator shall designate the terms and conditions of each Offering in writing, including without limitation, the Offering Period and the Purchase Periods. Each Participant shall be granted an Option with respect to an Offering Period on the applicable Grant Date. Subject to the limitations of Section 3.1(b) hereof, the number of shares of Common Stock subject to a Participant's Option shall be determined by dividing (a) such Participant's payroll deductions accumulated prior to an Exercise Date and retained in the Participant's Plan Account on such Exercise Date by (b) the applicable Option Price; *provided* that in no event shall a Participant be permitted to purchase during each Offering Period more than 100,000 shares of Common Stock (subject to any adjustment pursuant to Section 5.2 hereof). The Administrator may, for future Offering Periods, increase or decrease, in its absolute discretion, the maximum number of shares of Common Stock that a Participant may purchase during such future Offering Periods. Each Option shall expire on the last Exercise Date for the applicable Offering Period immediately after the automatic exercise of the Option in accordance with Section 4.3 hereof, unless such Option terminates earlier in accordance with Article 6 hereof.

4.2 Option Price. The "***Option Price***" per share of Common Stock to be paid by a Participant upon exercise of the Participant's Option on an Exercise Date for an Offering Period shall equal 85% of the lesser of the Fair Market Value of a share of Common Stock on (a) the applicable Grant Date and (b) the applicable Exercise Date, or such other price designated by the Administrator; *provided* that in no event shall the Option Price per share of Common Stock be less than the par value per share of the Common Stock.

4.3 Purchase of Shares.

(a) On each Exercise Date for an Offering Period, each Participant shall automatically and without any action on such Participant's part be deemed to have exercised the Participant's Option to purchase at the applicable per share Option Price the largest number of whole shares of Common Stock which can be purchased with the amount in the Participant's Plan Account. Any

balance less than the per share Option Price that is remaining in the Participant's Plan Account (after exercise of such Participant's Option) as of the Exercise Date shall be carried forward to the next Purchase Period or Offering Period, unless the Participant has elected to withdraw from the Plan pursuant to Section 6.1 hereof or, pursuant to Section 6.2 hereof, such Participant has ceased to be an Eligible Employee or Eligible Consultant. Any balance not carried forward to the next Purchase Period or Offering Period in accordance with the prior sentence promptly shall be refunded to the applicable Participant. In no event shall an amount greater than or equal to the per share Option Price as of an Exercise Date be carried forward to the next Purchase Period or Offering Period.

(b) As soon as practicable following each Exercise Date, the number of shares of Common Stock purchased by such Participant pursuant to Section 4.3(a) hereof shall be delivered (either in share certificate or book entry form), in the Company's sole discretion, to either (i) the Participant or (ii) an account established in the Participant's name at a stock brokerage or other financial services firm designated by the Company. If the Company is required to obtain from any commission or agency authority to issue any such shares of Common Stock, the Company shall seek to obtain such authority. Inability of the Company to obtain from any such commission or agency authority which counsel for the Company deems necessary for the lawful issuance of any such shares shall relieve the Company from liability to any Participant except to refund to the Participant such Participant's Plan Account balance, without interest thereon.

4.4 Automatic Termination of Offering Period. If the Fair Market Value of a share of Common Stock on any Exercise Date (except the final scheduled Exercise Date of any Offering Period) is lower than the Fair Market Value of a share of Common Stock on the Grant Date for an Offering Period, then such Offering Period shall terminate on such Exercise Date after the automatic exercise of the Option in accordance with Section 4.3 hereof, and each Participant shall automatically be enrolled in the Offering Period that commences immediately following such Exercise Date and such Participant's payroll deduction authorization shall remain in effect for such Offering Period.

4.5 Transferability of Rights. An Option granted under the Plan shall not be transferable, other than by will or the applicable laws of descent and distribution, and is exercisable during the Participant's lifetime only by the Participant. No option or interest or right to the Option shall be available to pay off any debts, contracts or engagements of the Participant or the Participant's successors in interest or shall be subject to disposition by pledge, encumbrance, assignment or any other means whether such disposition be voluntary or involuntary or by operation of law by judgment, levy, attachment, garnishment or any other legal or equitable proceedings (including bankruptcy), and any attempt at disposition of the Option shall have no effect.

ARTICLE 5
PROVISIONS RELATING TO COMMON STOCK

5.1 Common Stock Reserved. Subject to adjustment as provided in Section 5.2 hereof, the maximum number of shares of Common Stock that shall be made available for sale under the Plan shall be 2,000,000 shares. Shares made available for sale under the Plan may be authorized but unissued shares, treasury shares of Common Stock, or reacquired shares reserved for issuance under the Plan.

5.2 Adjustments Upon Changes in Capitalization, Dissolution, Liquidation, Merger or Asset Sale .

(a) Changes in Capitalization. Subject to any required action by the stockholders of the Company, the number of shares of Common Stock which have been authorized for issuance under the Plan but not yet placed under Option, as well as the price per share and the number of shares of Common Stock covered by each Option under the Plan which has not yet been exercised shall be proportionately adjusted for any increase or decrease in the number of issued shares of Common Stock resulting from a stock split, reverse stock split, stock dividend, combination or reclassification of the Common Stock, or any other increase or decrease in the number of shares of Common Stock effected without receipt of consideration by the Company; *provided*, *however*, that conversion of any convertible securities of the Company shall not be deemed to have been "effected without receipt of consideration." Such adjustment shall be made by the Administrator, whose determination in that respect shall be final, binding and

conclusive. Except as expressly provided herein, no issuance by the Company of shares of stock of any class, or securities convertible into shares of stock of any class, shall affect, and no adjustment by reason thereof shall be made with respect to, the number or price of shares of Common Stock subject to an Option.

(b) Dissolution or Liquidation. In the event of the proposed dissolution or liquidation of the Company, the Offering Periods then in progress shall be shortened by setting a new Exercise Date (the "***New Exercise Date***"), and shall terminate immediately prior to the consummation of such proposed dissolution or liquidation, unless provided otherwise by the Administrator. The New Exercise Date shall be before the date of the Company's proposed dissolution or liquidation. The Administrator shall notify each Participant in writing, at least ten business days prior to the New Exercise Date, that the Exercise Date for the Participant's Option has been changed to the New Exercise Date and that the Participant's Option shall be exercised automatically on the New Exercise Date, unless prior to such date the Participant has withdrawn from the Offering Period as provided in Section 6.1 hereof or the Participant has ceased to be an Eligible Employee as provided in Section 6.2 hereof.

(c) Merger or Asset Sale. In the event of a proposed sale of all or substantially all of the assets of the Company, or the merger of the Company with or into another corporation, each outstanding Option shall be assumed or an equivalent Option substituted by the successor corporation or a Parent or Subsidiary of the successor corporation. If the successor corporation refuses to assume or substitute for the Option, any Offering Periods then in progress shall be shortened by setting a New Exercise Date and any Offering Periods then in progress shall end on the New Exercise Date. The New Exercise Date shall be before the date of the Company's proposed sale or merger. The Administrator shall notify each Participant in writing, at least ten business days prior to the New Exercise Date, that the Exercise Date for the Participant's Option has been changed to the New Exercise Date and that the Participant's Option shall be exercised automatically on the New Exercise Date, unless prior to such date the Participant has withdrawn from the Offering Period as provided in Section 6.1 hereof or the Participant has ceased to be an Eligible Employee as provided in Section 6.2 hereof.

5.3 Insufficient Shares. If the Administrator determines that, on a given Exercise Date, the number of shares of Common Stock with respect to which Options are to be exercised may exceed the number of shares of Common Stock remaining available for sale under the Plan on such Exercise Date, the Administrator shall make a pro rata allocation of the shares of Common Stock available for issuance on such Exercise Date in as uniform a manner as shall be practicable and as it shall determine in its sole discretion to be equitable among all Participants exercising Options to purchase Common Stock on such Exercise Date, and unless additional shares are authorized for issuance under the Plan, no further Offering Periods shall take place and the Plan shall terminate pursuant to Section 7.5 hereof. If an Offering Period is so terminated, then the balance of the amount credited to the Participant's Plan Account which has not been applied to the purchase of shares of Common Stock shall be paid to such Participant in one lump sum in cash within 30 days after such Exercise Date, without any interest thereon.

5.4 Rights as Stockholders. With respect to shares of Common Stock subject to an Option, a Participant shall not be deemed to be a stockholder of the Company and shall not have any of the rights or privileges of a stockholder. A Participant shall have the rights and privileges of a stockholder of the Company when, but not until, shares of Common Stock have been deposited in the designated brokerage account following exercise of the Participant's Option.

ARTICLE 6
TERMINATION OF PARTICIPATION

6.1 Cessation of Contributions; Voluntary Withdrawal.

(a) A Participant may cease payroll deductions during an Offering Period and elect to withdraw from the Plan by delivering written notice of such election to the Company in such form and at such time prior to the Exercise Date for such Offering Period as may be established by the Administrator (a "***Withdrawal Election***"). A Participant electing to withdraw from the Plan may elect to either (i) withdraw all of the funds then credited to the Participant's Plan Account as of the date on which the Withdrawal Election is received by the Company, in which case amounts credited to such Plan

Account shall be returned to the Participant in one lump-sum payment in cash within 30 days after such election is received by the Company, without any interest thereon, and the Participant shall cease to participate in the Plan and the Participant's Option for such Offering Period shall terminate; or (ii) exercise the Option for the maximum number of whole shares of Common Stock on the applicable Exercise Date with any remaining Plan Account balance returned to the Participant in one lump-sum payment in cash within 30 days after such Exercise Date, without any interest thereon, and after such exercise cease to participate in the Plan. Upon receipt of a Withdrawal Election, the Participant's payroll deduction authorization and the Participant's Option shall terminate.

(b) A Participant's withdrawal from the Plan shall not have any effect upon the Participant's eligibility to participate in any similar plan which may hereafter be adopted by the Company or in succeeding Offering Periods which commence after the termination of the Offering Period from which the Participant withdraws.

(c) A Participant who ceases contributions to the Plan during any Offering Period shall not be permitted to resume contributions to the Plan during that Offering Period.

6.2 Termination of Eligibility. Upon a Participant's ceasing to be an Eligible Employee or Eligible Consultant, for any reason, such Participant's Option for the applicable Offering Period shall automatically terminate, the Participant shall be deemed to have elected to withdraw from the Plan, and such Participant's Plan Account shall be paid to such Participant or, in the case of the Participant's death, to the person or persons entitled thereto pursuant to applicable law, within 30 days after such cessation of being an Eligible Employee or Eligible Consultant, without any interest thereon. If a Participant transfers employment from the Company or any Designated Subsidiary participating in the Section 423 Component to any Designated Subsidiary participating in the Non-Section 423 Component, such transfer shall not be treated as a termination of employment, but the Participant shall immediately cease to participate in the Section 423 Component; however, any contributions made for the Offering Period in which such transfer occurs shall be transferred to the Non-Section 423 Component, and such Participant shall immediately join the then-current Offering under the Non-Section 423 Component upon the same terms and conditions in effect for the Participant's participation in the Section 423 Component, except for such modifications otherwise applicable for Participants in such Offering. A Participant who transfers employment from any Designated Subsidiary participating in the Non-Section 423 Component to the Company or any Designated Subsidiary participating in the Section 423 Component shall not be treated as terminating the Participant's employment and shall remain a Participant in the Non-Section 423 Component until the earlier of (i) the end of the current Offering Period under the Non-Section 423 Component, or (ii) the Enrollment Date of the first Offering Period in which the Participant is eligible to participate following such transfer. Notwithstanding the foregoing, the Administrator may establish different rules to govern transfers of employment between companies participating in the Section 423 Component and the Non-Section 423 Component, consistent with the applicable requirements of Section 423 of the Code.

ARTICLE 7
GENERAL PROVISIONS

7.1 Administration.

(a) The Plan shall be administered by the Committee, which shall be composed of members of the Board. The Committee may delegate administrative tasks under the Plan to the services of an Agent or Employees to assist in the administration of the Plan, including establishing and maintaining an individual securities account under the Plan for each Participant.

(b) It shall be the duty of the Administrator to conduct the general administration of the Plan in accordance with the provisions of the Plan. The Administrator shall have the power, subject to, and within the limitations of, the express provisions of the Plan:

(i) To establish and terminate Offerings;

(ii) To determine when and how Options shall be granted and the provisions and terms of each Offering (which need not be identical);

(iii) To select Designated Subsidiaries in accordance with Section 7.2 hereof; and

(iv) To construe and interpret the Plan, the terms of any Offering and the terms of the Options and to adopt such rules for the administration, interpretation, and application of the Plan as are consistent therewith and to interpret, amend or revoke any such rules. The Administrator, in the exercise of this power, may correct any defect, omission or inconsistency in the Plan, any Offering or any Option, in a manner and to the extent it shall deem necessary or expedient to administer the Plan, subject to Section 423 of the Code for the Section 423 Component.

(c) The Administrator may adopt rules or procedures relating to the operation and administration of the Plan to accommodate the specific requirements of local laws and procedures. Without limiting the generality of the foregoing, the Administrator is specifically authorized to adopt rules and procedures regarding handling of participation elections, payroll deductions, payment of interest, conversion of local currency, payroll tax, withholding procedures and handling of stock certificates which vary with local requirements. In its absolute discretion, the Board may at any time and from time to time exercise any and all rights and duties of the Administrator under the Plan.

(d) The Administrator may adopt sub-plans applicable to particular Designated Subsidiaries or locations, which sub-plans may be designed to be outside the scope of Section 423 of the Code. The rules of such sub-plans may take precedence over other provisions of this Plan, with the exception of Section 5.1 hereof, but unless otherwise superseded by the terms of such sub-plan, the provisions of this Plan shall govern the operation of such sub-plan.

(e) All expenses and liabilities incurred by the Administrator in connection with the administration of the Plan shall be borne by the Company. The Administrator may, with the approval of the Committee, employ attorneys, consultants, accountants, appraisers, brokers or other persons. The Administrator, the Company and its officers and directors shall be entitled to rely upon the advice, opinions or valuations of any such persons. All actions taken and all interpretations and determinations made by the Administrator in good faith shall be final and binding upon all Participants, the Company and all other interested persons. No member of the Board or Administrator shall be personally liable for any action, determination or interpretation made in good faith with respect to the Plan or the options, and all members of the Board or Administrator shall be fully protected by the Company in respect to any such action, determination, or interpretation.

7.2 Designation of Subsidiary Corporations. The Board or Administrator shall designate from time to time the Subsidiaries that shall constitute Designated Subsidiaries, and determine whether such Designated Subsidiaries shall participate in the Section 423 Component or Non-Section 423 Component. The Board or Administrator may designate a Subsidiary, or terminate the designation of a Subsidiary, without the approval of the stockholders of the Company.

7.3 Reports. Individual accounts shall be maintained for each Participant in the Plan. Statements of Plan Accounts shall be given to Participants at least annually, which statements shall set forth the amounts of payroll deductions, the Option Price, the number of shares purchased and the remaining cash balance, if any.

7.4 No Right to Employment. Nothing in the Plan shall be construed to give any person (including any Participant) the right to remain in the employ of the Company, a Parent or a Subsidiary or to affect the right of the Company, any Parent or any Subsidiary to terminate the employment of any person (including any Participant) at any time, with or without cause, which right is expressly reserved.

7.5 Amendment and Termination of the Plan.

(a) The Board may, in its sole discretion, amend, suspend or terminate the Plan at any time and from time to time. To the extent necessary to comply with Section 423 of the Code (or any

successor rule or provision), with respect to the Section 423 Component, or any other applicable law, regulation or stock exchange rule, the Company shall obtain stockholder approval of any such amendment to the Plan in such a manner and to such a degree as required by Section 423 of the Code or such other law, regulation or rule.

(b) If the Administrator determines that the ongoing operation of the Plan may result in unfavorable financial accounting consequences, the Administrator may in its discretion modify or amend the Plan to reduce or eliminate such accounting consequence including, but not limited to:

(i) altering the Option Price for any Offering Period including an Offering Period underway at the time of the change in Option Price;

(ii) shortening any Offering Period so that the Offering Period ends on a new Exercise Date, including an Offering Period underway at the time of the Administrator action; and

(iii) allocating shares of Common Stock.

Such modifications or amendments shall not require stockholder approval or the consent of any Participant.

(c) Upon termination of the Plan, the balance in each Participant's Plan Account shall be refunded as soon as practicable after such termination, without any interest thereon.

7.6 Use of Funds; No Interest Paid. All funds received by the Company by reason of purchase of shares of Common Stock under the Plan shall be included in the general funds of the Company free of any trust or other restriction and may be used for any corporate purpose. No interest shall be paid to any Participant or credited under the Plan.

7.7 Term; Approval by Stockholders. No Option may be granted during any period of suspension of the Plan or after termination of the Plan. The Plan shall be submitted for the approval of the Company's stockholders within 12 months after the date of the Board's initial adoption of the Plan. Options may be granted prior to such stockholder approval; *provided*, *however*, that such Options shall not be exercisable prior to the time when the Plan is approved by the stockholders; *provided*, *further* that if such approval has not been obtained by the end of the 12-month period, all Options previously granted under the Plan shall thereupon terminate and be canceled and become null and void without being exercised.

7.8 Effect Upon Other Plans. The adoption of the Plan shall not affect any other compensation or incentive plans in effect for the Company, any Parent or any Subsidiary. Nothing in the Plan shall be construed to limit the right of the Company, any Parent or any Subsidiary (a) to establish any other forms of incentives or compensation for Employees of the Company or any Parent or any Subsidiary, or (b) to grant or assume Options otherwise than under the Plan in connection with any proper corporate purpose, including, but not by way of limitation, the grant or assumption of options in connection with the acquisition, by purchase, lease, merger, consolidation or otherwise, of the business, stock or assets of any corporation, firm or association.

7.9 Conformity to Securities Laws. Notwithstanding any other provision of the Plan, the Plan and the participation in the Plan by any individual who is then subject to Section 16 of the Exchange Act shall be subject to any additional limitations set forth in any applicable exemption rule under Section 16 of the Exchange Act (including any amendment to Rule 16b-3 of the Exchange Act) that are requirements for the application of such exemptive rule. To the extent permitted by applicable law, the Plan shall be deemed amended to the extent necessary to conform to such applicable exemptive rule.

7.10 Notice of Disposition of Shares. Each Participant shall give the Company prompt notice of any disposition or other transfer of any shares of Common Stock, acquired pursuant to the exercise of an Option granted under the Section 423 Component, if such disposition or transfer is made (a) within two years after the applicable Grant Date or (b) within one year after the transfer of such shares of

Common Stock to such Participant upon exercise of such Option. The Company may direct that any certificates evidencing shares acquired pursuant to the Plan refer to such requirement.

7.11 Tax Withholding. The Company or any Parent or any Subsidiary shall be entitled to require payment in cash or deduction from other compensation payable to each Participant of any sums required by federal, state or local tax law to be withheld with respect to any purchase of shares of Common Stock under the Plan or any sale of such shares.

7.12 Governing Law. The Plan and all rights and obligations thereunder shall be construed and enforced in accordance with the laws of the State of Delaware, without regard to the conflict of law rules thereof or of any other jurisdiction.

7.13 Notices. All notices or other communications by a Participant to the Company under or in connection with the Plan shall be deemed to have been duly given when received in the form specified by the Company at the location, or by the person, designated by the Company for the receipt thereof.

7.14 Conditions To Issuance of Shares.

(a) Notwithstanding anything herein to the contrary, the Company shall not be required to issue or deliver any certificates or make any book entries evidencing shares of Common Stock pursuant to the exercise of an Option by a Participant, unless and until the Board or the Committee has determined, with advice of counsel, that the issuance of such shares of Common Stock is in compliance with all applicable laws, regulations of governmental authorities and, if applicable, the requirements of any securities exchange or automated quotation system on which the shares of Common Stock are listed or traded, and the shares of Common Stock are covered by an effective registration statement or applicable exemption from registration. In addition to the terms and conditions provided herein, the Board or the Committee may require that a Participant make such reasonable covenants, agreements, and representations as the Board or the Committee, in its discretion, deems advisable in order to comply with any such laws, regulations, or requirements.

(b) All certificates for shares of Common Stock delivered pursuant to the Plan and all shares of Common Stock issued pursuant to book entry procedures are subject to any stop-transfer orders and other restrictions as the Committee deems necessary or advisable to comply with federal, state, or foreign securities or other laws, rules and regulations and the rules of any securities exchange or automated quotation system on which the shares of Common Stock are listed, quoted, or traded. The Committee may place legends on any certificate or book entry evidencing shares of Common Stock to reference restrictions applicable to the shares of Common Stock.

(c) The Committee shall have the right to require any Participant to comply with any timing or other restrictions with respect to the settlement, distribution or exercise of any Option, including a window-period limitation, as may be imposed in the sole discretion of the Committee.

(d) Notwithstanding any other provision of the Plan, unless otherwise determined by the Committee or required by any applicable law, rule or regulation, the Company may, in lieu of delivering to any Participant certificates evidencing shares of Common Stock issued in connection with any Option, record the issuance of shares of Common Stock in the books of the Company (or, as applicable, its transfer agent or stock plan administrator).

7.15 Equal Rights and Privileges. All Eligible Employees of the Company (or of any Designated Subsidiary) granted Options pursuant to an Offering under the Section 423 Component shall have equal rights and privileges under this Plan to the extent required under Section 423 of the Code so that the Section 423 Component qualifies as an "employee stock purchase plan" within the meaning of Section 423 of the Code. Any provision of the Section 423 Component that is inconsistent with Section 423 of the Code shall, without further act or amendment by the Company or the Board, be reformed to comply with the equal rights and privileges requirement of Section 423 of the Code. Eligible Employees and Eligible Consultants participating in the Non-Section 423 Component need not have the same rights and privileges as Eligible Employees and Eligible Consultants participating in the Section 423 Component.

7.16 Rules Particular to Specific Countries. Notwithstanding anything herein to the contrary, the terms and conditions of the Plan with respect to Participants who are tax residents of a particular non-U.S. country or who are foreign nationals or employed in non-U.S. jurisdictions may be subject to an addendum to the Plan in the form of an appendix or sub-plan (which appendix or sub-plan may be designed to govern Offerings under the Section 423 Component or the Non-Section 423 Component, as determined by the Administrator). To the extent that the terms and conditions set forth in an appendix or sub-plan conflict with any provisions of the Plan, the provisions of the appendix or sub-plan shall govern. The adoption of any such appendix or sub-plan shall be pursuant to Section 7.1 above. Without limiting the foregoing, the Administrator is specifically authorized to adopt rules and procedures, with respect to Participants who are foreign nationals or employed in non-U.S. jurisdictions, regarding the exclusion of particular Subsidiaries from participation in the Plan, eligibility to participate, the definition of Compensation, handling of payroll deductions or other contributions by Participants, payment of interest, conversion of local currency, data privacy security, payroll tax, withholding procedures, establishment of bank or trust accounts to hold payroll deductions or contributions.

7.17 Section 409A. The Section 423 Component of the Plan and the Options granted pursuant to Offerings thereunder are intended to be exempt from the application of Section 409A. Neither the Non-Section 423 Component nor any Option granted pursuant to an Offering thereunder is intended to constitute or provide for "nonqualified deferred compensation" within the meaning of Section 409A. Notwithstanding any provision of the Plan to the contrary, if the Administrator determines that any Option granted under the Plan may be or become subject to Section 409A or that any provision of the Plan may cause an Option granted under the Plan to be or become subject to Section 409A, the Administrator may adopt such amendments to the Plan and/or adopt other policies and procedures (including amendments, policies and procedures with retroactive effect), or take any other actions as the Administrator determines are necessary or appropriate to avoid the imposition of taxes under Section 409A, either through compliance with the requirements of Section 409A or with an available exemption therefrom.

AMENDMENT TO THE
CODEXIS, INC. 2019 INCENTIVE AWARD PLAN

THIS AMENDMENT TO THE CODEXIS, INC. 2019 INCENTIVE AWARD PLAN (this " Amendment") is made and adopted by Codexis, Inc. a Delaware corporation (the "Company"). Capitalized terms used but not otherwise defined herein shall have the meanings ascribed to them in the Plan (as defined below).

RECITALS

WHEREAS, the Company maintains the Codexis, Inc. 2019 Incentive Award Plan (as amended from time to time, the " Plan");

WHEREAS, pursuant to Section 12.1 of the Plan, the Plan may be wholly or partially amended or otherwise modified, suspended or terminated at any time or from time to time by the Board of Directors of the Company (the "Board"), subject to the terms of the Plan; and

WHEREAS, the Board has adopted this Amendment, subject to approval by the stockholders of the Company within twelve months following the date of such action.

NOW, THEREFORE, in consideration of the foregoing, the Company hereby amends the Plan as follows, subject to approval by the stockholders of the Company within twelve months following the date of Board adoption of this Amendment:

1. Section 3.1(a) of the Plan is hereby amended and restated in its entirety to read as follows:

   "Subject to adjustment as provided in Section 3.1(b) and Section 12.2, the aggregate number of Shares which may be issued or transferred pursuant to Awards under the Plan is (i) 15,897,144 plus (ii) that number of Shares that are subject to equity awards granted under the Prior Plan which are outstanding as of April 22, 2019 and thereafter terminate, expire, lapse or are forfeited for any reason and which following the termination, expiration, lapse or forfeiture of such awards do not again become available for issuance under the Prior Plan; provided, however, that no more than 22,000,000 Shares may be issued upon the exercise of Incentive Stock Options."

2. This Amendment shall be and is hereby incorporated in and forms a part of the Plan; provided that the Amendment shall be subject to approval by the stockholders of the Company within twelve (12) months of the date hereof.

3. Except as expressly provided herein, all other terms and provisions of the Plan shall remain unchanged and in full force and effect.

IN WITNESS WHEREOF, I hereby certify that this Amendment was duly adopted by the Board of Directors of Codexis, Inc. on April 11, 2023 and was approved by the stockholders of Codexis, Inc. on June 13, 2023.

Codexis, Inc.

By: /s/ Sriram Ryali
Sriram Ryali
Chief Financial Officer

Date: June 15, 2023

Exhibit 31.1

CERTIFICATION

I, Stephen Dilly, certify that:

1. I have reviewed this Quarterly Report on Form 10-Q of Codexis, 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(s) 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)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) 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) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

   (c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

   (d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

   (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

   (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: August 3, 2023

/s/ Stephen Dilly

Stephen Dilly

President and Chief Executive Officer
(principal executive officer)

Exhibit 31.2

CERTIFICATION

I, Sriram Ryali, certify that:

1. I have reviewed this Quarterly Report on Form 10-Q of Codexis, 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(s) 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)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) 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) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

   (c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

   (d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

   (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

   (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: August 3, 2023

/s/ Sriram Ryali

Sriram Ryali
Chief Financial Officer
(principal financial and accounting officer)

Exhibit 32.1

CERTIFICATION PURSUANT TO
18 U.S.C. SECTION 1350,
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

In connection with the Quarterly Report of Codexis, Inc. (the "Company") on Form 10-Q for the fiscal quarter ended June 30, 2023, as filed with the Securities and Exchange Commission (the "Report"), Stephen Dilly, President and Chief Executive Officer of the Company and Sriram Ryali, Chief Financial Officer of the Company, respectively, do each hereby certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that:

- The Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934; and
- The information in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Date: August 3, 2023

/s/ Stephen Dilly
Stephen Dilly
President and Chief Executive Officer
(principal executive officer)

/s/ Sriram Ryali
Sriram Ryali
Chief Financial Officer
(principal financial and accounting officer)