

**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, 2022

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: 001-36481

ASPEN AEROGELS, INC.

(Exact name of registrant as specified in its charter)

Delaware
(State or other jurisdiction of
incorporation or organization)

30 Forbes Road, Building B
Northborough, Massachusetts
(Address of principal executive offices)

04-3559972
(I.R.S. Employer
Identification No.)

01532
(Zip Code)

Registrant's telephone number, including area code: (508) 691-1111

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

Title of each class	Trading Symbol	Name of exchange on which registered
Common Stock, par value \$0.00001 per share	ASPN	The New York Stock Exchange

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

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

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

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

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

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

As of August 4, 2022, the registrant had 40,440,651 shares of common stock outstanding.

ASPEN AEROGELS, INC.

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Trademarks, Trade Names and Service Marks

We own or have rights to use “Aspen Aerogels,” “Cryogel,” “Pyrogel,” “Spaceloft,” “PyroThin,” the Aspen Aerogels logo and other trademarks, service marks and trade names of Aspen Aerogels, Inc. appearing in this Quarterly Report on Form 10-Q. Solely for convenience, the trademarks, service marks and trade names referred to in this report are presented without the ® and TM symbols, but such references are not intended to indicate, in any way, that the owner thereof will not assert, to the fullest extent under applicable law, such owner’s rights to these trademarks, service marks and trade names. This report contains additional trademarks, service marks and trade names of other companies, which, to our knowledge, are the property of their respective owners.

PART I — FINANCIAL INFORMATION

Item 1. Financial Statements.

ASPEN AEROGELS, INC.
Consolidated Balance Sheets
(Unaudited)

	June 30, 2022	December 31, 2021
	(In thousands, except share and per share data)	
Assets		
Current assets:		
Cash and cash equivalents	\$ 162,185	\$ 76,564
Accounts receivable, net of allowances of \$142 and \$150	29,481	20,426
Inventories	17,000	11,987
Prepaid expenses and other current assets	4,616	3,173
Total current assets	213,282	112,150
Property, plant and equipment, net	122,206	55,778
Operating lease right-of-use assets	17,892	13,531
Other long-term assets	2,554	1,495
Total assets	\$ 355,934	\$ 182,954
Liabilities and Stockholders' Equity		
Current liabilities:		
Accounts payable	\$ 51,126	\$ 17,440
Accrued expenses	10,973	10,819
Current portion of prepayment liability	5,000	4,728
Deferred revenue	1,616	1,321
Operating lease liabilities	2,488	2,247
Total current liabilities	71,203	36,555
Prepayment liability	—	5,000
Convertible note - related party	102,721	—
Operating lease liabilities long-term	17,256	12,991
Total liabilities	191,180	54,546
Commitments and contingencies (Note 10)		
Stockholders' equity:		
Preferred stock, \$0.00001 par value; 5,000,000 shares authorized, no shares issued and outstanding at June 30, 2022 and December 31, 2021	—	—
Common stock, \$0.00001 par value; 125,000,000 shares authorized, 36,478,284 and 33,218,115 shares issued and outstanding at June 30, 2022 and December 31, 2021, respectively	—	—
Additional paid-in capital	753,341	673,461
Accumulated deficit	(588,587)	(545,053)
Total stockholders' equity	164,754	128,408
Total liabilities and stockholders' equity	\$ 355,934	\$ 182,954

See accompanying notes to unaudited consolidated financial statements.

ASPEN AEROGELS, INC.
Consolidated Statements of Operations
(Unaudited)

	Three Months Ended		Six Months Ended	
	June 30,		June 30,	
	2022	2021	2022	2021
	(In thousands, except share and per share data)		(In thousands, except share and per share data)	
Revenue	\$ 45,640	\$ 31,670	\$ 84,047	\$ 59,767
Cost of revenue	46,851	27,090	87,046	51,231
Gross (loss) profit	(1,211)	4,580	(2,999)	8,536
Operating expenses:				
Research and development	4,447	2,609	8,039	5,051
Sales and marketing	7,633	3,568	13,651	6,869
General and administrative	9,355	5,017	16,581	9,405
Total operating expenses	21,435	11,194	38,271	21,325
Loss from operations	(22,646)	(6,614)	(41,270)	(12,789)
Other income (expense)				
Interest expense, convertible note - related party	(1,550)	—	(2,369)	—
Interest expense, net	146	(55)	105	(130)
Total other income (expense), net	(1,404)	(55)	(2,264)	(130)
Net loss	\$ (24,050)	\$ (6,669)	\$ (43,534)	\$ (12,919)
Net loss per share:				
Basic and diluted	\$ (0.68)	\$ (0.23)	\$ (1.27)	\$ (0.46)
Weighted-average common shares outstanding:				
Basic and diluted	35,207,975	28,501,044	34,276,083	28,243,687

See accompanying notes to unaudited consolidated financial statements.

ASPEN AEROGELS, INC.
Consolidated Statements of Stockholders' Equity
(Unaudited)
(In thousands, except share data)

	Preferred Stock \$0.00001 Par Value		Common Stock \$0.00001 Par Value		Additional Paid-in Capital	Accumulated Deficit	Total Stockholders' Equity
	Shares	Value	Shares	Value			
Balance at December 31, 2021	—	\$ —	33,218,115	\$ —	\$ 673,461	\$ (545,053)	\$ 128,408
Net loss	—	—	—	—	—	(19,484)	(19,484)
Stock compensation expense	—	—	—	—	1,828	—	1,828
Vesting of restricted stock units	—	—	166,211	—	(2,315)	—	(2,315)
Proceeds from employee stock option exercises	—	—	4,681	—	38	—	38
Proceeds from at-the-market offering, net of commissions of \$729 and issuance costs of \$318	—	—	737,288	—	23,272	—	23,272
Proceeds from private placement of common stock, net of fees and issuance costs of \$136	—	—	1,791,986	—	49,864	—	49,864
Balance at March 31, 2022	—	\$ —	35,918,281	\$ —	\$ 746,148	\$ (564,537)	\$ 181,611
Net loss	—	—	—	—	—	(24,050)	(24,050)
Stock compensation expense	—	—	—	—	2,295	—	2,295
Issuance of restricted stock	—	—	391,324	—	—	—	—
Vesting of restricted stock units	—	—	2,569	—	(24)	—	(24)
Proceeds from employee stock option exercises	—	—	21,110	—	136	—	136
Proceeds from at-the-market offering, net of commissions of \$149 and issuance costs of \$28	—	—	145,000	—	4,786	—	4,786
Proceeds from private placement of common stock, net of fees and issuance costs	—	—	—	—	—	—	—
Balance at June 30, 2022	—	\$ —	36,478,284	\$ —	\$ 753,341	\$ (588,587)	\$ 164,754

	Preferred Stock \$0.00001 Par Value		Common Stock \$0.00001 Par Value		Additional Paid-in Capital	Accumulated Deficit	Total Stockholders' Equity
	Shares	Value	Shares	Value			
Balance at December 31, 2020	—	\$ —	27,821,685	\$ —	\$ 575,811	\$ (507,959)	\$ 67,852
Net loss	—	—	—	—	—	(6,250)	(6,250)
Stock compensation expense	—	—	—	—	976	—	976
Vesting of restricted stock units	—	—	246,737	—	(2,613)	—	(2,613)
Proceeds from employee stock option exercises	—	—	48,056	—	463	—	463
Proceeds from at-the-market offering, net of commissions and fees of \$193 and issuance costs of \$17	—	—	305,182	—	6,215	—	6,215
Forfeiture of performance-based restricted stock	—	—	(78,125)	—	—	—	—
Balance at March 31, 2021	—	\$ —	28,343,535	\$ —	\$ 580,852	\$ (514,209)	\$ 66,643
Net loss	—	—	—	—	—	(6,669)	(6,669)
Stock compensation expense	—	—	—	—	1,070	—	1,070
Issuance of restricted stock	—	—	476,550	—	—	—	—
Vesting of restricted stock units	—	—	6,207	—	(64)	—	(64)
Proceeds from employee stock option exercises	—	—	23,886	—	230	—	230
Proceeds from at-the-market offering, net of commissions and fees of \$383 and issuance costs of \$27	—	—	594,799	—	12,352	—	12,352
Proceeds from private placement common stock offering, net of fees and issuance costs of \$1,414	—	—	3,462,124	—	73,586	—	73,586
Balance at June 30, 2021	—	\$ —	32,907,101	\$ —	\$ 668,026	\$ (520,878)	\$ 147,148

See accompanying notes to unaudited consolidated financial statements.

ASPEN AEROGELS, INC.
Consolidated Statements of Cash Flows
(Unaudited)

	Six Months Ended June 30,	
	2022	2021
	(In thousands)	
Cash flows from operating activities:		
Net loss	\$ (43,534)	\$ (12,919)
Adjustments to reconcile net loss to net cash used in operating activities:		
Depreciation	4,161	4,742
Accretion of interest on convertible note - related party	2,369	—
Amortization of convertible note issuance costs	13	7
Provision for bad debt	(1)	(98)
Stock-compensation expense	4,123	2,046
Reduction in the carrying amount of operating lease right-of-use assets	1,219	520
Changes in operating assets and liabilities:		
Accounts receivable	(9,054)	(3,570)
Inventories	(5,013)	3,661
Prepaid expenses and other assets	(2,500)	(1,174)
Accounts payable	15,980	3,962
Accrued expenses	154	3,083
Deferred revenue	295	(192)
Operating lease liabilities	(1,076)	(597)
Net cash used in operating activities	(32,864)	(529)
Cash flows from investing activities:		
Capital expenditures	(52,359)	(3,879)
Net cash used in investing activities	(52,359)	(3,879)
Cash flows from financing activities:		
Proceeds from issuance of convertible note related party	100,000	—
Issuance costs from convertible note	(185)	—
Proceeds from employee stock option exercises	174	693
Payments made for employee restricted stock tax withholdings	(2,339)	(2,677)
Proceeds from at-the-market offering, net of commissions of \$879 and \$576	28,404	18,611
Fees and issuance costs from at-the-market offering	(346)	(44)
Proceeds from private placement of common stock	50,000	75,000
Fees and issuance costs from private placement of common stock	(136)	(1,414)
Repayment of prepayment liability	(4,728)	—
Net cash provided by financing activities	170,844	90,169
Net increase in cash	85,621	85,761
Cash and cash equivalents at beginning of period	76,564	16,496
Cash and cash equivalents at end of period	\$ 162,185	\$ 102,257
Supplemental disclosures of cash flow information:		
Interest paid	\$ 95	\$ 113
Income taxes paid	\$ —	\$ —
Supplemental disclosures of non-cash activities:		
Right-of-use assets obtained in exchange for new operating lease liabilities	\$ 5,582	\$ 9,032
Capitalized interest	\$ 524	\$ —
Changes in accrued capital expenditures	\$ 17,706	\$ 209

See accompanying notes to unaudited consolidated financial statements.

ASPEN AEROGELS, INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS
(UNAUDITED)

(1) Description of Business and Basis of Presentation

Nature of Business

Aspen Aerogels, Inc. (the Company) is an aerogel technology company that designs, develops and manufactures innovative, high-performance aerogel insulation used primarily in the energy infrastructure and sustainable building materials markets. In addition, the Company has introduced a line of aerogel thermal barriers for use in battery packs in the electric vehicle market. The Company is also developing applications for its aerogel technology in the battery materials and a number of other high-potential markets.

The Company maintains its corporate offices in Marlborough and Northborough, Massachusetts. The Company has three wholly owned subsidiaries: Aspen Aerogels Rhode Island, LLC, Aspen Aerogels Germany, GmbH and Aspen Aerogels Georgia, LLC.

Liquidity

During the six months ended June 30, 2022, the Company incurred a net loss of \$43.5 million, used \$32.9 million of cash in operations, used \$52.4 million of cash for capital expenditures, received net proceeds of \$28.1 million through an at-the-market (ATM) offering of the Company's common stock from the sale of 882,288 shares of the Company's common stock, and received net proceeds of \$49.9 million through a private placement of the Company's common stock. On February 15, 2022, the Company entered into a note purchase agreement with an affiliate of Koch Strategic Platforms, LLC, relating to the issuance and sale of \$100.0 million of the Company's convertible debt (see note 9). The Company had cash and cash equivalents of \$162.2 million, a \$5.0 million current prepayment liability (see note 10), and no outstanding borrowings under its revolving line of credit (see note 7). After giving effect to \$1.2 million of outstanding letters of credit, the amount available to the Company at June 30, 2022 under the revolving line of credit was \$18.0 million. The revolving line of credit matures on August 26, 2022.

The Company is increasing investment in the research and development of next-generation aerogel products and manufacturing process technologies. In addition, the Company has developed a number of promising aerogel products and technologies for the electric vehicle market. The Company believes that the commercial potential for the Company's products and technology in the electric vehicle market is significant. Accordingly, the Company is hiring additional personnel, incurring additional operating expenses, and incurring significant capital expenditures to expand silica aerogel manufacturing capacity, build an automated thermal barrier fabrication operation, enhance research and development laboratory facilities and equipment, and construct a battery materials facility, among other efforts.

The Company expects its existing cash balance and the amount anticipated to be available under the existing revolving line of credit will be sufficient to support current operating requirements, current research and development activities and the initial capital expenditures required to support the evolving commercial opportunity in the electric vehicle market and other strategic business initiatives. However, the Company plans to supplement its cash balance and available credit with equity financings, debt financings, customer prepayments, or technology licensing fees to provide the additional capital necessary to purchase the capital equipment, construct the new facilities, establish the operations and complete the aerogel capacity expansions required to support these evolving commercial opportunities and strategic business initiatives.

Unaudited Interim Financial Information

The accompanying unaudited interim consolidated financial statements include the accounts of the Company and have been prepared in accordance with accounting principles generally accepted in the United States of America (U.S. GAAP) and with the instructions to Form 10-Q and Article 10 of Regulation S-X. Certain information and disclosures normally included in the consolidated financial statements prepared in accordance with U.S. GAAP have been condensed or omitted pursuant to such rules and regulations. As such, the information included in this Quarterly Report on Form 10-Q should be read in conjunction with the audited consolidated financial statements and accompanying notes in our Annual Report on Form 10-K for the year ended December 31, 2021 (the Annual Report), filed with the U.S. Securities and Exchange Commission on March 1, 2022.

In the opinion of the Company's management, the unaudited interim consolidated financial statements have been prepared on the same basis as the audited consolidated financial statements and include all adjustments that are of a normal recurring nature and necessary for the fair statement of the Company's financial position as of June 30, 2022 and the results of its operations and stockholders' equity for the three and six months ended June 30, 2022 and 2021 and the cash flows for the six-month periods then ended. The Company has evaluated subsequent events through the date of this filing.

The Company's results of operations for the three and six months ended June 30, 2022 are not necessarily indicative of the results to be expected for the year ending December 31, 2022 or any other period. In addition, the Company is uncertain of the continued duration and severity of the COVID-19 pandemic and the impact it will have on the Company's results of operations for the year ending December 31, 2022 or any other period.

(2) Significant Accounting Policies

Principles of Consolidation

The accompanying consolidated financial statements, which have been prepared in accordance with U.S. GAAP, include the accounts of the Company and its wholly owned subsidiaries. All intercompany balances and transactions have been eliminated in consolidation.

Use of Estimates

The preparation of the consolidated financial statements requires the Company to make a number of estimates and assumptions that affect the reported amounts of assets and liabilities at the date of the consolidated financial statements and the reported amounts of revenues and expenses during the reporting period. Significant items subject to such estimates and assumptions include allowances for doubtful accounts, sales returns and allowances, product warranty costs, inventory valuation, the carrying amount of property and equipment, right-of-use assets, convertible note, lease liabilities, stock-based compensation, and deferred income taxes. The Company evaluates its estimates and assumptions on an on-going basis using historical experience and other factors, including current economic conditions, which are believed to be reasonable under the circumstances. Management adjusts such estimates and assumptions when facts and circumstances warrant. Illiquid credit markets, volatile equity markets and declines in business investment can increase the uncertainty inherent in such estimates and assumptions. As future events and their effects cannot be determined with precision, actual results could differ significantly from these estimates. Changes in these estimates resulting from continuing changes in the economic environment will be reflected in the financial statements in future periods.

Cash and Cash Equivalents

Cash equivalents include short-term, highly liquid instruments, which consist of money market accounts and high-quality debt securities issued by the U.S. government via cash sweep accounts. All cash and cash equivalents are maintained with major financial institutions in North America. Deposits with these financial institutions may exceed the amount of insurance provided on such deposits; however, these deposits typically may be redeemed upon demand and, therefore, bear minimal risk.

Concentration of Credit Risk

Financial instruments, which potentially expose the Company to concentrations of credit risk, consist principally of accounts receivable. The Company's customers are primarily insulation distributors, insulation contractors, insulation fabricators and select energy and automotive end-users located throughout the world. The Company performs ongoing credit evaluations of its customers' financial condition and generally requires no collateral to secure accounts receivable. The Company maintains an allowance for doubtful accounts based on its assessment of the collectability of accounts receivable. The Company reviews the allowance for doubtful accounts quarterly. During the six months ended June 30, 2022, the Company recorded a reduction for estimated customer uncollectible accounts receivable of less than \$0.1 million. During the six months ended June 30, 2021, the Company recorded a reduction for estimated customer uncollectible accounts receivable of \$0.1 million and had collections of \$0.2 million of previously reserved customer accounts receivables.

Revenue Recognition

The Company recognizes revenue in accordance with Accounting Standards Codification 606, Revenue from Contracts with Customers (ASC 606). See note 3 for further details.

Leases

The Company accounts for its leases in accordance with Accounting Standards Update (ASU) 2016-02 (Topic 842). See note 11 for further details.

Stock-based Compensation

Stock-based compensation expense is measured at the grant date based on the fair value of the award. Expense is recognized on a straight-line basis over the requisite service period for all awards with service conditions. For performance-based awards, the grant date fair value is recognized as expense when the condition is probable of being achieved and then on a graded basis over the requisite service period. The Company uses the Black-Scholes option-pricing model to determine the fair value of service-based option awards, which requires a number of complex and subjective assumptions including the fair value of the underlying security, the expected volatility of the underlying security, a risk-free interest rate and the expected term of the option. The fair value of restricted stock and restricted stock unit grants is determined using the closing trading price of the Company's common stock on the date of grant. The fair value of awards containing market conditions is determined using a Monte-Carlo simulation model based upon the nature of the conditions, the expected volatility of the underlying security, and other relevant factors.

During the six months ended June 30, 2022, the Company granted 161,004 restricted common stock units (RSUs) with a grant date fair value of \$4.2 million and non-qualified stock options (NSOs) to purchase 432,480 shares of common stock with a grant date fair value of \$6.4 million to employees under the 2014 Employee, Director, and Consultant Equity Incentive Plan (the 2014 Equity Plan). The RSUs and NSOs granted to employees will vest over a three-year period. During the six months ended June 30, 2022, the Company also granted 16,194 shares of restricted common stock with a grant date fair value of \$0.3 million and NSOs to purchase 19,068 shares of common stock with a grant date fair value of \$0.2 million to its non-employee directors under the 2014 Equity Plan. The restricted common stock and NSOs granted to non-employee directors vest upon the earlier of the date that is the one-year anniversary of the grant date or the day prior to the Company's annual meeting of stockholders to be held in 2023.

On June 2, 2022, the Company issued 53,590 shares of restricted common stock, pursuant to a performance-based restricted stock agreement, to each of certain employees. The restricted common stock vests in tranches, subject to achievement of certain time and performance vesting conditions, as defined, over a three-to-five year period. The Company used a Monte-Carlo simulation model to estimate the grant date fair value of the awards. The equity awards had a total aggregate fair value of \$4.0 million at the time of grant.

Stock-based compensation is included in cost of revenue or operating expenses, as applicable, and consists of the following:

	Three Months Ended		Six Months Ended	
	June 30,		June 30,	
	2022	2021	2022	2021
	(In thousands)		(In thousands)	
Cost of product revenue	\$ 230	\$ 129	\$ 386	\$ 241
Research and development expenses	313	189	537	378
Sales and marketing expenses	456	206	780	374
General and administrative expenses	1,296	546	2,420	1,053
Total stock-based compensation	\$ 2,295	\$ 1,070	\$ 4,123	\$ 2,046

Pursuant to the "evergreen" provisions of the 2014 Equity Plan, the number of shares of common stock authorized for issuance under the plan automatically increased by 664,362 shares to 9,195,775 shares effective January 1, 2022.

As of June 30, 2022, 4,234,562 shares of common stock were reserved for issuance upon the exercise or vesting of outstanding stock-based awards granted under the 2014 Equity Plan and 2001 Equity Incentive Plan, as amended (the 2001 Equity Plan). Any cancellations or forfeitures of the options outstanding under the 2001 Equity Plan will result in the shares reserved for issuance upon exercise of such options becoming available for grant under the 2014 Equity Plan. As of June 30, 2022, the Company has either

reserved in connection with statutory tax withholdings or issued a total of 4,580,653 shares under the 2014 Equity Plan. As of June 30, 2022, there were 380,560 shares of common stock available for future grant under the 2014 Equity Plan.

Net Loss per Share

The Company calculates net loss per share of common stock based on the weighted-average number of shares of common stock outstanding during each period. Potential common stock equivalents are determined using the treasury stock method. The weighted-average number of shares of common stock included in the computation of diluted net loss gives effect to all potentially dilutive common equivalent shares, including outstanding stock options and RSUs. Common equivalent shares are excluded from the computation of diluted net loss per share if their effect is antidilutive.

Warranty

The Company provides warranties for its products and records the estimated cost within cost of revenue in the period that the related revenue is recorded.

The Company's standard warranty period for energy industrial products extends to one year from the date of shipment. This standard warranty provides that the Company's products will be free from defects in material and workmanship, and will, under normal use, conform to the specifications for the product. The Company's products may be utilized in systems that involve new technical demands and new configurations. Accordingly, the Company regularly reviews and assesses whether warranty reserves should be recorded in the period the related revenue is recorded.

The Company's thermal barrier products provide quality and warranty provisions customary in the automotive industry.

The Company recorded warranty expense related to its thermal barrier products of less than \$0.1 million during the six months ended June 30, 2022. The Company did not record any warranty expense during the six months ended June 30, 2021.

Recently Issued Accounting Standards

From time to time, new accounting pronouncements are issued by the Financial Accounting Standards Board (FASB) or other standard setting bodies. Recently issued standards typically do not require adoption until a future effective date. Prior to their effective date, the Company evaluates the pronouncements to determine the potential effects of adoption to its consolidated financial statements.

Standards Implemented Since December 31, 2021

During the six months ended June 30, 2022, the Company adopted Accounting Standards Update (ASU) 2020-06, Debt-Debt with Conversion and Other Options (Topic 470) and Derivatives and Hedging-Contracts in Entity's Own Equity (Topic 815): Accounting for Convertible Instruments and Contracts in an Entity's Own Equity. This ASU simplifies the accounting for convertible instruments by eliminating the cash conversion and beneficial conversion feature models used to separately account for embedded conversion features as a component of equity. Instead, the entity will account for the convertible debt or convertible preferred stock securities as a single unit of account, unless the conversion feature requires bifurcation and recognition as derivatives. Additionally, the guidance requires entities to use the if-converted method for all convertible instruments in the diluted earnings per share calculation and include the effect of potential share settlement for instruments that may be settled in cash or shares. The adoption of this standard did not have a material impact on our consolidated financial statements.

Standards to be Implemented

The Company believes that the impact of recently issued accounting standards that are not yet effective will not have a material impact on its consolidated financial statements.

(3) Revenue from Contracts with Customers

Revenue Recognition

Revenue is recognized when a customer obtains control of promised goods or services in an amount that reflects the consideration which the entity expects to receive in exchange for those goods or services. To determine revenue recognition for arrangements within the scope of ASC 606, the Company performs the following five steps: (i) identification of the contract with a customer; (ii) identification of the performance obligations in the contract; (iii) determination of the transaction price; (iv) allocation of the transaction price to the separate performance obligations in the contract; and (v) recognition of the revenue associated with performance obligations as they are satisfied. The Company applies the five-step model to contracts when it is probable that the Company will collect the consideration it is entitled to in exchange for the goods or services it transfers to the customer. At contract inception, once the contract is determined to be within the scope of ASC 606, the Company assesses the goods or services promised within each contract and determines those that are performance obligations and assesses whether each promised good or service is distinct. If the contract contains a single performance obligation, the entire transaction price is allocated to the single performance obligation. Contracts that contain multiple performance obligations require an allocation of the transaction price based on the estimated relative standalone-selling prices of the promised products or services underlying each performance obligation. The Company determines standalone-selling prices based on the price at which the performance obligation is sold separately. If the standalone-selling price is not observable through past transactions, the Company estimates the standalone-selling price considering available information such as market conditions and internally approved pricing guidelines related to the performance obligations. The Company then recognizes as revenue the amount of the transaction price that is allocated to the respective performance obligation when (or as) the performance obligation is satisfied.

When determining the transaction price of a contract, an adjustment is made if payment from a customer occurs either significantly before or significantly after performance, resulting in a significant financing component. Applying the practical expedient in paragraph ASC 606-10-32-18, the Company does not assess whether a significant financing component exists if the period between when the Company performs its obligations under the contract and when the customer pays is one year or less. The Company did not have any contracts outstanding at December 31, 2021 and did not enter into any contracts during the six months ended June 30, 2022 that contained a significant financing component.

The Company records deferred revenue for product sales when (i) the Company has delivered products, but other revenue recognition criteria have not been satisfied, or (ii) payments have been received in advance of the completion of required performance obligations.

Shipping and Handling Costs

Shipping and handling costs associated with outbound freight after control over a product has transferred to a customer are accounted for as fulfillment costs and are included in the cost of product revenue. The associated amount of revenue recognized includes the consideration to which the Company expects to be entitled to receive in exchange for incurring these shipping and handling costs.

Energy Industrial

The Company generally enters into contracts containing one type of performance obligation. The Company recognizes revenue when the performance obligation is satisfied, which is generally upon delivery according to contractual shipping terms within customer purchase orders.

The Company also enters into rebate agreements with certain customers. These agreements may be considered an additional performance obligation of the Company or variable consideration within a contract. Rebates are recorded as a reduction of revenue in the period the related revenue is recognized. A corresponding liability is recorded as a component of deferred revenue on the consolidated balance sheets. These arrangements are primarily based on the customer attaining contractually specified sales volumes.

The Company estimates the amount of its sales that may be returned by its customers and records this estimate as a reduction of revenue in the period the related revenue is recognized. The Company currently estimates return liabilities using historical rates of return, current quarter credit sales, and specific items of exposure on a contract-by-contract basis. Sales return reserves were approximately \$0.1 million at both June 30, 2022 and December 31, 2021.

Subsea Projects

The Company manufactures and sells subsea products that are designed for pipe-in-pipe applications in offshore oil production and are typically customized to meet customer specifications. Subsea products typically have no alternative use and contain an enforceable right to payment. Customer invoicing terms for subsea products are typically based on certain milestones within the production and delivery schedule. Under the provisions of ASC 606, the Company recognizes revenue at a point in time when transfer of control of the products is passed to the customer, or over time utilizing the input method. The timing of revenue recognition is assessed on a contract-by-contract basis. During the six months ended June 30, 2022 and 2021, the Company recognized revenue of \$3.1 million and \$1.1 million, respectively, from subsea projects.

Thermal Barriers

The Company supplies fabricated, multi-part thermal barriers for use in battery packs in the electric vehicle market. These thermal barriers are customized to meet customer specifications. Thermal barrier products typically have no alternative use and may contain an enforceable right to payment. Under the provisions of ASC 606, the Company may recognize revenue at a point in time when transfer of the control of the products is passed to the customer, or over time utilizing the input method. The timing of revenue recognition is assessed on a contract-by-contract basis. During the six months ended June 30, 2022 and 2021, the Company recognized revenue of \$18.4 million and \$0.3 million, respectively, from thermal barrier contracts.

Disaggregation of Revenue

In the following tables, revenue is disaggregated by primary geographical region and source of revenue:

	Three Months Ended June 30,					
	2022			2021		
	U.S.	International	Total	U.S.	International	Total
	(In thousands)					
Geographical region						
Asia	\$ —	\$ 11,651	\$ 11,651	\$ —	\$ 4,553	\$ 4,553
Canada	—	1,452	1,452	—	991	991
Europe	—	6,160	6,160	—	9,435	9,435
Latin America	—	1,295	1,295	—	1,147	1,147
U.S.	25,082	—	25,082	15,544	—	15,544
Total revenue	<u>\$ 25,082</u>	<u>\$ 20,558</u>	<u>\$ 45,640</u>	<u>\$ 15,544</u>	<u>\$ 16,126</u>	<u>\$ 31,670</u>
Source of revenue						
Energy industrial	\$ 15,293	\$ 17,071	\$ 32,364	\$ 15,367	\$ 15,424	\$ 30,791
Subsea projects	911	1,602	2,513	—	667	667
Thermal barrier	8,878	1,885	10,763	177	35	212
Total revenue	<u>\$ 25,082</u>	<u>\$ 20,558</u>	<u>\$ 45,640</u>	<u>\$ 15,544</u>	<u>\$ 16,126</u>	<u>\$ 31,670</u>
	Six Months Ended June 30,					
	2022			2021		
	U.S.	International	Total	U.S.	International	Total
	(In thousands)					
Geographical region						
Asia	\$ —	\$ 18,975	\$ 18,975	\$ —	\$ 10,141	\$ 10,141
Canada	—	2,312	2,312	—	1,955	1,955
Europe	—	10,071	10,071	—	16,681	16,681
Latin America	—	2,901	2,901	—	2,691	2,691
U.S.	49,788	—	49,788	28,299	—	28,299
Total revenue	<u>\$ 49,788</u>	<u>\$ 34,259</u>	<u>\$ 84,047</u>	<u>\$ 28,299</u>	<u>\$ 31,468</u>	<u>\$ 59,767</u>
Source of revenue						
Energy industrial	\$ 33,020	\$ 29,560	\$ 62,580	\$ 28,070	\$ 30,311	\$ 58,381
Subsea projects	1,459	1,613	3,072	—	1,074	1,074
Thermal barrier	15,309	3,086	18,395	229	83	312
Total revenue	<u>\$ 49,788</u>	<u>\$ 34,259</u>	<u>\$ 84,047</u>	<u>\$ 28,299</u>	<u>\$ 31,468</u>	<u>\$ 59,767</u>

Contract Balances

The following table presents changes in the Company's contract assets and contract liabilities during the six months ended June 30, 2022:

	Balance at December 31, 2021	Additions	Deductions	Balance at June 30, 2022
(In thousands)				
Contract assets				
Subsea projects	\$ 1,448	\$ 3,462	\$ (2,417)	\$ 2,493
Research services	148	77	(225)	—
Thermal barrier	235	—	—	235
Total contract assets	<u>\$ 1,831</u>	<u>\$ 3,539</u>	<u>\$ (2,642)</u>	<u>\$ 2,728</u>
Contract liabilities				
Deferred revenue				
Energy industrial	\$ 1,321	\$ 1,396	\$ (1,491)	\$ 1,226
Subsea projects	—	1,939	(1,549)	390
Prepayment liability	9,728	—	(4,728)	5,000
Total contract liabilities	<u>\$ 11,049</u>	<u>\$ 3,335</u>	<u>\$ (7,768)</u>	<u>\$ 6,616</u>

During the six months ended June 30, 2022, the Company recognized \$1.3 million of revenue that was included in deferred revenue as of December 31, 2021.

A contract asset is recorded when the Company satisfies a performance obligation by transferring a promised good or service and has earned the right to consideration from its customer. These assets may represent a conditional or unconditional right to consideration and are included within accounts receivable and other current assets on the consolidated balance sheets.

A contract liability is recorded when consideration is received, or such consideration is unconditionally due, from a customer prior to transferring goods or services under the terms of the contract. Contract liabilities are recognized as revenue after control of the products or services is transferred to the customer and all revenue recognition criteria have been met.

(4) Inventories

Inventories consist of the following:

	June 30, 2022	December 31, 2021
(In thousands)		
Raw materials	\$ 12,040	\$ 7,312
Finished goods	4,960	4,675
Total	<u>\$ 17,000</u>	<u>\$ 11,987</u>

(5) Property, Plant and Equipment, Net

Property, plant and equipment consist of the following:

	June 30, 2022	December 31, 2021	Useful life
	(In thousands)		
Construction in progress	\$ 75,488	\$ 13,456	—
Buildings	24,540	24,016	30 years
Machinery and equipment	138,234	130,529	3-10 years
Computer equipment and software	9,785	9,457	3 years
Total	248,047	177,458	
Accumulated depreciation	(125,841)	(121,680)	
Property, plant and equipment, net	<u>\$ 122,206</u>	<u>\$ 55,778</u>	

Depreciation expense was \$4.2 million and \$4.7 million for the six months ended June 30, 2022 and 2021, respectively.

Construction in progress totaled \$75.5 million and \$13.5 million at June 30, 2022 and December 31, 2021, respectively. The balance at June 30, 2022 and December 31, 2021 included engineering designs and construction costs totaling \$62.5 million and \$6.1 million, respectively for a planned aerogel manufacturing facility in Bulloch County, Georgia.

(6) Accrued Expenses

Accrued expenses consist of the following:

	June 30, 2022	December 31, 2021
	(In thousands)	
Employee compensation	\$ 6,738	\$ 8,991
Other accrued expenses	4,235	1,828
Total	<u>\$ 10,973</u>	<u>\$ 10,819</u>

(7) Revolving Line of Credit

The Company is party to an Amended and Restated Loan and Security Agreement with Silicon Valley Bank (Loan Agreement). On March 12, 2021, the Loan Agreement was amended and restated to extend the maturity date of the revolving credit facility to April 28, 2022 and to establish financial covenants on certain minimum Adjusted EBITDA levels and minimum Adjusted Quick Ratio covenants, each as defined in the Loan Agreement. At various dates in 2021, and subsequently on March 31, 2022 and April 28, 2022, the Company entered into amendments to the Loan Agreement to revise certain financial covenants, among other things. On June 23, 2022, the Loan Agreement was amended to extend the maturity date of the revolving credit facility to August 26, 2022.

Under the revolving credit facility, the Company is permitted to borrow a maximum of \$20.0 million, subject to continued covenant compliance and borrowing base requirements. The interest rate applicable to borrowings under the revolving credit facility is based on the prime rate, subject to a minimum rate of 4.00% per annum. The rates applicable to borrowings vary from prime rate plus 0.75% per annum to prime rate plus 2.00% per annum. In addition, the Company is required to pay a monthly unused revolving line facility fee of 0.50% per annum of the average unused portion of the revolving credit facility.

Under the Loan Agreement, the Company is required to comply with both non-financial and financial covenants, including a minimum Adjusted EBITDA covenant and a minimum Adjusted Quick Ratio covenant. As of June 30, 2022, the Company was in compliance with all such covenants. Obligations under the Loan Agreement are secured by a security interest in all assets of the Company, including those at the East Providence facility, except for certain exclusions. The Company intends to extend or replace the facility prior to its maturity.

As of June 30, 2022 and December 31, 2021, the Company had no amounts drawn from the revolving credit facility.

The Company has provided letters of credit to secure obligations under certain commercial contracts and other obligations. The Company had outstanding letters of credit backed by the revolving credit facility of \$1.2 million and \$1.3 million at June 30, 2022 and December 31, 2021, respectively, which reduce the funds otherwise available to the Company under the facility.

As of June 30, 2022, the amount available to the Company under the revolving credit facility was \$18.0 million after giving effect to the \$1.2 million of outstanding letters of credit.

(8) Related Party Transactions

Convertible Note

During the six months ended June 30, 2022, the Company issued a \$100.0 million aggregate principal amount convertible note to Wood River Capital, LLC, an entity affiliated with Koch Strategic Platforms, LLC (the 2022 Convertible Note). Refer to note 9 for more information.

During the six months ended June 30, 2022, the Company incurred \$2.9 million of interest from the 2022 Convertible Note, of which \$0.5 million was capitalized as part of the construction in progress for the planned manufacturing facility in Bulloch County, Georgia.

Common Stock Private Placement

During the six months ended June 30, 2022, the Company sold 1,791,986 shares of common stock to Wood River Capital, LLC, an entity affiliated with Koch Strategic Platforms, LLC, at a purchase price equal to \$27.902 per share, for aggregate gross proceeds of approximately \$50.0 million.

Other

During the six months ended June 30, 2022, the Company recorded costs of \$2.1 million as a component of construction in progress in connection with the planned aerogel manufacturing facility in Bulloch County, Georgia in fees from Koch Project Solutions, LLC, an entity affiliated with Koch Strategic Platforms, LLC for project management services.

During the six months ended June 30, 2022, the Company sold 135,870 shares of its common stock to Robert M. Gervis, a director of the Company, in the Company's at-the-market offering pursuant to a sales agreement, dated March 16, 2022, by and among the Company and Cowen and Company, LLC and Piper Sandler & Co. (the Sales Agreement), for net proceeds of \$4.4 million.

(9) Convertible Note – Related Party

2022 Convertible Note

On February 15, 2022, the Company entered into a note purchase agreement (the Note Purchase Agreement) with Wood River Capital LLC, an entity affiliated with Koch Strategic Platforms, LLC (Koch), relating to the issuance and sale to Koch of the 2022 Convertible Note in the aggregate principal amount of \$100.0 million. The transactions contemplated by the Note Purchase Agreement closed on February 18, 2022 (the Issue Date). The maturity date of the 2022 Convertible Note is February 18, 2027, subject to earlier conversion, redemption, or repurchase.

The 2022 Convertible Note is a senior unsecured obligation of the Company and ranks equal in right of payment to all senior unsecured indebtedness of the Company, and will rank senior in right of payment to any indebtedness that is contractually subordinated to the 2022 Convertible Note.

In accordance with ASU 2020-06, the 2022 Convertible Note is accounted for as a single unit of account and consists of the following:

	<u>June 30, 2022</u>
Convertible note, principal	\$ 100,000
Accrued interest	2,893
Debt issuance costs, net of accumulated amortization	(172)
Convertible note	<u>\$ 102,721</u>

Contractual Interest Rates

The 2022 Convertible Note was issued at par and bears interest at the Secured Overnight Financing Rate (SOFR) plus 5.50% per annum if interest is paid in cash, or, if interest is paid in-kind as an increase in the principal amount of the outstanding note, at the SOFR plus 6.50% per annum. Under the terms of the Convertible Note, SOFR has a floor of 1% and a cap of 3%. Interest on the 2022 Convertible Note is payable semi-annually in arrears on June 30 and December 30. The Company, at its option, is permitted to settle each semi-annual interest payment in cash, in-kind, or any combination thereof.

Interest accrued was \$2.9 million for the six months ended June 30, 2022, of which debt issuance costs comprised less than \$0.2 million. The effective interest rate approximated the contract interest rate for the six months ended June 30, 2022.

Conversion Rights

The 2022 Convertible Note is convertible at the option of the holder at any time prior to the business day immediately preceding the maturity date at an initial conversion rate of 28.623257 shares of the Company's common stock per \$1,000 of capitalized principal. The effective conversion price is approximately \$34.936625 per share (the Conversion Price). The Conversion Price is subject to adjustment upon the occurrence of certain dilutive events such as stock splits and combinations, stock dividends, mergers and spin-off. For the six months ended June 30, 2022, there were no adjustments to Conversion Price. As of June 30, 2022, 2,945,133 shares of the Company's common stock were issuable upon conversion of the 2022 Convertible Note. The Company has the right to settle conversions in shares of common stock, cash, or any combination thereof. If the closing price per share of the Company's common stock on the New York Stock Exchange is at least 130% of the Conversion Price for 20 consecutive trading days, the Company may elect to convert the principal and accrued interest owing under the Notes, plus a make-whole amount equal to the sum of the present values of the remaining interest payments that would have otherwise been payable from the date of such conversion, redemption or repurchase, as applicable, through maturity (the Make-Whole Amount), into the Company's common stock at the Conversion Price.

Optional Redemption

The 2022 Convertible Note is redeemable at the Company's option at any time and in the event that the volume weighted average price of the Company's common stock for the 10 trading days immediately preceding the date on which the Company provides the redemption notice has been at least 130% of the Conversion Price then in effect at a redemption price of 100% of the principal amount, plus accrued and unpaid interest (excluding the redemption date), plus the Make-Whole Amount.

Contingent Redemption

Upon the occurrence of certain fundamental changes described in the Indenture (each, a Fundamental Change), the Holder of the Note may require that the Company repurchase all or part of the principal amount of the Note at a purchase price of 100% of the principal amount of such Note, plus accrued and unpaid interest to, but excluding, the Fundamental Change repurchase date, plus the Make-Whole Amount. The Indenture includes customary "events of default," which may result in the acceleration of the maturity of the Note.

Embedded Derivatives

The Company determined that the Make-Whole feature of the 2022 Convertible Note requires bifurcation in accordance with Accounting Standards Codification 815, Derivatives and Hedging (ASC 815). Accordingly, the Company must separately account for the feature at fair value with changes in fair value reported in current period earnings. The fair value of the Make-Whole was determined to be immaterial as of February 18, 2022 and June 30, 2022.

(10) Commitments and Contingencies

Cloud Computing Agreement

The Company is party to a cloud computing agreement that is a service contract for enterprise resource planning software. During the six months ended June 30, 2022, the Company amended the agreement to a new five-year term. As of June 30, 2022, the Company capitalized \$1.7 million of costs related to implementation of the agreement that will begin to amortize during 2022. The capitalized implementation costs are classified on the consolidated balance sheets as follows:

	June 30, 2022	December 31, 2021
	(In thousands)	
Cloud computing costs included in other current assets	\$ 356	\$ 390
Cloud computing costs included in other assets	1,381	637
Total capitalized cloud computing costs	<u>\$ 1,737</u>	<u>\$ 1,027</u>

Thermal Barrier Contracts

The Company is party to production contracts with a major U.S. automotive original equipment manufacturer (OEM) to supply fabricated, multi-part thermal barriers (Barriers) for use in the battery system of its next-generation electric vehicles (Contracts). Pursuant to the Contracts, the Company is obligated to supply Barriers at fixed annual prices and at volumes to be specified by the OEM up to a daily maximum quantity through the respective terms of the agreements, which expire at various times from 2026 through 2034. While the OEM has agreed to purchase its requirement for Barriers from the Company for locations to be designated from time to time by the OEM, it has no obligation to purchase any minimum quantity of Barriers under the Contracts. In addition, the OEM may terminate the Contracts at any time and for any or no reason. All other terms of the Contracts are generally consistent with the OEM's standard purchase terms, including quality and warranty provisions customary in automotive industry.

BASF Supply Agreement

The Company was party to a supply agreement, as amended, with BASF Polyurethanes GmbH (BASF) (the Supply Agreement) and a joint development agreement with BASF SE (the JDA). Pursuant to the Supply Agreement, the Company agreed to sell exclusively to BASF certain of the Company's products at annual volumes specified by BASF, subject to certain volume limits, through December 31, 2027.

Through the year ended December 31, 2019, BASF made two prepayments each in the amount of \$5.0 million to the Company. BASF had the right to request that 25.3% of any amount invoiced by the Company to BASF for Spaceloft A2 were to be credited against the outstanding balance of the prepayments. BASF also had the right to request that the Company repay any uncredited amount of the first prepayment to BASF following a six-week notice period on or after January 1, 2022 and the second prepayment on or after January 1, 2023.

As of June 30, 2022, the Company had received \$10.0 million in prepayments from BASF and applied approximately \$0.3 million of credits against amounts invoiced to BASF for Spaceloft A2.

During 2021, the Company and BASF jointly announced that BASF would discontinue further marketing and sale of Spaceloft A2 as of November 15, 2021. After that date, BASF customers have had the right to purchase Spaceloft A2 directly from the Company.

On December 15, 2021, the Company terminated the supply arrangement and JDA with BASF and BASF SE, respectively. As part of the termination, the Company and BASF agreed that any uncredited prepayment balances would remain outstanding and subject to repayment upon BASF's request following the requisite six-week notice periods after January 1, 2022 and January 1, 2023, respectively. On January 31, 2022, BASF requested that an outstanding prepayment balance of \$4.7 million be repaid and the Company made the requested repayment on February 17, 2022.

The prepayment liability consists of the following:

	June 30, 2022	December 31, 2021
	(In thousands)	
Prepayment liability	\$ 5,000	\$ 9,728
Current portion of prepayment liability	(5,000)	(4,728)
Prepayment liability, long-term	\$ —	\$ 5,000

Federal, State and Local Environmental Regulations

The Company is subject to federal, state and local laws and regulations relating to the environment. These laws generally provide for control of pollutants released into the environment and require responsible parties to undertake remediation. Penalties may be imposed for noncompliance.

Litigation

The Company is, from time to time, a party to litigation that arises in the normal course of its business operations. See Part II, Item 1 “Legal Proceedings” of this Quarterly Report on Form 10-Q for a description of certain of the Company’s current legal proceedings. The Company is not presently a party to any litigation for which it believes a loss is probable requiring an amount to be accrued or a possible loss contingency requiring disclosure.

(11) Leases

The Company leases office, laboratory, warehouse and fabrication space in Massachusetts, Rhode Island and Monterrey, Mexico under operating leases. Under these agreements, the Company is obligated to pay annual rent, real estate taxes, and certain other operating expenses. The Company also leases equipment under operating leases. The Company’s operating leases expire at various dates through 2034.

The Company determines if an arrangement is a lease at inception. Right-of-use (ROU) assets represent the Company’s right to use an underlying asset for the lease term and lease liabilities represent the Company’s payment obligations under the lease. Operating lease ROU assets and liabilities are recognized based on the present value of lease payments over the lease term. To measure its lease liabilities, the Company uses its incremental borrowing rate or the rate implicit in the lease, if available. The Company calculates its incremental borrowing rate using a synthetic credit rating analysis based on Moody’s Building Materials Industry Rating Methodology. ROU assets also include any direct costs and prepaid lease payments but exclude any lease incentives received. The Company’s lease terms may include options to extend or terminate the lease when it is reasonably certain that the Company will exercise that option. Lease expense for lease payments is recognized on a straight-line basis over the lease term.

The Company elected the short-term lease recognition exemption for all leases that qualify. For leases that qualify for this exemption, the Company does not recognize ROU assets or lease liabilities. For lease agreements with lease and non-lease components, the Company accounts for each component separately. However, in the case of equipment leases, the Company accounts for lease and non-lease components as a single component.

Maturities of operating lease liabilities as of June 30, 2022 are as follows:

Year	Operating Leases (In thousands)
2022 (excluding the six months ended June 30, 2022)	\$ 1,944
2023	3,480
2024	2,810
2025	2,579
2026	2,208
Thereafter	13,942
Total lease payments	26,963
Less imputed interest	(7,219)
Total lease liabilities	<u>\$ 19,744</u>

The Company incurred operating lease costs of \$1.8 million and \$0.7 million during the six months ended June 30, 2022 and 2021, respectively. Cash payments related to operating lease liabilities were \$1.6 million and \$0.8 million during the six months ended June 30, 2022 and 2021, respectively.

As of June 30, 2022, the weighted average remaining lease term for operating leases was 9.7 years. As of June 30, 2022, the weighted average discount rate for operating leases was 6.6%.

As of June 30, 2022, the Company had additional operating equipment leases that will commence during 2022 with total lease payments of less than \$0.1 million and a weighted average lease term of 3.3 years.

As of June 30, 2022, the Company had no additional operating real estate lease that would commence during 2022.

(12) CARES Act Payroll Tax Deferral

The Company elected to defer approximately \$0.9 million of its employer payroll tax obligation for the period from March 27, 2020 to December 31, 2020 pursuant to the provisions of the CARES Act. The Company was required to remit 50 percent of the deferred tax balance on or before December 31, 2021 and the remaining 50 percent on or before December 31, 2022. As of December 31, 2021, the Company had remitted its initial repayment obligation. As of June 30, 2022 and December 31, 2021, a corresponding liability of \$0.4 million was recorded as a component of accrued expenses on the consolidated balance sheets.

(13) Net Loss Per Share

The computation of basic and diluted net loss per share consists of the following:

	Three Months Ended June 30,		Six Months Ended June 30,	
	2022	2021	2022	2021
	(In thousands, except share and per share data)			
Numerator:				
Net loss	\$ (24,050)	\$ (6,669)	\$ (43,534)	\$ (12,919)
Denominator:				
Weighted average shares outstanding, basic and diluted	35,207,975	28,501,044	34,276,083	28,243,687
Net loss per share, basic and diluted	<u>\$ (0.68)</u>	<u>\$ (0.23)</u>	<u>\$ (1.27)</u>	<u>\$ (0.46)</u>

Potentially dilutive common shares that were excluded from the computation of diluted net loss per share because they were anti-dilutive consist of the following:

	Three and Six Months Ended June 30,	
	2022	2021
Common stock options	3,979,424	3,834,009
Restricted common stock units	255,139	347,633
Restricted common stock awards	852,940	476,550
Convertible note, if converted	2,945,133	—
Total	8,032,636	4,658,192

As the Company incurred a net loss for the three and six months ended, June 30, 2022 and 2021, the potential dilutive shares from common stock options, restricted common stock units, restricted common stock awards, and the convertible note were excluded from the calculation of diluted net loss per share because their effect would have been anti-dilutive for the periods presented. The Company excludes the shares issued in connection with restricted stock awards from the calculation of basic weighted average common shares outstanding until the restrictions lapse.

(14) Income Taxes

The Company incurred net operating losses and recorded a full valuation allowance against net deferred tax assets for all periods presented. Accordingly, the Company has not recorded a provision for federal or state income taxes.

(15) Segment Information

Operating segments are identified as components of an enterprise about which separate, discrete financial information is available for evaluation by the chief operating decision maker in making decisions on how to allocate resources and assess performance. The Company's chief operating decision maker is the Chief Executive Officer. The Company's chief operating decision maker reviews consolidated operating results to make decisions about allocating resources and assessing performance for the entire Company. The Company reports two segments: Energy Industrial and Thermal Barrier. We evaluate segment performance based on the segment profit (loss) before corporate expenses.

Summarized below are the Revenue and Segment Operating Profit for each reporting segment:

	Three Months Ended Revenue June 30,		Three Months Ended Segment Operating Profit (Loss) June 30,		Six Months Ended Revenue June 30,		Six Months Ended Segment Operating Profit (Loss) June 30,	
	2022	2021	2022	2021	2022	2021	2022	2021
	(In thousands)						(In thousands)	
Energy industrial	\$ 34,877	\$ 31,458	\$ 5,984	\$ 5,798	\$ 65,652	\$ 59,455	\$ 8,981	\$ 10,675
Thermal barrier	10,763	212	(7,195)	(1,218)	18,395	312	(11,980)	(2,139)
Total	\$ 45,640	\$ 31,670	\$ (1,211)	\$ 4,580	\$ 84,047	\$ 59,767	\$ (2,999)	\$ 8,536
Corporate expenses			21,435	11,194			38,271	21,325
Operating loss			(22,646)	(6,614)			(41,270)	(12,789)
Other expense, net			(1,404)	(55)			(2,264)	(130)
Net loss			\$ (24,050)	\$ (6,669)			\$ (43,534)	\$ (12,919)

(16) Subsequent Events

The Company has evaluated subsequent events through August 4, 2022, the date of issuance of the consolidated financial statements for the three and six months ended June 30, 2022.

The Company received net proceeds of \$39.5 million upon the sale of 3,959,798 shares of its common stock, pursuant to a sales agreement, dated March 16, 2022, by and among the Company and Cowen and Company, LLC and Piper Sandler & Co., in an ATM offering.

Item 2. Management’s Discussion and Analysis of Financial Condition and Results of Operations.

The following information should be read in conjunction with the unaudited financial information and the notes thereto included in this Quarterly Report on Form 10-Q and the audited financial information and the notes thereto included in the Annual Report on Form 10-K for the year ended December 31, 2021, filed with the U.S. Securities and Exchange Commission (SEC) on March 1, 2022, which we refer to as the Annual Report.

Certain matters discussed in this Quarterly Report on Form 10-Q may be deemed to be forward-looking statements that involve risks and uncertainties. We make such forward-looking statements pursuant to the safe harbor provisions of the Private Securities Litigation Reform Act of 1995 and other federal securities laws. In this Quarterly Report on Form 10-Q, words such as “may,” “will,” “anticipate,” “estimate,” “expects,” “projects,” “intends,” “plans,” “believes” and similar expressions (as well as other words or expressions referencing future events, conditions or circumstances) are intended to identify forward-looking statements.

Our actual results and the timing of certain events may differ materially from the results discussed, projected, anticipated, or indicated in any forward-looking statements. We caution you that forward-looking statements are not guarantees of future performance and that our actual results of operations, financial condition and liquidity, and the development of the industry in which we operate may differ materially from the forward-looking statements contained in this Quarterly Report on Form 10-Q. In addition, even if our results of operations, financial condition and liquidity, and the development of the industry in which we operate are consistent with the forward-looking statements contained in this Quarterly Report on Form 10-Q, they may not be predictive of results or developments in future periods.

The following information and any forward-looking statements should be considered in light of factors discussed elsewhere in this Quarterly Report on Form 10-Q and under “Risk Factors” in Item 1A of the Annual Report.

We caution readers not to place undue reliance on any forward-looking statements made by us, which speak only as of the date they are made. We disclaim any obligation, except as specifically required by law and the rules of the SEC, to publicly update or revise any such statements to reflect any change in our expectations or in events, conditions or circumstances on which any such statements may be based, or that may affect the likelihood that actual results will differ from those set forth in the forward-looking statements.

You should read the following discussion and analysis of financial condition and results of operations together with Part I Item 1 “Financial Statements,” which includes our financial statements and related notes, elsewhere in this Quarterly Report on Form 10-Q.

Investors and others should note that we routinely use the Investors section of our website to announce material information to investors and the marketplace. While not all of the information that we post on the Investors section of our website is of a material nature, some information could be deemed to be material. Accordingly, we encourage investors, the media, and others interested in us to review the information that we share on the Investors section of our website, <https://www.aerogel.com>.

Products

Our core businesses are organized into two reportable segments: Energy Industrial and Thermal Barrier. The following describes our key product offerings and new product innovations by reportable segment.

Energy Industrial

We design, develop and manufacture innovative, high-performance aerogel insulation used primarily in the energy infrastructure and sustainable building materials markets. We believe our aerogel blankets deliver the best thermal performance of any widely used insulation product available on the market today and provide a combination of performance attributes unmatched by traditional insulation materials. Our end-user customers select our products where thermal performance is critical and to save money, improve resource efficiency, enhance sustainability, preserve operating assets and protect workers. Our insulation is used by oil producers and the owners and operators of refineries, petrochemical plants, liquefied natural gas facilities, power generating assets and other energy infrastructure. Our Pyrogel and Cryogel product lines have undergone rigorous technical validation by industry leading end-users and achieved significant market adoption. Our Spaceloft building materials are increasingly used by building owners to improve the energy efficiency and to enhance fire protection in buildings ranging from historic brownstones to modern high rises.

We also derive revenue from a number of other end markets. Customers in these markets use our products for applications as diverse as military and commercial aircraft, trains, buses, appliances, apparel, footwear and outdoor gear. As we continue to enhance our aerogel technology platform, we believe we will have additional opportunities to address high value applications in the global

insulation market, the electric vehicle market and in a number of new, high-value markets, including hydrogen energy, filtration, water purification, and gas sorption.

We market and sell our products primarily through a sales force based in North America, Europe and Asia. The efforts of our sales force are supported by a small number of sales consultants with extensive knowledge of a particular market or region. Our sales force is responsible for establishing and maintaining customer and partner relationships, delivering highly technical information and ensuring high-quality customer service.

Our salespeople work directly with end-user customers and engineering firms to promote the qualification, specification and acceptance of our aerogel and thermal barrier products. We also rely on an existing and well-established channel of qualified insulation distributors and contractors in more than 50 countries around the world to ensure rapid delivery of our aerogel products and strong end-user support.

Thermal Barrier

We are actively developing a number of promising aerogel products and technologies for the electric vehicle market. We have developed and are commercializing our proprietary line of PyroThin aerogel thermal barriers for use in battery packs in electric vehicles. Our PyroThin product is an ultra-thin, lightweight and flexible thermal barrier designed with other functional layers to impede the propagation of thermal runaway across multiple lithium-ion battery system architectures. Our thermal barrier technology is designed to offer a unique combination of thermal management, mechanical performance and fire protection properties. These properties enable electric vehicle manufacturers to achieve critical battery performance and safety goals. In addition, we are seeking to leverage our patented carbon aerogel technology to develop industry-leading battery materials for use in lithium-ion battery cells. These battery materials have the potential to increase the energy density of the battery cells, thus enabling an increase in the driving range of electric vehicles.

The commercial potential for our PyroThin thermal barriers and our carbon aerogel battery materials in the electric vehicle market is significant. Accordingly, we are hiring additional personnel, incurring additional operating expenses, incurring significant capital expenditures to expand aerogel manufacturing capacity, establishing an automated thermal barrier fabrication operation, enhancing research and development resources and expanding our battery material research facilities, among other items.

We have entered into production contracts with certain major OEMs, including General Motors LLC (GM) to supply fabricated, multi-part thermal barriers for use in the battery system of its next-generation electric vehicles. Pursuant to the contracts with GM, we are obligated to supply the barriers at fixed annual prices and at volumes to be specified by the customer up to a daily maximum quantity through the term of the agreements, which expire at various times from 2026 through 2034. While GM has agreed to purchase its requirement for the barriers from us at locations to be designated from time to time, it has no obligation to purchase any minimum quantity of barriers under the contracts. In addition, GM may terminate the contracts any time and for any or no reason. All other terms of the contracts are generally consistent with GM's standard purchase terms, including quality and warranty provisions customary in the automotive industry.

Manufacturing Operations

We manufacture our products using our proprietary technology at our facility in East Providence, Rhode Island. We have operated the East Providence facility since 2008 and have increased our capacity in phases to approximately \$250.0 million in annual revenue. To meet expected growth in demand for our aerogel products in the electric vehicle market, we are planning to expand our aerogel blanket capacity by constructing a second manufacturing plant in Bulloch County, Georgia.

On February 17, 2022, we entered into an Inducement Agreement with the Development Authority of Bulloch County (the Development Authority), the City of Statesboro, Bulloch County, Georgia (collectively, Statesboro Entities). Pursuant to the Inducement Agreement, the Statesboro Entities will provide various incentives to induce us to invest at least \$325.0 million in constructing and equipping our second manufacturing facility in Bulloch County, Georgia and to create at least 250 full-time jobs. Separately, and concurrently, the Company entered into a Memorandum of Understanding (the MOU) with the Georgia Department of Economic Development (the GDEcD). Pursuant to both the Inducement Agreement and the MOU, the Local Governmental Entities and the GDEcD will provide various incentives to induce the Company to invest at least \$325.0 million in constructing and equipping a facility to produce aerogel-based products in Bulloch County, Georgia and to create at least 250 full-time jobs (the Project). We will also receive statutory incentives for economic development provided by the State of Georgia. Incentives afforded by the Statesboro Entities to us include, but are not limited to, property tax reductions and utility and site infrastructure improvements for the Project. Additionally, the Development Authority, with assistance from the GDEcD, will also apply for a grant, the proceeds of which shall be used by us for certain equipment in connection with the Project. The Development Authority will lease to us an approximately 90-acre property along with buildings and equipment to be built therein, for a term of five years, with an option to renew for an additional

5 years, in consideration for the payment of nominal rent, and grant to us an option to purchase the property upon the earlier of the expiration or termination of the lease at a nominal price.

In addition, we entered into a (i) PILOT Agreement with the Statesboro Entities that sets forth our rights and obligations with respect to the incentives received pursuant to the Inducement Agreement and (ii) a Performance and Accountability Agreement with other state authorities, which provides for a grant of \$1,000,000. Pursuant to these agreements, in the event that we fail to meet at least 80% of the investment and job creation goals within 36 months following the earlier to occur of (i) the completion and issuance of the certificate of occupancy with respect to the planned second manufacturing facility or (ii) December 31, 2024 (the Commencement Date), we may be required to repay portions of property tax savings, the grant to the Development Authority and other incentives. In addition, we must maintain our achievement of 80% of the investment and job creation goals for a period of 60 months thereafter.

We expect to build the second plant in two phases at an estimated cost of \$575.0 million for the first phase and \$125.0 million for the second phase. We currently expect the first phase of the plant will increase our annual revenue capacity by approximately \$650.0 million and the second phase by approximately \$700.0 million. We expect to have the first phase of the second plant operational late in the second-half of 2023. In addition, we are constructing a state-of-the-art, automated thermal barrier fabrication operation in Monterrey, Mexico in order to keep pace with the significant potential demand for our PyroThin thermal barriers.

Financial Summary

On February 18, 2022, we sold and issued to an affiliate of Koch \$100.0 million in aggregate principal amount of our Convertible Senior PIK Toggle Notes due 2027 (the Notes), pursuant to a note purchase agreement, dated as of February 15, 2022, by and between us and the affiliate of Koch. The Notes bear interest at the Secured Overnight Financing Rate (SOFR) plus 5.50% per annum if interest is paid in cash (the Cash Interest), or, if interest is paid in kind (through an increase in the principal amount of the outstanding Notes or through the issuance of additional Notes), at SOFR plus 6.50% per annum (PIK Interest). Under the terms of the investment, SOFR has a floor of 1% and a cap of 3%. We can elect to make any interest payment through Cash Interest, PIK Interest or any combination thereof. Interest on the Notes is payable semi-annually in arrears on June 30 and December 30, commencing on June 30, 2022. It is expected that the Notes will mature on February 18, 2027, subject to earlier conversion, redemption or repurchase.

On March 28, 2022, we sold to an affiliate of Koch 1,791,986 shares of our common stock for aggregate gross proceeds of \$50.0 million, pursuant to a securities purchase agreement, dated as of February 15, 2022, by and between us and the affiliate of Koch.

On March 16, 2022, we entered into a sales agreement for an at-the-market (ATM) offering program with Cowen and Company, LLC as our sales agent. During the six months ended June 30, 2022, we sold 882,288 shares of our common stock, through the ATM offering program and received net proceeds of \$28.1 million, after deducting commissions and estimated offering expenses payable by us.

On March 12, 2021, we entered into an Amended and Restated Loan and Security Agreement (Loan Agreement) with Silicon Valley Bank to extend the maturity date of the revolving credit facility to April 28, 2022. Pursuant to the Loan Agreement, we are permitted to borrow a maximum of \$20.0 million, subject to continued covenant compliance and borrowing base requirements. The interest rate applicable to borrowings under the revolving credit facility is based on the prime rate, subject to a minimum rate of 4.00% per annum, plus a margin. The rates applicable to borrowings vary from prime rate plus 0.75% per annum to prime rate plus 2.00% per annum. In addition, we are required to pay a monthly unused revolving line facility fee of 0.50% per annum of the average unused portion of the revolving credit facility. The credit facility has also been amended to establish minimum Adjusted EBITDA and minimum Adjusted Quick Ratio covenants, each as defined in the Loan Agreement. At various dates in 2021, and subsequently on March 31, 2022 and April 28, 2022, we entered into amendments to the Loan Agreement to revise certain financial covenants, among other things. On June 23, 2022, the Loan Agreement was amended to extend the maturity date of the revolving credit facility to August 26, 2022.

Our revenue for the six months ended June 30, 2022 was \$84.0 million, which represented an increase of \$24.2 million, or 41%, from \$59.8 million for the six months ended June 30, 2021. Net loss for the six months ended June 30, 2022 was \$43.5 million and net loss per share was \$1.27. Net loss for the six months ended June 30, 2021 was \$12.9 million and net loss per share was \$0.46.

In response to the COVID-19 pandemic, we have implemented and are following safe practices recommended by public health authorities and other government entities. We continue to focus on the safety and health of our employees, customers and vendors. In addition, we have implemented various precautionary measures, including remote work arrangements, restricted business travel and procedures for social distancing, face coverings and safe hygiene. We continue to monitor public health guidance as it evolves and plan to adapt our practices as appropriate. Refer to "Risk Factors" in Item 1A of the Annual Report for more information concerning risks to our business associated with COVID-19.

Key Metrics and Non-GAAP Financial Measures

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

Square Foot Operating Metric

We price our energy industrial product and measure our shipments in square feet. We believe the square foot operating metric allows us and our investors to measure our manufacturing capacity and energy industrial product shipments on a uniform and consistent basis. The following chart sets forth energy industrial product shipments in square feet associated with recognized revenue, including revenue recognized over time utilizing the input method, for the periods presented:

	Three Months Ended June 30,		Six Months Ended June 30,	
	2022	2021	2022	2021
Product shipments in square feet	9,200	9,830	17,363	18,444

(In thousands)

Adjusted EBITDA

We use Adjusted EBITDA, a non-GAAP financial measure, as a means to assess our operating performance. We define Adjusted EBITDA as net income (loss) before interest expense, taxes, depreciation, amortization, stock-based compensation expense and other items, from time to time, which we do not believe are indicative of our core operating performance. Adjusted EBITDA is a supplemental measure of our performance that is not presented in accordance with U.S. GAAP. Adjusted EBITDA should not be considered as an alternative to net income (loss) or any other measure of financial performance calculated and presented in accordance with U.S. GAAP. In addition, our definition and presentation of Adjusted EBITDA may not be comparable to similarly titled measures presented by other companies.

We use Adjusted EBITDA:

- as a measure of operating performance because it does not include the impact of items that we do not consider indicative of our core operating performance;
- for planning purposes, including the preparation of our annual operating budget;
- to allocate resources to enhance the financial performance of our business; and
- as a performance measure used under our bonus plan.

We also believe that the presentation of Adjusted EBITDA provides useful information to investors with respect to our results of operations and in assessing the performance and value of our business. Various measures of EBITDA are widely used by investors to measure a company's operating performance without regard to items that can vary substantially from company to company depending upon financing and accounting methods, book values of assets, capital structures and the methods by which assets were acquired.

Although measures similar to Adjusted EBITDA are frequently used by investors and securities analysts in their evaluation of companies, we understand that Adjusted EBITDA has limitations as an analytical tool, and you should not consider it in isolation or as a substitute for net income (loss), income (loss) from operations, net cash provided by (used in) operating activities or an analysis of our results of operations as reported under U.S. GAAP. Some of these limitations are:

- Adjusted EBITDA does not reflect our historical cash expenditures or future requirements for capital expenditures or other contractual commitments;
- Adjusted EBITDA does not reflect changes in, or cash requirements for, our working capital needs;
- Adjusted EBITDA does not reflect stock-based compensation expense;
- Adjusted EBITDA does not reflect our income tax expense or cash requirements to pay our income taxes;
- Adjusted EBITDA does not reflect our interest expense, or the cash requirements necessary to service interest or principal payments on our debt;

- although depreciation, amortization and impairment charges are non-cash charges, the assets being depreciated, amortized or impaired will often have to be replaced in the future, and Adjusted EBITDA does not reflect any cash requirements for these replacements; and
- other companies in our industry may calculate EBITDA or Adjusted EBITDA differently than we do, limiting their usefulness as a comparative measure.

Because of these limitations, our Adjusted EBITDA should not be considered as a measure of discretionary cash available to us to reinvest in the growth of our business or as a measure of cash available for us to meet our obligations.

To properly and prudently evaluate our business, we encourage you to review the U.S. GAAP financial statements included elsewhere in this Quarterly Report on Form 10-Q, and not to rely on any single financial measure to evaluate our business.

The following table presents a reconciliation of net loss, the most directly comparable U.S. GAAP measure, to Adjusted EBITDA for the periods presented:

	Three Months Ended June 30,		Six Months Ended June 30,	
	2022	2021	2022	2021
	(In thousands)		(In thousands)	
Net loss	\$ (24,050)	\$ (6,669)	\$ (43,534)	\$ (12,919)
Depreciation and amortization	2,032	2,104	4,161	4,742
Stock-based compensation ⁽¹⁾	2,295	1,070	4,123	2,046
Interest expense	1,404	55	2,264	130
Adjusted EBITDA	<u>\$ (18,319)</u>	<u>\$ (3,440)</u>	<u>\$ (32,986)</u>	<u>\$ (6,001)</u>

(1) Represents non-cash stock-based compensation related to vesting and modifications of stock option grants, vesting of restricted stock units and vesting of restricted common stock.

Our financial performance, including such measures as net income (loss), earnings per share and Adjusted EBITDA, are affected by a number of factors including volume and mix of aerogel products sold, average selling prices, our material costs and manufacturing expenses, the costs associated with capacity expansions and start-up of additional production capacity, and the amount and timing of operating expenses. Accordingly, we expect that our net income (loss), earnings per share and Adjusted EBITDA will vary from period to period.

We expect growth in revenue during 2022 driven by a continued post-COVID recovery in the energy infrastructure market, accelerating demand in the electric vehicle market and continued market share gains in the sustainable building materials market. Our expectation to maintain revenue growth is based, in part, on our original equipment manufacturer (OEM) customers' production volume forecasts and targets as well as our expectation to successfully scale our manufacturing capabilities and address any potential supply chain issues to meet this expected demand. We are also planning a significant increase in staffing and spending levels in support of our electric vehicle market opportunities during the year, including expenses associated with the start-up and operation of an automated fabrication facility in Monterrey, Mexico and the initial staffing and operational requirements of our planned second aerogel manufacturing facility in Bulloch County, Georgia. As a result, we expect to experience an increase in net loss and a decrease in Adjusted EBITDA during 2022.

We also expect to incur significant capital expenditures and increased expenses during the remainder of 2022, related to our planned second aerogel manufacturing facility to be located in Bulloch County, Georgia. We are planning to invest approximately \$700.0 million in two phases in the construction of the second facility. We expect to have the first phase of the second plant operational late in the second-half of 2023.

Components of Our Results of Operations

Revenue

We recognize revenue from the sale of our energy industrial aerogel products and thermal barriers. Revenue is recognized upon the satisfaction of contractual performance obligations.

We record deferred revenue for sales when (i) we have delivered products, but other revenue recognition criteria have not been satisfied, or (ii) payments have been received in advance of the completion of required performance obligations.

We project revenue growth during 2022 due to a continued post-COVID recovery in the energy infrastructure market, accelerating demand in the electric vehicle market for our thermal barrier product and continued market share gains in the sustainable building materials market. Our projected revenue growth may be constrained by a shortage of unskilled labor associated with the COVID-19 pandemic.

Cost of Revenue

Cost of product revenue consists primarily of materials and manufacturing expense. Cost of product revenue is recorded when the related product revenue is recognized.

Material is our most significant component of cost of energy industrial product revenue and includes fibrous batting, silica materials and additives. Material costs as a percentage of product revenue vary from product to product due to differences in average selling prices, material requirements, product thicknesses, and manufacturing yields. In addition, we provide warranties for our products and record the estimated cost within cost of revenue in the period that the related revenue is recorded or when we become aware that a potential warranty claim is probable and can be reasonably estimated. As a result of these factors, material costs as a percentage of product revenue will vary from period to period due to changes in the mix of aerogel products sold, the costs of our raw materials or the estimated cost of warranties. In addition, global supply chain disturbances, increased reliance on foreign materials procurement, industrial gas supply constraints, increases in the cost of our raw materials, and other factors may significantly impact our material costs and have a material impact on our operations. In May 2022, one of our silanes suppliers, Silbond Corporation, informed us that it needs to curtail supply of one of the silanes we use, such that we may not receive all of our requirements in the near term due to difficulties in arranging transportation of the silanes to us. We are currently working with our supplier to identify and obtain an adequate supply of silanes or otherwise fill the shortage. We are also exploring other potential options for obtaining transportation and supply, including potentially from other third parties including from Asia or by arranging transportation of silanes ourselves. However, there can be no assurance that we will be able to obtain sufficient supplies of silanes in a timely matter, which could result in material adverse impacts on our business and our financial condition. We expect that material costs will increase in absolute dollars during 2022 due to projected growth in product shipments, but decrease as a percentage of revenue due to projected increases in average selling prices, improved manufacturing, and fabrication yields and a favorable mix of products sold.

Manufacturing expense is also a significant component of cost of revenue. Manufacturing expense includes labor, utilities, maintenance expense, and depreciation on manufacturing assets. Manufacturing expense also includes stock-based compensation for manufacturing employees and shipping costs. Manufacturing expense is our most significant component of cost of our thermal barrier product revenue. We expect that manufacturing expense will increase in absolute dollars and as a percentage of revenue during 2022 due to increased manual fabrication staffing and spending levels in support of our thermal barrier business, including the start-up and operation of a fabrication facility in Monterrey, Mexico and the initial staffing and operational requirements of our planned second aerogel manufacturing facility in Bulloch County, Georgia.

In total, we expect that cost of product revenue will increase in absolute dollars during 2022 versus 2021 and as a percentage of revenue versus 2021 driven by the costs to support our expected higher run-rate revenue in future periods.

Gross Profit

Our gross profit as a percentage of revenue is affected by a number of factors, including the volume of aerogel products produced and sold, the mix of aerogel products sold, average selling prices, our material and manufacturing costs, realized capacity utilization and the costs associated with expansions and start-up of production capacity. Accordingly, we expect our gross profit to vary significantly in absolute dollars and as a percentage of revenue from period to period.

During 2022, we expect gross profit to increase in both absolute dollars and as a percentage of total revenue due to the combination of a projected increase in total revenue combined with projected reduction in material costs as a percentage of total revenue related to our energy industrial products, offset, in part, by a projected increase in manufacturing expense as a percentage of revenue primarily related to our thermal barrier business.

Operating Expenses

Operating expenses consist of research and development, sales and marketing, and general and administrative expenses. Operating expenses include personnel costs, legal fees, professional fees, service fees, insurance premiums, travel expense, facilities related costs and other costs, expenses and fees. The largest component of our operating expenses is personnel costs, consisting of salaries, benefits, incentive compensation and stock-based compensation. In any particular period, the timing and extent of personnel

additions or reductions, legal activities, including patent enforcement actions, marketing programs, research efforts and a range of similar activities or actions could materially affect our operating expenses, both in absolute dollars and as a percentage of revenue.

During 2022, we expect to continue to hire additional technical, operational and commercial personnel and incur additional operating expenses to support the anticipated multi-year growth in our PyroThin thermal barrier business. As a result, we expect that operating expenses will increase in both absolute dollars and as a percentage of revenue during the year. In the longer term, we expect that operating expenses will increase in absolute dollars, but decrease as a percentage of revenue.

Research and Development Expenses

Research and development expenses consist primarily of expenses for personnel engaged in the development of next-generation aerogel compositions, form factors and manufacturing technologies. These expenses also include testing services, prototype expenses, consulting services, trial formulations for new products, equipment depreciation, facilities costs and related overhead. We expense research and development costs as incurred. We expect to continue to devote substantial resources to the development of new aerogel technologies, including our carbon aerogel battery materials. We believe that these investments are necessary to maintain and improve our competitive position. We also expect to continue to invest in research and engineering personnel and the infrastructure required in support of their efforts. While we expect our research and development expenses will increase in absolute dollars but decrease as a percentage of revenue in the longer term, in 2022, we expect these expenses will increase in both absolute dollars and as a percentage of revenue.

Sales and Marketing Expenses

Sales and marketing expenses consist primarily of personnel costs, incentive compensation, marketing programs, travel and related costs, consulting expenses and facilities related costs. We expect that sales and marketing expenses will increase in absolute dollars and as a percentage of revenue during 2022 principally due to an increase in compensation associated with the addition of personnel in support of our PyroThin thermal barrier business. In the longer term, we expect that sales and marketing expenses will increase in absolute dollars but decrease as a percentage of revenue.

General and Administrative Expenses

General and administrative expenses consist primarily of personnel costs, legal expenses, consulting and professional services, audit fees, compliance with securities, corporate governance and related laws and regulations, investor relations expenses and insurance premiums, including director and officer insurance.

We expect our general and administrative expenses to increase as we add general and administrative personnel to support the anticipated growth of our business. We also expect that the patent enforcement actions, described in more detail under “Legal Proceedings” in Part I, Item 3 of our Annual Report on Form 10-K for the year ended December 31, 2021, if protracted, could result in significant legal expense over the medium to long-term. While we expect that our general and administrative expenses will increase in absolute dollars but decrease as a percentage of revenue in the longer term, in 2022, we expect such expenses will increase in both absolute dollars and as a percentage of revenue.

Interest Expense, Net

Interest expense, net consists of interest expense on our convertible note and fees and interest expense related to our revolving credit facility.

Provision for Income Taxes

We have incurred net losses since inception and have not recorded benefit provisions for U.S. federal income taxes or state income taxes since the tax benefits of our net losses have been offset by valuation allowances due to the uncertainty associated with the utilization of net operating loss carryforwards.

Results of Operations

Three months ended June 30, 2022 compared to the three months ended June 30, 2021

The following tables set forth a comparison of the components of our results of operations for the periods presented:

Revenue

	Three Months Ended June 30,				Change	
	2022		2021			
	Amount	Percentage of Revenue	Amount	Percentage of Revenue	Amount	Percentage
(\$ in thousands)						
Revenue:						
Energy industrial	\$ 34,877	76%	\$ 31,458	99%	\$ 3,419	11%
Thermal barrier	10,763	24%	212	1%	10,551	NM
Total revenue	<u>\$ 45,640</u>	100%	<u>\$ 31,670</u>	100%	<u>\$ 13,970</u>	44%

Total revenue increased \$14.0 million, or 44%, to \$45.6 million for the three months ended June 30, 2022 from \$31.6 million in the comparable period in 2021. The increase in total revenue was the result of increases in both thermal barrier and energy industrial revenue.

The following chart sets forth energy industrial product shipments in square feet associated with recognized revenue, including revenue recognized over time utilizing the input method, for the periods presented:

	Three Months Ended June 30,		Change	
	2022	2021	Amount	Percentage
Product shipments in square feet (in thousands)	9,200	9,830	(630)	(6)%

Energy industrial revenue increased by \$3.4 million, or 11%, to \$34.9 million for the three months ended June 30, 2022 from \$31.5 million in the comparable period in 2021. This increase was driven by project-based demand in the subsea market in addition to an increase in maintenance-based demand in the Asia global petrochemical and refinery markets offset by a decrease in Europe.

Energy industrial revenue for the three months ended June 30, 2022 included \$9.3 million to a North American distributor. Energy industrial revenue for the three months ended June 30, 2021 included \$9.6 million to a North American distributor and \$3.7 million to a European LNG project contractor.

The average selling price per square foot of our energy industrial products increased by \$0.59, or 18%, to \$3.79 per square foot for the three months ended June 30, 2022 from \$3.20 per square foot for the three months ended June 30, 2021. The increase in average selling price principally reflected the impact of a change in the mix of products sold. This increase in average selling price had the effect of increasing product revenue by \$5.4 million for the three months ended June 30, 2022 from the comparable period in 2021.

In volume terms, energy industrial product shipments decreased by 0.6 million square feet, or 6%, to 9.2 million square feet for the three months ended June 30, 2022, as compared to 9.8 million square feet for the three months ended June 30, 2021. The decrease in volume had the effect of decreasing product revenue by \$2.0 million for the three months ended June 30, 2022 from the comparable period in 2021.

Thermal barrier revenue was \$10.8 million for the three months ended June 30, 2022 as compared to \$0.2 million for the three months ended June 30, 2021. Thermal barrier revenue for the three months ended June 30, 2022 included \$7.4 million to a major U.S. automotive OEM and \$1.9 million to a major Asian automotive OEM.

Cost of Revenue

	Three Months Ended June 30,						Change	
	2022			2021				
	Amount	Percentage of Related Revenue	Percentage of Total Revenue	Amount	Percentage of Related Revenue	Percentage of Total Revenue	Amount	Percentage
(\$ in thousands)								
Cost of revenue:								
Energy industrial	\$ 28,893	83%	63%	\$ 25,660	82%	81%	\$ 3,233	13%
Thermal barrier	17,958	167%	39%	1,430	NM	5%	16,528	NM
Total cost of revenue	<u>\$ 46,851</u>	103%	103%	<u>\$ 27,090</u>	86%	86%	<u>\$ 19,761</u>	73%

Total cost of revenue increased \$19.8 million, or 73%, to \$46.9 million for the three months ended June 30, 2022 from \$27.1 million in the comparable period in 2021. The increase in total cost of revenue was the result of increases in thermal barrier and energy industrial cost of revenue.

Energy industrial cost of revenue increased \$3.2 million, or 13%, to \$28.9 million for the three months ended June 30, 2022 from \$25.7 million in the comparable period in 2021. The \$3.2 million increase was the result of a \$6.2 million increase in material costs to support the 11% increase in energy industrial revenue from the comparable period in 2021, offset by a \$3.0 million decrease in manufacturing and other operating costs.

Thermal barrier cost of revenue increased \$16.6 million to \$18.0 million for the three months ended June 30, 2022 as compared to \$1.4 million for the three months ended June 30, 2021. The \$16.6 million increase was the result of a \$4.9 million increase in material costs and an \$11.7 million increase in manufacturing. The increase in material costs was the result of the increase in revenue volume from the comparable period in 2021 in which there were minimal thermal barrier sales. The increase in manufacturing was driven by increases in compensation and related costs of \$7.8 million and other manufacturing and operating costs of \$3.9 million.

Gross Profit

	Three Months Ended June 30,				Change	
	2022		2021			
	Amount	Percentage of Revenue	Amount	Percentage of Revenue	Amount	Percentage
(\$ in thousands)						
Gross profit:						
Energy industrial	\$ 5,984	17%	\$ 5,798	18%	\$ 186	3%
Thermal barrier	(7,195)	(67)%	(1,218)	NM	(5,977)	NM
Total gross (loss) profit	<u>\$ (1,211)</u>	(3)%	<u>\$ 4,580</u>	14%	<u>\$ (5,791)</u>	(126)%

Gross profit decreased by \$5.8 million, or 126%, to \$(1.2) million for the three months ended June 30, 2022 from \$4.6 million in the comparable period in 2021. The decrease in gross profit was the result of the \$19.8 million increase in total cost of revenue, offset, in part, by the \$14.0 million increase in total revenue. The decrease in gross profit reflects the increase in overhead costs and additional resources to support our expected higher run-rate revenue in future periods for both our energy industrial and thermal barrier products.

Research and Development Expenses

	Three Months Ended June 30,				Change	
	2022		2021			
	Amount	Percentage of Revenue	Amount	Percentage of Revenue	Amount	Percentage
(\$ in thousands)						
Research and development expenses	\$ 4,447	10%	\$ 2,609	8%	\$ 1,838	70%

Research and development expenses increased by \$1.8 million, or 70%, to \$4.4 million for the three months ended June 30, 2022 from \$2.6 million in the comparable period in 2021. The \$1.8 million increase reflects an increase in compensation and related costs of \$0.8 million, equipment and lease expenses of \$0.6 million and other research and development expenses of \$0.4 million.

Research and development expenses as a percentage of total revenue increased to 10% of total revenue for three months ended June 30, 2022 from 8% in the comparable period in 2021.

Sales and Marketing Expenses

	Three Months Ended June 30,				Change	
	2022		2021			
	Amount	Percentage of Revenue	Amount	Percentage of Revenue	Amount	Percentage
	(\$ in thousands)					
Sales and marketing expenses	\$ 7,633	17%	\$ 3,568	11%	\$ 4,065	114%

Sales and marketing expenses increased by \$4.0 million, or 114%, to \$7.6 million for the three months ended June 30, 2022 from \$3.6 million in the comparable period in 2021. The \$4.0 million increase was principally the result of increases in compensation and related costs of \$2.2 million, operating supplies expenses of \$0.9 million, travel-related expenditures of \$0.4 million, marketing expenses of \$0.2 million and other sales and marketing expenses of \$0.3 million.

Sales and marketing expenses as a percentage of total revenue increased to 17% for the three months ended June 30, 2022 from 11% in the comparable period in 2021, due principally to the increase in compensation and related expenses associated with an increase in sales and business development personnel.

General and Administrative Expenses

	Three Months Ended June 30,				Change	
	2022		2021			
	Amount	Percentage of Revenue	Amount	Percentage of Revenue	Amount	Percentage
	(\$ in thousands)					
General and administrative expenses	\$ 9,355	20%	\$ 5,017	16%	\$ 4,338	86%

General and administrative expenses increased by \$4.3 million, or 86%, to \$9.3 million for the three months ended June 30, 2022 from \$5.0 million in the comparable period in 2021. The \$4.3 million increase was the result of increases in compensation and related costs of \$2.6 million, operating and lease expenses of \$1.0 million, professional fees of \$0.6 million and other general and administrative expenses of \$0.1 million.

General and administrative expenses as a percentage of total revenue increased to 20% for the three months ended June 30, 2022 from 16% in the comparable period in 2021.

Interest Expense, net

	Three Months Ended June 30,				Change	
	2022		2021			
	Amount	Percentage of Revenue	Amount	Percentage of Revenue	Amount	Percentage
	(\$ in thousands)					
Interest expense:						
Interest expense, related party	\$ (1,550)	(3)%	\$ —	—	\$ (1,550)	NM
Interest expense, net	146	0%	(55)	—	201	NM
Total interest expense, net	\$ (1,404)	(3)%	\$ (55)	0%	\$ (1,349)	NM

Interest expense, net increased by \$1.3 million to \$1.4 million for the three months ended June 30, 2022 from less than \$0.1 million in the comparable period in 2021. The \$1.3 million increase was the result of interest relating to our Convertible Note.

Results of Operations

Six months ended June 30, 2022 compared to the six months ended June 30, 2021

The following tables set forth a comparison of the components of our results of operations for the periods presented:

Revenue

	Six Months Ended June 30,				Change	
	2022		2021			
	Amount	Percentage of Revenue	Amount	Percentage of Revenue	Amount	Percentage
(\$ in thousands)						
Revenue:						
Energy industrial	\$ 65,652	78%	\$ 59,455	99%	\$ 6,197	10%
Thermal barrier	18,395	22%	312	1%	18,083	NM
Total revenue	\$ 84,047	100%	\$ 59,767	100%	\$ 24,280	41%

Total revenue increased \$24.2 million, or 41%, to \$84.0 million for the three months ended June 30, 2022 from \$59.8 million in the comparable period in 2021. The increase in total revenue was the result of increases in both thermal barrier and energy industrial revenue.

The following chart sets forth energy industrial product shipments in square feet associated with recognized revenue, including revenue recognized over time utilizing the input method, for the periods presented:

	Six Months Ended June 30,		Change	
	2022	2021	Amount	Percentage
Product shipments in square feet (in thousands)	17,363	18,444	(1,081)	(6)%

Energy industrial revenue increased by \$6.2 million, or 10%, to \$65.7 million for the six months ended June 30, 2022 from \$59.5 million in the comparable period in 2021. This increase was driven by maintenance-based demand in the global petrochemical and refinery markets, particularly in Asia and North America, due to the continued post-COVID recovery, project based demand in the subsea market, offset, in part, by a maintenance-based demand in the global petrochemical and refinery markets, particularly in Europe.

Energy industrial revenue for the six months ended June 30, 2022 included \$20.2 million to a North American distributor. Energy industrial revenue for the six months ended June 30, 2021 included \$17.0 million to a North American distributor and \$8.8 million to a European LNG project contractor.

The average selling price per square foot of our energy industrial products increased by \$0.56, or 17%, to \$3.78 per square foot for the six months ended June 30, 2022 from \$3.22 per square foot for the six months ended June 30, 2021. The increase in average selling price principally reflected the impact of a change in the mix of products sold. This increase in average selling price had the effect of increasing product revenue by \$9.7 million for the six months ended June 30, 2022 from the comparable period in 2021.

In volume terms, energy industrial product shipments decreased by 1.1 million square feet, or 6%, to 17.4 million square feet for the six months ended June 30, 2022, as compared to 18.4 million square feet for the six months ended June 30, 2021. The decrease in volume had the effect of decreasing product revenue by \$3.5 million the six months ended June 30, 2022 from the comparable period in 2021.

Thermal barrier revenue was \$18.4 million for the six months ended June 30, 2022 as compared to \$0.3 million for the six months ended June 30, 2021. Thermal barrier revenue for the six months ended June 30, 2022 included \$13.6 million to a major U.S. automotive OEM and \$3.1 million to a major Asian automotive OEM.

Cost of Revenue

	Six Months Ended June 30,						Change	
	2022			2021				
	Amount	Percentage of Related Revenue	Percentage of Total Revenue	Amount	Percentage of Related Revenue	Percentage of Total Revenue	Amount	Percentage
(\$ in thousands)								
Cost of revenue:								
Energy industrial	\$ 56,671	86%	67%	\$ 48,780	82%	82%	\$ 7,891	16%
Thermal barrier	30,375	165%	36%	2,451	NM	4%	27,924	NM
Total cost of revenue	<u>\$ 87,046</u>	104%	104%	<u>\$ 51,231</u>	86%	86%	<u>\$ 35,815</u>	70%

Total cost of revenue increased \$35.8 million, or 70%, to \$87.0 million for the six months ended June 30, 2022 from \$51.2 million in the comparable period in 2021. The increase in total cost of revenue was the result of increases in thermal barrier and energy industrial cost of revenue.

Energy industrial cost of revenue increased \$7.9 million, or 16%, to \$56.7 million for the six months ended June 30, 2022 from \$48.8 million in the comparable period in 2021. The \$7.9 million increase was the result of a \$9.6 million increase in material costs to support the 10% increase in energy industrial revenue from the comparable period in 2021 and a \$1.7 million decrease in manufacturing and other operating costs.

Thermal barrier cost of revenue increased \$27.9 million to \$30.4 million for the six months ended June 30, 2022 as compared to \$2.5 million in the comparable period in 2021. The \$27.9 million increase was the result of a \$9.6 million increase in material costs and an \$18.3 million increase in manufacturing costs. The increase in material costs was the result of the increase in revenue volume from the comparable period in 2021 in which there were minimal thermal barrier sales. The increase in manufacturing costs was driven by increases in compensation and related costs of \$14.3 million and other operating and manufacturing costs of \$4.0 million.

Gross Profit

	Six Months Ended June 30,				Change	
	2022		2021			
	Amount	Percentage of Revenue	Amount	Percentage of Revenue	Amount	Percentage
(\$ in thousands)						
Gross profit:						
Energy industrial	\$ 8,981	14%	\$ 10,675	18%	\$ (1,694)	(16)%
Thermal barrier	(11,980)	(65)%	(2,139)	NM	(9,841)	NM
Total gross (loss) profit	<u>\$ (2,999)</u>	(4)%	<u>\$ 8,536</u>	14%	<u>\$ (11,535)</u>	(135)%

Gross profit decreased by \$11.5 million, or 135%, to \$(3.0) million for the six months ended June 30, 2022 from \$8.5 million in the comparable period in 2021. The decrease in gross profit was the result of the \$35.8 million increase in total cost of revenue, offset, in part, by the \$24.2 million increase in total revenue. The decrease in gross profit reflects the increase in overhead costs and additional resources to support our expected higher run-rate revenue in future periods for both our energy industrial and thermal barrier products.

Research and Development Expenses

	Six Months Ended June 30,				Change	
	2022		2021			
	Amount	Percentage of Revenue	Amount	Percentage of Revenue	Amount	Percentage
(\$ in thousands)						
Research and development expenses	\$ 8,039	10%	\$ 5,051	8%	\$ 2,988	59%

Research and development expenses increased by \$3.0 million, or 59%, to \$8.0 million for the six months ended June 30, 2022 from \$5.0 million in the comparable period in 2021. The \$3.0 million increase reflects an increase in compensation and related costs of \$1.3 million, equipment and lease expenses of \$1.1 million and other research and development expenses of \$0.6 million.

Research and development expenses as a percentage of total revenue increased to 10% for the six months ended June 30, 2022 from 8% in the comparable period in 2021.

Sales and Marketing Expenses

	Six Months Ended June 30,				Change	
	2022		2021			
	Amount	Percentage of Revenue	Amount	Percentage of Revenue	Amount	Percentage
			(\$ in thousands)			
Sales and marketing expenses	\$ 13,651	16%	\$ 6,869	11%	\$ 6,782	99%

Sales and marketing expenses increased by \$6.8 million, or 99%, to \$13.7 million for the six months ended June 30, 2022 from \$6.9 million in the comparable period in 2021. The \$6.8 million increase was principally the result of increases in compensation and related costs of \$4.3 million, operating supplies expenses of \$1.1 million, travel-related expenditures of \$0.6 million, marketing expenses of \$0.4 million, and other sales and marketing expenses of \$0.4 million.

Sales and marketing expenses as a percentage of total revenue increased to 16% for the six months ended June 30, 2022 from 11% in the comparable period in 2021, due principally to the increase in compensation and related expenses associated with an increase in sales and business development personnel.

General and Administrative Expenses

	Six Months Ended June 30,				Change	
	2022		2021			
	Amount	Percentage of Revenue	Amount	Percentage of Revenue	Amount	Percentage
			(\$ in thousands)			
General and administrative expenses	\$ 16,581	20%	\$ 9,405	16%	\$ 7,176	76%

General and administrative expenses increased by \$7.2 million, or 76%, to \$16.6 million for the six months ended June 30, 2022 from \$9.4 million in the comparable period in 2021. The \$7.2 million increase was the result of increases in compensation and related costs of \$3.5 million, operating and lease expenses of \$2.1 million, an increase in professional fees of \$0.8 million and other general and administrative expenses of \$0.8 million.

General and administrative expenses as a percentage of total revenue increased to 20% for the six months ended June 30, 2022 from 16% in the comparable period in 2021.

Interest Expense, net

	Six Months Ended June 30,				Change	
	2022		2021			
	Amount	Percentage of Revenue	Amount	Percentage of Revenue	Amount	Percentage
			(\$ in thousands)			
Interest expense:						
Interest expense, related party	\$ (2,369)	(3)%	\$ —	\$ —	\$ (2,369)	NM
Interest expense, net	105	—	(130)	—	235	(181)%
Total interest expense, net	\$ (2,264)	(3)%	\$ (130)	0%	\$ (2,134)	1642%

Interest expense, net increased by \$2.1 million to \$2.2 million for the six months ended June 30, 2022 from \$0.1 million in the comparable period in 2021. The \$2.1 million increase was the result of interest relating to our Convertible Note.

Liquidity and Capital Resources

Overview

We have experienced significant losses and invested substantial resources since our inception to develop, commercialize and protect our aerogel technology and to build a manufacturing infrastructure capable of supplying aerogel products at the volumes and costs required by our customers. These investments have included research and development and other operating expenses, capital expenditures and investment in working capital balances.

Our long-term financial projections anticipate revenue growth, increasing levels of gross profit, and improved cash flows from operations. To meet expected growth in demand for our aerogel products in the electric vehicle market, we are planning to expand our aerogel blanket capacity by constructing a second manufacturing plant in Bulloch County, Georgia. We expect to build the second plant in two phases at an estimated cost of \$575.0 million for the first phase and \$125.0 million for the second phase. We expect to have the first phase of the second plant operational late in the second-half of 2023. In addition, we are constructing and planning commence the operation of a state-of-the-art, thermal barrier fabrication operation in Monterrey, Mexico during 2022 in order to keep pace with the significant potential demand for our PyroThin thermal barriers.

We are also increasing our investment in the research and development of next-generation aerogel products and technologies. During 2022, we will continue to develop aerogel products and technologies for the electric vehicle market. We believe the commercial potential for our technology in the electric vehicle market is significant. To meet the anticipated revenue growth and take advantage of this market opportunity, we are adding personnel, incurring additional operating expenses, and planning to construct a carbon aerogel battery materials facility, among other items.

We took several actions during 2021 to increase the financial resources available to support current operating requirements and capital expenditures. In June 2021, we sold 3,462,124 shares to an affiliate of Koch Strategic Platforms in a private placement of our common stock and received net proceeds of \$73.5 million after deducting fees and offering expenses of \$1.5 million. During 2021, we also sold shares of our common stock through our ATM offering program and received net proceeds of \$19.4 million.

In February 2022, we sold 1,791,986 shares to an affiliate of Koch Strategic Platforms in a private placement of our common stock and received net proceeds of \$49.9 million after deducting fees and offering expenses of \$0.1 million. In addition, in February 2022, we sold and issued to an affiliate of Koch \$100.0 million in aggregate principal amount of our Convertible Senior PIK Toggle Notes. During the six months ended June 30, 2022, we sold 882,288 shares of our common stock through our ATM offering program and received net proceeds of \$28.1 million, after deducting commissions and estimated offering expenses payable by us.

We believe that our June 30, 2022 cash and cash equivalents balance of \$162.2 million and funds available under our revolving credit facility will be sufficient to support current operating requirements, current research and development activities and the initial capital expenditures required to support the evolving commercial opportunities in the electric vehicle market and other strategic business opportunities.

However, we plan to supplement our cash balance and available credit with equity financings, debt financings, customer prepayments or technology licensing fees to provide the additional capital necessary to purchase the capital equipment, construct the new facilities and complete the aerogel capacity expansions required to support our evolving commercial opportunities and strategic business initiatives. We also intend to extend or replace our revolving credit facility with Silicon Valley Bank prior to its maturity. We believe that the consummation of equity financings could potentially result in an ownership change under Section 382 of the Internal Revenue Code. Such an ownership change would lead to the use of our net operating loss carryforwards being restricted. Our inability to use a substantial portion of our net operating loss carryforwards would result in a higher effective tax rate and adversely affect our financial condition and results of operations.

Primary Sources of Liquidity

Our principal sources of liquidity are currently our cash and cash equivalents and our revolving credit facility with Silicon Valley Bank. Cash and cash equivalents consist primarily of cash and money market accounts on deposit with banks. As of June 30, 2022, we had \$162.2 million of cash and cash equivalents.

On June 29, 2021, we sold 3,462,124 shares to an affiliate of Koch Strategic Platforms in a private placement of our common stock and received net proceeds of \$73.5 million after deducting fees and offering expenses of \$1.5 million.

In February 2022, we sold 1,791,986 shares to an affiliate of Koch Strategic Platforms in a private placement of our common stock and received net proceeds of \$49.9 million after deducting fees and offering expenses of \$0.1 million. In addition, in February 2022, we sold and issued to an affiliate of Koch \$100.0 million in aggregate principal amount of our Convertible Senior PIK Toggle Notes.

On March 16, 2022, we entered into a sales agreement for an ATM offering program with Cowen and Company, LLC and Piper Sandler & Co., as our sales agents. During the six months ended June 30, 2022, we sold 882,288 shares of our common stock through the ATM offering program and received net proceeds of \$28.1 million, after deducting commissions and estimated offering expenses payable by us. Subsequent to June 30, 2022, we sold 3,959,798 shares of our common stock and received net proceeds of \$39.5 million through the ATM offering program.

We have a prepayment balance of \$5.0 million associated with prepayments received pursuant to our supply agreement with BASF, which we expect to repay on or after January 1, 2023.

We have maintained our revolving credit facility, as amended from time to time, with Silicon Valley Bank since March 2011. At various dates in 2021, and subsequently on March 31, 2022 and April 28, 2022, the Company entered into amendments to the Loan Agreement to revise certain financial covenants, among other things. On June 23, 2022, the Loan Agreement was amended to extend the maturity date of the revolving credit facility to August 26, 2022. We intend to extend or replace the facility prior to its maturity.

Under our revolving credit facility, we may borrow a maximum of \$20.0 million, subject to continued covenant compliance and borrowing base requirements. The interest rate applicable to borrowings under the revolving credit facility is based on the prime rate, as defined, subject to a minimum rate of 4.00% per annum. The rates applicable to borrowings vary from prime rate plus 0.75% per annum to prime rate plus 2.00% per annum. In addition, we are required to pay a monthly unused revolving line facility fee of 0.50% per annum of the average unused portion of the revolving credit facility.

As of June 30, 2022, we had no outstanding borrowings under our revolving credit facility and \$1.2 million of outstanding letters of credit secured by the revolving credit facility.

Under the revolving credit facility, we are required to comply with both non-financial and financial covenants, including minimum Adjusted EBITDA and Adjusted Quick Ratio covenants, as defined in the loan agreement. As of June 30, 2022, we were in compliance with all such covenants.

The amount available to us under the revolving credit facility as of June 30, 2022 was \$18.0 million after giving effect to the \$1.2 million of letters of credit outstanding.

Analysis of Cash Flow

Net Cash Used in Operating Activities

During the six months ended June 30, 2022, we used \$32.9 million in net cash in operating activities, as compared to the use of \$0.5 million in net cash during the comparable period in 2021, an increase in the use of cash of \$32.4 million. This increase in use of cash was the result of increases in net loss adjusted for non-cash items of \$25.9 million and in net cash used by changes in operating assets and liabilities of \$6.3 million.

Net Cash Used in Investing Activities

Net cash used in investing activities is for capital expenditures for machinery and equipment principally to improve the throughput, efficiency and capacity of our East Providence facility and engineering designs for the planned aerogel manufacturing facility in Bulloch County, Georgia. Net cash used in investing activities for the six months ended June 30, 2022 and 2021 was \$52.4 million and \$3.9 million, respectively.

Net Cash Provided by Financing Activities

Net cash provided by financing activities for the six months ended June 30, 2022 totaled \$170.8 million and consisted of \$99.8 million in net proceeds from the issuance of convertible debt, \$49.9 million in net proceeds from the private placement of our common stock, \$28.1 million in net proceeds from the ATM offering program, and less than \$0.2 million in proceeds from employee stock

option exercises, offset, in part, by \$4.7 million in cash used for payments made for repayments of a prepayment liability and \$2.4 million in cash used for payments made for employee tax withholdings associated with the vesting of restricted stock units.

Net cash provided by financing activities for the six months ended June 30, 2021 totaled \$90.2 million and consisted of \$73.6 million in net proceeds from the Private Placement, \$18.6 million in net proceeds from the ATM offering program, and \$0.7 million in proceeds from employee stock option exercises, offset, in part, by \$2.7 million in cash used for payments made for employee tax withholdings associated with the vesting of restricted stock units.

Contractual Obligations and Commitments

There have been no material changes to our contractual obligations and commitments as reported in our Annual Report.

Recent Accounting Pronouncements

Information regarding new accounting pronouncements is included in note 2 to our unaudited consolidated financial statements contained in Item 1 of this Quarterly Report on Form 10-Q.

Critical Accounting Policies and Estimates

Our financial statements are prepared in accordance with U.S. GAAP. The preparation of our financial statements and related disclosures requires us to make estimates, assumptions and judgments that affect the reported amount of assets, liabilities, revenue, costs and expenses and related disclosures. We believe that the estimates, assumptions and judgments involved in these accounting policies have the greatest potential impact on our financial statements and, therefore, we consider these to be our critical accounting policies. Accordingly, we evaluate our estimates and assumptions on an ongoing basis. Our actual results may differ from these estimates under different assumptions and conditions. See our Annual Report and note 2 to our consolidated financial statements included elsewhere in this Quarterly Report on Form 10-Q for information about these critical accounting policies, as well as a description of our other significant accounting policies.

Certain Factors That May Affect Future Results of Operations

The SEC encourages companies to disclose forward-looking information so that investors can better understand a company's future prospects and make informed investment decisions. This Quarterly Report on Form 10-Q contains such "forward-looking statements" within the meaning of the Private Securities Litigation Reform Act of 1995. These statements involve known and unknown risks, uncertainties and other important factors, which may cause our actual results, performance or achievements to be materially different from any future results, performances or achievements expressed or implied by the forward-looking statements. Forward-looking statements include, but are not limited to, statements about: the expected future growth of the market for our aerogel products and our continued gain in market share, in particular in the electric vehicle market, the energy infrastructure insulation market, the lithium-ion battery thermal barrier markets, and other markets we target; our beliefs in the appropriateness of our assumptions, the accuracy of our estimates regarding expenses, loss contingencies, future revenues, future profits, uses of cash, available credit, capital requirements, and the need for additional financing to operate our business, including to complete the planned construction and development of our second manufacturing facility in Bulloch County, Georgia, or fabrication operations in Monterrey, Mexico, and to fund our planned strategic business initiatives; the performance of our aerogel blankets; our expectation that we will be successful in obtaining, enforcing and defending our patents against competitors and that such patents are valid and enforceable; our belief that our products possess strong competitive advantages over traditional insulation materials, including the superior thermal performance and the thin, easy-to-use and durable blanket form of our products; our expectations regarding the investment to open a second manufacturing facility in Georgia and the anticipated job creation as a result thereof; the anticipated capacity expansion as a result of the planned second manufacturing facility in Georgia and the expected commencement of production; our estimates of annual production capacity; our plans regarding the future capacity expansion, including the selection of a manufacturing site and the construction and operation of the facility; our ability to obtain approvals and terms that are acceptable to move forward with the construction of a facility in the southeastern U.S. on a timely basis, or at all; beliefs about the role of our technology and products in the electric vehicle market; beliefs about the commercial potential for our technology in the electric vehicle market; beliefs about our ability to produce and deliver products to electric vehicle customers; beliefs about Aspen's contracts with the major U.S. automotive manufacturer; beliefs about the potential for the major U.S. automotive manufacturer to become a significant customer for Aspen's products; beliefs about revenue, costs, expenses, profitability, investments or cash flow associated with the contracts with the major U.S. automotive manufacturer; our expectations about the size and timing of awarded business in the electric vehicle market, future revenues and profit margins, arising from our supply relationship and contract with automotive OEMs and our ability to win more business and increase revenue in the electric vehicle market; beliefs about the performance of our thermal

barrier products in the battery systems of electric vehicles; beliefs about the potential commercial opportunity for Aspen's thermal barrier products; the current or future trends in the energy, energy infrastructure, chemical and refinery, LNG, sustainable building materials, electric vehicle thermal barrier, electric vehicle battery materials or other markets and the impact of these trends on our business; our investments in the electric vehicle market and aerogel technology platform; our beliefs about the usefulness of the square foot operating metric; our beliefs about the financial metrics that are indicative of our core performance; our beliefs about the usefulness of our presentation of Adjusted EBITDA; our expectations about the effect of manufacturing capacity on financial metrics such as Adjusted EBITDA; our expectations about future revenues, expenses, gross profit, net loss, loss per share and Adjusted EBITDA, sources and uses of cash, capital requirements and the sufficiency of our existing cash balance and available credit; our beliefs about the outcome, effects or estimated costs of current or potential litigation or their respective timing, including expected legal expense in connection with our patent enforcement actions; our plans to devote substantial resources to the development of new aerogel technology; our expectations about product mix; our expectations about future material costs and manufacturing expenses as a percentage of revenue; our expectations of future gross profit and the effect of manufacturing expenses, manufacturing capacity and productivity on gross profit; our expectations about our resources and other investments in new technology and related research and development activities and associated expenses; our expectations about short and long term (a) research and development (b) general and administrative and (c) sales and marketing expenses; our expectations of revenue growth, increased gross profit, and improving cash flows over the long term; our intentions about managing capital expenditures and working capital balances; our expectations about incurring significant capital expenditures in the future; our expectations about the expansion of our workforce and resources and its effect on sales and marketing, general and administrative, and related expenses; our expectations about future product revenue and demand for our products; our expectations about the effect of stock-based compensation on various costs and expenses; our expectations about potential sources of future financing; our beliefs about the impact of accounting policies on our financial statements; our beliefs about the effect of interest rates, inflation and foreign currency fluctuations on our results of operations and financial condition; our beliefs about the expansion of our international operations, including in Mexico; our statements about the impact of major public health concerns, including the COVID-19 pandemic or other pandemics arising globally, and the future, and currently unknown extent of, the impact of the COVID-19 pandemic on our business and operations; and our statements about the sufficiency of our current and future actions to address the impact of the COVID-19 pandemic on our business and operations, including our future revenue, Adjusted EBITDA and other financial metrics.

Words such as “may,” “will,” “anticipate,” “estimate,” “expects,” “projects,” “intends,” “plans,” “believes” and words and terms of similar substance used in connection with any discussion of future operating or financial performance, identify forward-looking statements. All forward-looking statements are management's present expectations of future events and are subject to a number of risks and uncertainties that could cause actual results to differ materially and adversely from those described in the forward-looking statements. These risks include, but are not limited to, those set forth in this Quarterly Report on Form 10-Q and under the heading “Risk Factors” contained in Item 1A of our Annual Report.

In light of these assumptions, risks and uncertainties, the results and events discussed in the forward-looking statements contained in this Quarterly Report on Form 10-Q might not occur. Stockholders and other readers are cautioned not to place undue reliance on the forward-looking statements, which speak only as of the date of this Quarterly Report on Form 10-Q. We are not under any obligation, and we expressly disclaim any obligation, to update or alter any forward-looking statements, whether as a result of new information, future events or otherwise. All subsequent forward-looking statements attributable to Aspen Aerogels, Inc. or to any person acting on its behalf are expressly qualified in their entirety by the cautionary statements contained or referred to in this section.

Item 3. Quantitative and Qualitative Disclosures About Market Risk.

Market risk represents the risk of loss that may impact our financial position due to adverse changes in financial market prices and rates. Our market risk exposure results primarily from fluctuations in interest rates as well as from inflation. In the normal course of business, we are exposed to market risks, including changes in interest rates which affect our line of credit under our revolving credit facility as well as cash flows. We may also face additional exchange rate risk in the future as we expand our business internationally.

Interest Rate Risk

We are exposed to changes in interest rates in the normal course of our business. As of June 30, 2022, we had unrestricted cash and cash equivalents of \$162.2 million. These amounts were held for working capital and capital expansion purposes and were invested primarily in deposit accounts, money market accounts, and high-quality debt securities issued by the U.S. government via cash sweep accounts at a major financial institution in North America. Due to the short-term nature of these investments, we believe that our exposure to changes in the fair value of our cash as a result of changes in interest rates is not material.

As of June 30, 2022, we had a convertible note outstanding with principal balance of \$100.0 million. Our convertible note bears interest at the Secured Overnight Financing Rate (SOFR) plus 5.50% per annum if interest is paid in cash, or, if interest is paid in-kind as an increase in the principal amount of the outstanding note, at the SOFR plus 6.50% per annum. Under the terms of the investment, SOFR has a floor of 1% and a cap of 3%. Interest is paid semi-annually in arrears on June 30 and December 30. We, at our option, are permitted to settle each semi-annual interest payment in cash, in-kind, or any combination thereof.

As of June 30, 2022, we had no borrowings outstanding on our revolving credit facility. As of June 30, 2022, we had \$1.2 million of outstanding letters of credit supported by the revolving credit facility.

Under our revolving credit facility, we are permitted to borrow a maximum of \$20.0 million, subject to continued covenant compliance and borrowing base requirements. The interest rate applicable to borrowings under the revolving credit facility is based on the prime rate, as defined, subject to a minimum rate of 4.00% per annum. The rates applicable to borrowings vary from prime rate plus 0.75% per annum to prime rate plus 2.00% per annum. In addition, we are required to pay a monthly unused revolving line of credit facility fee of 0.5% per annum of the average unused portion of the revolving credit facility. The maturity date of our revolving credit facility is August 26, 2022. We intend to extend or replace the facility prior to its maturity.

As of June 30, 2022, the amount available to us under the revolving credit facility was \$18.0 million after giving effect to the \$1.2 million of letters of credit outstanding under the facility.

Inflation Risk

Although we expect that our operating results will be influenced by general economic conditions, we do not believe that inflation has had a material effect on our results of operations during the periods presented in this report. However, our business may be affected by inflation in the future.

Foreign Currency Exchange Risk

We are subject to inherent risks attributed to operating in a global economy. Principally all our revenue, receivables, purchases and debts are denominated in U.S. dollars.

Item 4. Controls and Procedures.

(a) Evaluation of Disclosure Controls and Procedures.

We maintain disclosure controls and procedures that are designed to ensure that information required to be disclosed in the reports that we file or submit under the Securities Exchange Act of 1934, as amended (the Exchange Act), is recorded, processed, summarized and reported within the time periods specified in the SEC's rules and forms and is accumulated and communicated to our management, including our principal executive officer and principal financial officer, or persons performing similar functions, as appropriate to allow timely decisions regarding required disclosure.

As of June 30, 2022, our management, with the participation of our principal executive officer and principal financial officer, evaluated the effectiveness of our disclosure controls and procedures (as defined in Rules 13a-15(e) and 15d-15(e) under the Exchange Act). Our management recognizes that any controls and procedures, no matter how well designed and operated, can provide only reasonable assurance of achieving their objectives, and management necessarily applies its judgment in evaluating the cost-benefit relationship of possible controls and procedures. Based on such evaluation, our principal executive officer and principal financial officer have concluded that, as of June 30, 2022, our disclosure controls and procedures were effective to ensure that information required to be disclosed by us in the reports that we file or submit under the Exchange Act is recorded, processed, summarized and reported within the time periods specified in the SEC's rules and forms, and is accumulated and communicated to our management, including our principal executive officer and principal financial officer, or persons performing similar functions, as appropriate to allow timely decisions regarding required disclosure. In addition, our principal executive officer and principal financial officer have concluded that the impact of the COVID-19 pandemic did not impact our ability to maintain our internal controls over financial reporting and disclosure controls and procedures.

(b) *Changes in Internal Controls.*

During the six months ended June 30, 2022, there were no changes in our internal control over financial reporting, as such term is defined in Rules 13a-15(f) and 15(d)-15(f) promulgated under the Exchange Act, that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

PART II — OTHER INFORMATION

Item 1. Legal Proceedings.

We are involved in various legal claims and proceedings in the normal course of operations. We believe the outcome of these matters will not have a material adverse effect on our consolidated financial position, results of operations or liquidity, except as described in Part 1, Item 3. “Legal Proceedings” of our Annual Report on Form 10-K. Since the filing of our Form 10-K, there have been no material changes in our legal proceedings from those disclosed therein.

Item 1A. Risk Factors.

The ownership of our common stock involves a number of risks and uncertainties. When evaluating the Company and our business before making an investment decision regarding our securities, potential investors should carefully consider the risk factors and uncertainties described in Part 1, Item 1A. “Risk Factors” of our Annual Report on Form 10-K. Since the filing of our Form 10-K, there have been no material changes in our risk factors from those disclosed therein, other than as provided below.

Legislation and policies adopted to address forced labor practices in China may adversely affect our business.

On December 21, 2021, the United States adopted the Uyghur Forced Labor Prevention Act (the “UFLPA”), which creates a rebuttable presumption that any goods, wares, articles, and merchandise mined, produced, or manufactured in whole or in part in the Xinjiang Uyghur Administrative Region of China (“XUAR”) or that are produced by certain entities are prohibited from importation into the United States and are not entitled to entry unless U.S. Customs and Border Protection (the “CBP”) determines, based on “clear and convincing evidence”, that the goods in question were not produced wholly or in part by forced labor, and submits a report to the U.S. Congress setting out its findings. Other countries and jurisdictions, including the European Union, may be considering similar measures. The UFLPA directs the Forced Labor Enforcement Task Force (the “FLETF”), chaired by the Department of Homeland Security, to develop a strategy to support the enforcement of the UFLPA. On June 17, 2022, the FLETF published a strategy that includes the listing of various entities associated with forced labor in XUAR. The import restrictions pursuant to the UFLPA came into effect on June 21, 2022. Pursuant to the UFLPA, the CBP may detain any shipments if it suspects the goods involved have a connection to XUAR and are subject to the UFLPA. It is unclear how broadly or aggressively CBP will pursue the detention of shipments in furtherance of this enforcement strategy. It is also unclear what evidence may be persuasive to the CBP to allow the release of detained shipments. While we are not presently aware of any direct impacts these restrictions will have on our supply chain, the UFLPA and its enforcement may materially and adversely impact our ability to import the goods, materials and products we rely on to manufacture our products and operate our business, as it may adversely impact the availability and cost of such goods, materials and products. In addition, the UFLPA and similar potential legislation in other countries and jurisdictions may adversely impact our customers’ ability to source goods, materials and products necessary to meet expected their production volumes, as it may adversely impact the availability and cost of such goods, materials and products. The full potential impact to us of the UFLPA remains uncertain and could have an adverse effect on our business and results of operations.

Item 2. Unregistered Sales of Equity Securities and Use of Proceeds.

(a) Unregistered Sales of Equity Securities.

None.

(b) Use of Proceeds from Initial Public Offering of Common Stock.

Not applicable.

(c) Purchases of Equity Securities by the Issuer and Affiliated Purchasers.

We did not repurchase any of our equity securities during the quarter ended June 30, 2022.

Item 3. Defaults Upon Senior Securities.

None.

Item 4. Mine Safety Disclosures.

Not applicable.

Item 5. Other Information.

None.

Item 6. Exhibits.

(a) Exhibits

- 10.1 [Fifth Amendment to the Second Amended and Restated Loan and Security Agreement, dated as of June 23, 2022, by and between the Registrant and Silicon Valley Bank.](#)
- 10.2 [Form of Performance-Based Restricted Stock Agreement for certain employees +](#)
- 31.1 [Certification of principal executive officer under Section 302\(a\) of the Sarbanes-Oxley Act of 2002.](#)
- 31.2 [Certification of principal financial officer under Section 302\(a\) of the Sarbanes-Oxley Act of 2002.](#)
- 32 [Certifications of the principal executive officer and the principal financial officer under Section 906 of the Sarbanes-Oxley Act of 2002.](#)
- 101.INS XBRL Instance Document - the instance document does not appear in the Interactive Data File because its XBRL tags are embedded within the Inline XBRL document.
- 101.SCH Inline XBRL Taxonomy Extension Schema Document.
- 101.CAL Inline XBRL Taxonomy Extension Calculation Linkbase Document.
- 101.DEF Inline XBRL Taxonomy Extension Definition Linkbase Document.
- 101.LAB Inline XBRL Taxonomy Extension Label Linkbase Document.
- 101.PRE Inline XBRL Taxonomy Extension Presentation Linkbase Document.
- 104 Cover Page Interactive Data File (embedded within the Inline XBRL document).

+ 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.

ASPEN AEROGELS, INC.

Date: August 4, 2022

By: /s/ Donald R. Young
Donald R. Young
President and Chief Executive Officer
(principal executive officer)

Date: August 4, 2022

By: /s/ Ricardo C. Rodriguez
Ricardo C. Rodriguez
Senior Vice President, Chief Financial Officer and Treasurer
(principal financial officer and principal accounting officer)

**FIFTH AMENDMENT
TO
SECOND AMENDED AND RESTATED LOAN AND SECURITY AGREEMENT**

This Fifth Amendment to Second Amended and Restated Loan and Security Agreement (this “**Amendment**”) is entered into this 23rd day of June, 2022 by and between **SILICON VALLEY BANK** (“**Bank**”) and **ASPEN AEROGELS, INC.**, a Delaware corporation (“**Borrower**”) whose address is 30 Forbes Road, Building B, Northborough, Massachusetts 01532.

RECITALS

A. Bank and Borrower have entered into that certain Second Amended and Restated Loan and Security Agreement dated as of March 12, 2021, as amended by that certain First Amendment to Second Amended and Restated Loan and Security Agreement dated September 29, 2021, as further amended by that certain Second Amendment to Second Amended and Restated Loan and Security Agreement dated December 27, 2021, as further amended by that certain Third Amendment to Second Amended and Restated Loan and Security Agreement dated March 31, 2022, as further amended by that certain Fourth Amendment to Second Amended and Restated Loan and Security Agreement dated April 28, 2022 (as the same may from time to time be further amended, restated, amended and restated, modified and/or supplemented, the “**Loan Agreement**”).

B. Bank has extended credit to Borrower for the purposes permitted in the Loan Agreement.

C. Borrower has requested that Bank amend the Loan Agreement to make certain revisions to the Loan Agreement as more fully set forth herein.

D. Bank has agreed to so amend certain provisions of the Loan Agreement, but only to the extent, in accordance with the terms, subject to the conditions and in reliance upon the representations and warranties set forth below.

AGREEMENT

NOW, THEREFORE, in consideration of the foregoing recitals and other good and valuable consideration, the receipt and adequacy of which is hereby acknowledged, and intending to be legally bound, the parties hereto agree as follows:

1. Definitions. Capitalized terms used but not defined in this Amendment shall have the meanings given to them in the Loan Agreement.

2. Amendments to Loan Agreement.

2.1 Section 13 (Definitions). The following terms and their respective definitions set forth in Section 13.1 are deleted in their entirety and replaced with the following:

“ **“Key Person**” is Borrower’s Chief Executive Officer and President as of the Effective Date, who is Donald R. Young.”
“ **“Revolving Line Maturity Date**” is August 26, 2022.”

3. Limitation of Amendments.

3.1 The amendments set forth in Section 2 above are effective for the purposes set forth herein and shall be limited precisely as written and shall not be deemed to (a) be a consent to any amendment, waiver or modification of any other term or condition of any Loan Document, or (b) otherwise prejudice any right or remedy which Bank may now have or may have in the future under or in connection with any Loan Document.

3.2 This Amendment shall be construed in connection with and as part of the Loan Documents and all terms, conditions, representations, warranties, covenants and agreements set forth in the Loan Documents, except as herein amended, are hereby ratified and confirmed and shall remain in full force and effect.

4. Representations and Warranties. To induce Bank to enter into this Amendment, Borrower hereby represents and warrants to Bank as follows:

4.1 Immediately after giving effect to this Amendment (a) the representations and warranties contained in the Loan Documents are true, accurate and complete in all material respects as of the date hereof (except to the extent such representations and warranties relate to an earlier date, in which case they are true and correct as of such date), and (b) no Event of Default has occurred and is continuing;

4.2 Borrower has the power and authority to execute and deliver this Amendment and to perform its obligations under the Loan Agreement, as amended by this Amendment;

4.3 The organizational documents of Borrower delivered to Bank on the Effective Date remain true, accurate and complete and have not been amended, supplemented or restated and are and continue to be in full force and effect;

4.4 The execution and delivery by Borrower of this Amendment and the performance by Borrower of its obligations under the Loan Agreement, as amended by this Amendment, have been duly authorized;

4.5 The execution and delivery by Borrower of this Amendment and the performance by Borrower of its obligations under the Loan Agreement, as amended by this Amendment, do not and will not contravene (a) any law or regulation binding on or affecting Borrower, (b) any contractual restriction with a Person binding on Borrower, (c) any order, judgment or decree of any court or other governmental or public body or authority, or subdivision thereof, binding on Borrower, or (d) the organizational documents of Borrower;

4.6 The execution and delivery by Borrower of this Amendment and the performance by Borrower of its obligations under the Loan Agreement, as amended by this Amendment, do not require any order, consent, approval, license, authorization or validation of, or filing, recording or registration with, or exemption by any governmental or public body or authority, or subdivision thereof, binding on Borrower, except as already has been obtained or made; and

4.7 This Amendment has been duly executed and delivered by Borrower and is the binding obligation of Borrower, enforceable against Borrower in accordance with its terms, except as such enforceability may be limited by bankruptcy, insolvency, reorganization, liquidation, moratorium or other similar laws of general application and equitable principles relating to or affecting creditors' rights.

5. Ratification of Perfection Certificate. Borrower hereby ratifies, confirms and reaffirms, all and singular, in all material respects, the terms and disclosures contained in a certain Perfection Certificate dated as of March 12, 2021, and acknowledges, confirms and agrees that the disclosures and information Borrower provided to Bank in such Perfection Certificate as updated by Annex 1, have not changed, as of the date hereof.

6. No Defenses of Borrower. Borrower hereby acknowledges and agrees that Borrower has no offsets, defenses, claims, or counterclaims against Bank with respect to the Obligations, or otherwise, and that if Borrower now has, or ever did have, any offsets, defenses, claims, or counterclaims against Bank, whether known or unknown, at law or in equity, all of them are hereby expressly WAIVED and Borrower hereby RELEASES Bank from any liability thereunder.

7. Integration. This Amendment and the Loan Documents represent the entire agreement about this subject matter and supersede prior negotiations or agreements. All prior agreements, understandings,

representations, warranties, and negotiations between the parties about the subject matter of this Amendment and the Loan Documents merge into this Amendment and the Loan Documents.

8. Counterparts. This Amendment may be executed in any number of counterparts and all of such counterparts taken together shall be deemed to constitute one and the same instrument.

9. Fees and Expenses. Borrower agrees to promptly pay Bank, upon receipt of an invoice, Bank's legal fees and expenses incurred in connection with this Amendment.

10. Effectiveness. As a condition precedent to the effectiveness of this Amendment and the Bank's obligation to make further Advances under the Revolving Line, the Bank shall have received the following documents prior to or concurrently with this Amendment, each in form and substance reasonably satisfactory to Bank:

10.1 this Amendment duly executed on behalf of Borrower;

10.2 the Acknowledgment of Amendment and Reaffirmation of Guaranty substantially in the form attached hereto as **Schedule 1**, duly executed and delivered by Guarantor; and

10.3 such other documents as Bank may reasonably request.

[Signature page follows.]

IN WITNESS WHEREOF, the parties hereto have caused this Amendment to be duly executed and delivered as of the date first written above.

BANK		BORROWER
SILICON VALLEY BANK		ASPEN AEROGELS, INC.
By: /s/ Frank Groccia		By: /s/ Ricardo C. Rodriguez
Name: Frank Groccia		Name: Ricardo C. Rodriguez
Title: Director		Title: Senior Vice President, Chief Financial Officer and Treasurer

**ACKNOWLEDGMENT OF AMENDMENT
AND REAFFIRMATION OF GUARANTY AND SECURITY AGREEMENT**

Section 1. Guarantor hereby acknowledges and confirms that it has reviewed and approved the terms and conditions of the Fifth Amendment to Second Amended and Restated Loan and Security Agreement dated as of the date hereof (“the **Amendment**”).

Section 2. Guarantor hereby consents to the Amendment and agrees that the Guaranty and Guarantor Security Agreement relating to the Obligations of Borrower under the Loan Agreement shall continue in full force and effect, shall be valid and enforceable and shall not be impaired or otherwise affected by the execution of the Amendment or any other document or instruction delivered in connection herewith.

Section 3. Guarantor represents and warrants that, after giving effect to the Amendment, all representations and warranties contained in the Guaranty are true, accurate and complete as if made the date hereof.

Dated as of June 23, 2022

[Signature Page Follows]

GUARANTOR:		ASPEN AEROGELS RHODE ISLAND, LLC
		By: /s/ Ricardo C. Rodriguez
		Name: Ricardo C. Rodriguez
		Title: Senior Vice President, Chief Financial Officer and Treasurer

Annex 1

Section 2 of the Perfection Certificate is hereby updated to refer to the following filed reports:

Public Disclosures By Borrower Since March 2021

Date	Filing Type
March 15, 2021	S-3
March 23, 2021	Press Release – Water Tower Fireside Chat Series
April 7, 2021	Press Release – Q1 2021 Earnings Release and Conference Call Date
April 19, 2021	DEFA 14A
April 23, 2021	Effectiveness Order
April 29, 2021	8-K - Press Release Q1 2021 Financial Results
April 29, 2021	Press Release – Q1 2021 Financial Results
May 4, 2021	10-Q (Q1 2021)
May 6, 2021	Press Release – Italian Building Materials Lawsuit
May 6, 2021	8-K – Press Release Patent Infringement Action
May 17, 2021	Press Release – Water Tower Fireside Chat Series
May 18, 2021	Press Release – Needham Technology & Media Conference
June 1, 2021	8-K – Annual Meeting Voting Results
June 1, 2021	Press Release – Fireside Chat at Cowen Technology
June 3, 2021	Form 4 – Non-Employee Director Stock Award
June 3, 2021	Form 4 – Non-Employee Director Stock Award
June 3, 2021	Form 4 – Non-Employee Director Stock Award
June 3, 2021	Form 4 – Non-Employee Director Stock Award
June 3, 2021	Form 4 – Non-Employee Director Stock Award
June 3, 2021	Form 4 – Non-Employee Director Stock Award
June 8, 2021	Press Release - Water Tower Fireside Chat Series
June 29, 2021	Press Release - \$75 Million Private Placement with Koch Strategic Platforms
June 30, 2021	8-K – Securities Purchase Agreement
July 1, 2021	D – Small Company Offereing and Sale of Securities Without Registration
July 1, 2021	Form 4 – Employee Director Stock Award
July 8, 2021	Press Release – Q2 2021 Earnings Release and Conference Call Date
July 29, 2021	8-K – Press Release Q1 2021 Financial Results
July 29, 2021	Press Release – Q2 2021 Financial Results
August 4, 2021	Form 4 – Whitaker exercise/sale
August 4, 2021	Form 4 – Landes sale
August 4, 2021	10-Q (Q2 2021)
August 5, 2021	Fireside Chat at Canaccord Genuity 41 st Annual Growth Conference
August 27, 2021	Form 4 – Conte exercise/sale
September 1, 2021	Fireside Chat at Cowen 14 th Annual Global Transportation & Sustainable Mobility Conference
September 10, 2021	S-3
September 20, 2021	Effectiveness Order

September 24, 2021	424B3 - Prospectus
October 1, 2021	Current report filing
October 28, 2021	Current report filing
November 3, 2021	Form 4 – Young sale
November 4, 2021	8-K - Press Release Q3 2021 Financial Results
November 10, 2021	Form 4 – Whitaker exercise/sale
November 29, 2021	Form 4 – Gervis exercise
December 1, 2021	Form 4 – Conte exercise/sale
December 20, 2021	Form 4 – Noetzel exercise
December 27, 2021	Current report filing
January 3, 2022	Current report filing
January 4, 2022	Current report filing
January 13, 2022	Current report filing
January 28, 2022	Schedule 13G/A filing
January 31, 2022	Form 3 filing
February 9, 2022	Schedule 13G/A filing
February 11, 2022	Form 5 filing
February 17, 2022	Current report filing
February 17, 2022	Current report filing
February 18, 2022	Current report filing
February 22, 2022	Schedule 13G/A filing
February 23, 2022	Form 4 – Spring Creek Capital LLC
February 25, 2022	Form 4 - Fairbanks
February 25, 2022	Form 4 - Young
February 25, 2022	Form 4 - Conte
February 25, 2022	Form 4 - Schilling
February 25, 2022	Form 4 - Gould
February 25, 2022	Form 4 - Whitaker
February 25, 2022	Form 4 - Landes
March 1, 2022	S-8 registration Statement
March 1, 2022	Form 10-K Annual Report
March 1, 2022	Form 4 - Young
March 1, 2022	Form 4 - Whitaker
March 1, 2022	Form 4 - Fairbanks
March 1, 2022	Form 4 - Conte
March 1, 2022	Form 4 - Landes
March 3, 2022	Form D
March 16, 2022	S-3 Registration Statement
March 16, 2022	Current report filing
March 23, 2022	Form 4 – Gervis
March 29, 2022	Current report filing
March 30, 2022	Form 3 – Wood River Capital LLC
March 30, 2022	Form 4 – Koch Industries, Inc.
April 1, 2022	Current report filing
April 1, 2022	Form 3 - Rodriguez
April 5, 2022	Schedule 13D
April 6, 2022	Form D
April 11, 2022	Form 4 – Noetzel Exercise
April 21, 2022	Proxy Statement (definitive)

April 21, 2022	Additional Proxy Soliciting Materials (definitive)
April 27, 2022	Current report filing
April 29, 2022	Current report filing
April 29, 2022	Additional Proxy Soliciting Materials (definitive)
May 3, 2022	SC 13D/A Amended Statement of Beneficial Ownership
May 3, 2022	Form 4
May 3, 2022	Form 4
May 4, 2022	S-3 Registration Statement
May 10, 2022	10-Q Quarterly Report
May 12, 2022	Form 4
May 13, 2022	Effectiveness Order
May 19, 2022	Current report filing
May 24, 2022	Form 3
June 3, 2022	Current report filing
June 6, 2022	Current report filing
June 6, 2022	Current report filing
June 6, 2022	A total of 13 - Form 4/4A filings

OFFICERS OF THE COMPANY AND ITS SUBSIDIARIES

The following are the names and titles of the officers of the Company and its subsidiaries.

<u>Name of Officer</u>	<u>Office/Title</u>	<u>Name of Company/Subsidiary</u>
Donald R. Young	President and Chief Executive Officer	Aspen Aerogels, Inc. and Rhode Island, German and Georgia Subsidiaries
Ricardo C. Rodriguez	Senior Vice President, Chief Financial Officer and Treasurer	Aspen Aerogels, Inc. and Rhode Island, German and Georgia Subsidiaries.
Corby Whitaker	Senior Vice President Sales & Marketing	Aspen Aerogels, Inc.
Keith L. Schilling	Senior Vice President, Technology	Aspen Aerogels, Inc.
Kelley Conte	Senior Vice President, Human Resources	Aspen Aerogels, Inc. and Rhode Island and Georgia Subsidiaries.
Gregg Landes	Senior Vice President, Operations and Strategic Development	Aspen Aerogels, Inc. and Rhode Island and Georgia Subsidiaries.
Virginia H. Johnson	Chief Legal Officer, General Counsel and Corporate Secretary	Aspen Aerogels, Inc. and Rhode Island and Georgia Subsidiaries.
Poongunran Muthukumaran	Assistant Secretary	Aspen Aerogels, Inc. and Rhode Island and Georgia Subsidiaries.

PERFORMANCE-BASED RESTRICTED STOCK AGREEMENT

ASPEN AEROGELS, INC.

AGREEMENT made as of the June 2, 2022 (the “Grant Date”), between Aspen Aerogels, Inc. (the “Company”), a Delaware corporation having its principal place of business in Northborough, Massachusetts and _____ (the “Participant”).

WHEREAS, the Company has adopted the 2014 Employee, Director and Consultant Equity Incentive Plan (the “Plan”) to promote the interests of the Company by providing an incentive for Employees, directors and Consultants of the Company or its Affiliates;

WHEREAS, pursuant to the provisions of the Plan, the Company desires to offer to the Participant shares of the Company’s common stock, \$0.00001 par value per share (“Common Stock”), in accordance with the provisions of the Plan, all on the terms and conditions hereinafter set forth;

WHEREAS, the Participant wishes to accept said offer; and

WHEREAS, the parties hereto understand and agree that any terms used and not defined herein have the meanings ascribed to such terms in the Plan.

NOW, THEREFORE, in consideration of the premises and the mutual covenants contained herein and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the parties hereto hereby agree as follows:

1. Terms of Grant. The Participant hereby accepts the offer of the Company to issue to the Participant, in accordance with the terms of the Plan and this Agreement, 53,590 Shares of the Company’s Common Stock (such shares, subject to adjustment pursuant to Section 25 of the Plan and Subsection 2.1(g) hereof, the “Granted Shares”) at a purchase price per share of \$0.00001 (the “Purchase Price”), receipt of which is hereby acknowledged by the Company by the Participant’s prior service to the Company and which amount will be reported as income on the Participant’s W-2 (or other applicable form). For purposes of this section, Open Price shall equal \$18.66.

2.1. Forfeiture Provisions.

(a) Lapsing Forfeiture Right. In the event that for any reason (i) the Participant is no longer an employee, director or consultant of the Company or an Affiliate (such event being the “Termination”) prior to achievement of the applicable Share Price (as defined below) as set forth below; or (ii) the Share Price is not achieved as set forth below by the fifth (5th) anniversary of the Grant Date (the “Performance End Date”), the Participant (or the Participant’s Survivor) shall, on the date of Termination or the Performance End Date, as applicable, immediately forfeit to the Company (or its designee) the number of Granted Shares as to which the Company’s forfeiture right has not yet lapsed as set forth below (the “Lapsing Forfeiture Right”) except as otherwise set forth in Section 2.1(c) and Section 2.1(d). The Lapsing Forfeiture Right shall lapse with respect to the number of the Granted Shares set forth below upon achievement of the Share Price prior to the date of Termination or the Performance End Date, as applicable (The “Earned Shares”). The foregoing notwithstanding, if a Share Price goal is achieved prior to the second (2nd) anniversary of the Grant Date, then the Lapsing Forfeiture Right as to the number of Earned Shares applicable to such Share Price goal shall not lapse until the third (3rd) anniversary of the Grant Date, and if a Share Price goal is achieved after the second (2nd) anniversary of the Grant Date, then the Lapsing Forfeiture Right as to the number of Earned Shares applicable to such Share Price goal shall not lapse until the date that is one (1) year after the date that the applicable Share Price goal is achieved; provided that if the applicable Share Price goal is achieved, the Earned Shares applicable to such Share Price goal will vest no later than the day prior to the Performance End Date.

If a Termination occurs prior to the third (3rd) anniversary of the Grant Date or prior to the date that is one year after the date that the applicable Share Price goal is achieved, as applicable, the Earned Shares shall be forfeited to the

Company as if the Share Price goal had not been achieved as of the Termination date; provided, however, that if such Termination occurs due to the Participant's termination without Cause (as defined in the Participant's Employment Agreement with the Company dated as of _____ (the "Employment Agreement")), the Participant's resignation for Good Reason (as defined in the Employment Agreement), or the Participant's death or Disability (as defined in the Plan), the Earned Shares applicable to such Share Price goal shall not be forfeited to the Company, and the Lapsing Forfeiture Right with respect to such Earned Shares shall lapse as of such Termination date.

The Lapsing Forfeiture Right shall lapse with respect to number of the Granted Shares set forth below, and such shares shall become Earned Shares, upon the achievement of a stock price that equals or exceeds a price per share (adjusted for any stock splits or stock dividends after the grant date in accordance with Section 25 of the Plan) (the "Share Price") calculated as follows: (A) the 30 day volume weighted average price of the Company's common stock on a national securities exchange (the "30-Day VWAP") for at least 60 consecutive trading days; or (B) in event of a Change of Control Sale of the Company (as defined in Section 2.1(d) below), the per share value received by the Company's shareholders in the sale of the Company; provided that for purposes of calculating the per share value received by the Company's shareholders, cash consideration would be valued at par, any publicly traded securities received as consideration would be valued at their 60 day volume weighted average price (the "60-day VWAP") of the acquiring company's common stock on a national securities exchange as of the closing date of the Change of Control Sale of the Company, and any securities that are not publicly traded or for which a 60-day VWAP cannot be calculated will be valued by the Company's Board of Directors in its reasonable judgment (the Change of Control Vesting Price").

The Lapsing Forfeiture Right shall lapse with respect to:

- 34% of the Granted Shares upon the achievement of a Share Price that equals or exceeds \$43.33 ("Tranche 1 Performance Hurdle");
- 33% of the Granted Shares upon the achievement of a Share Price that equals or exceeds \$64.99 ("Tranche 2 Performance Hurdle"); and
- 33% of the Granted Shares upon the achievement of a Share Price that equals or exceeds \$86.65 ("Tranche 3 Performance Hurdle").

Any Granted Shares as to which the Company's Lapsing Forfeiture Right has not previously lapsed upon achievement of the above Share Price goals shall be forfeited to the Company on the Performance End Date, or earlier upon a Termination, subject to the provisions of Sections 2.1(c) and (d) below,).

(b) Effect of a For Cause Termination or Resignation without Good Reason. Notwithstanding anything to the contrary contained in this Agreement or in the Participant's Employment Agreement, including without limitation, Section 5(a)(xi) of the Employment Agreement, in the event the Company terminates the Participant's service as an Employee, director or Consultant for Cause (as defined in the Employment Agreement) or in the event the Board of Directors determines, within one year after the Participant's termination, that either prior or subsequent to the Participant's termination the Participant engaged in conduct that would constitute Cause, or if the Participant resigns without Good Reason (as defined in the Employment Agreement), all of the Granted Shares then held by the Participant that have not vested shall be forfeited to the Company immediately as of the time the Participant is notified that he or she has been terminated for Cause or that he or she engaged in conduct which would constitute Cause or as of the effective time of the Participant's resignation without Good Reason.

(c) Effect of a Termination without Cause or Resignation for Good Reason. Notwithstanding anything to the contrary contained in this Agreement or the Employment Agreement, including, without limitation, Section 4(b)(vi) of the Employment Agreement, but in accordance with the requirement that the release referred to in Section 4(b) of the Employment Agreement (the "Release") be effective and irrevocable, in the event the Company terminates the Participant's service as an Employee, director or Consultant without Cause (as defined in the Employment Agreement) or if the Participant resigns for Good Reason (as defined in the Employment Agreement), the Company's Lapsing Forfeiture Right shall lapse with respect to a portion of the Granted Shares then held by the Participant as to which the Company's Lapsing Forfeiture Right has not previously lapsed, and such shares will become Earned Shares, as follows:

- If the 60-day VWAP of the Company's common stock on a national securities exchange on the Termination date (the "Termination VWAP") is less than the Tranche 1 Performance Hurdle, the Company's Lapsing Forfeiture Right shall lapse with respect to 34% of the Granted Shares multiplied by a fraction determined as follows:

$$\frac{\text{Termination VWAP} - \text{Open Price}}{\text{Tranche 1 Performance Hurdle} - \text{Open Price}}$$

- If the Termination VWAP is greater than Tranche 1 Performance Hurdle and less than Tranche 2 Performance Hurdle, the Company's Lapsing Forfeiture Right shall lapse with respect to 33% of the Granted Shares multiplied by a fraction determined as follows:

$$\frac{\text{Termination VWAP} - \text{Tranche 1 Performance Hurdle}}{\text{Tranche 2 Performance Hurdle} - \text{Tranche 1 Performance Hurdle}}$$

- If the Termination VWAP is greater than Tranche 2 Performance Hurdle and less than Tranche 3 Performance Hurdle, the Company's Lapsing Forfeiture Right shall lapse with respect to 33% of the Granted Shares multiplied by a fraction determined as follows:

$$\frac{\text{Termination VWAP} - \text{Tranche 1 Performance Hurdle}}{\text{Tranche 2 Performance Hurdle} - \text{Tranche 1 Performance Hurdle}}$$

In addition, any unearned tranche of Granted Shares that would be earned in accordance with Section 2.1(a) if the Share Price was calculated as the Termination VWAP will become Earned Shares. Upon the Release becoming effective and irrevocable, all Earned Shares (including any shares earned as a result of the application of this Section 2.1(c) shall become fully vested. The remainder of the Granted Shares held by the Participant as to which the Company's Lapsing Forfeiture Right has not lapsed shall be forfeited to the Company.

(d) Effect of Change of Control. Notwithstanding anything to the contrary contained in the Employment Agreement, including Section 4(b)(vi) or Section 5(a)(xi) thereof, in addition to any vesting provided for in Section 2.1(a), the Company's Lapsing Repurchase Right shall terminate, and the Participant's ownership of a portion of the Granted Shares then held by the Participant, shall become vested in the event of a Change of Control Sale of the Company (as defined below) and such shares will become Earned Shares, in accordance with the following:

- If the Change of Control Vesting Price is less than the Tranche 1 Performance Hurdle, the Company's Lapsing Forfeiture Right shall lapse with respect to 33% of the Granted Shares multiplied by a fraction determined as follows:

$$\frac{\text{Change of Control Vesting Price} - \text{Open Price}}{\text{Tranche 1 Performance Hurdle} - \text{Open Price}}$$

- If the Change of Control Vesting Price is greater than Tranche 1 Performance Hurdle and less than Tranche 2 Performance Hurdle, the Company's Lapsing Forfeiture Right shall lapse with respect to 33% of the Granted Shares multiplied by a fraction determined as follows:

$$\frac{\text{Change of Control Vesting Price} - \text{Open Price}}{\text{Tranche 2 Performance Hurdle} - \text{Open Price}}$$

- If the Change of Control Vesting Price is greater than Tranche 2 Performance Hurdle and less than Tranche 3 Performance Hurdle, the Company's Lapsing Forfeiture Right shall lapse with respect to 34% of the Granted Shares multiplied by a fraction determined as follows:

$$\frac{\text{Change of Control Vesting Price} - \text{Open Price}}{\text{Tranche 3 Performance Hurdle} - \text{Open Price}}$$

In addition, any unearned tranche of Granted Shares that would be earned in accordance with Section 2.1(a) if the Share Price was calculated as the Change of Control Vesting Price will become Earned Shares. Any shares that become Earned Shares as a result of the application of this Section 2.1(d), shall nonetheless remain subject to the time-based vesting requirements of Section 2.1(a), subject to the provisions of Section 2.1(c). Granted Shares held by the Participant as to which the Company's Lapsing Forfeiture Right has not lapsed shall be forfeited to the Company.

Notwithstanding the foregoing, in the event the successor company in the Change of Control Sale of the Company does not assume the Company's obligations under this Agreement, the Lapsing Forfeiture Right shall lapse as to all Earned Shares as of immediately prior to the closing of the Change of Control Sale of the Company.

"Change of Control Sale of the Company" means the sale of the Company in which proceeds are received by the Company's shareholders in connection with the occurrence of any of the following events:

- (i) **Ownership.** Any "Person" (as such term is used in Sections 13(d) and 14(d) of the Exchange Act) becomes the "Beneficial Owner" (as defined in Rule 13d-3 under the Exchange Act), directly or indirectly, of securities of the Company representing 50% or more of the total voting power represented by the Company's then outstanding voting securities (excluding for this purpose any such voting securities held by the Company or its Affiliates or by any employee benefit plan of the Company) pursuant to a transaction or a series of related transactions; or
- (ii) **Merger/Sale of Assets.** (A) A merger or consolidation of the Company whether or not approved by the Board of Directors, other than a merger or consolidation which would result in the voting securities of the Company outstanding immediately prior thereto continuing to represent (either by remaining outstanding or by being converted into voting securities of the surviving entity or the parent of such corporation) more than 50% of the total voting power represented by the voting securities of the Company or such surviving entity or parent of such corporation, as the case may be, outstanding immediately after such merger or consolidation; or (B) the sale or disposition by the Company of all or substantially all of the Company's assets in a transaction requiring stockholder approval; or
- (iii) **Change in Board Composition.** A change in the composition of the Board of Directors, as a result of which fewer than a majority of the directors are Incumbent Directors. "Incumbent Directors" shall mean directors who either (A) are directors of the Company as of the date hereof, or (B) are elected, or nominated for election, to the Board of Directors with the affirmative votes of at least a majority of the Incumbent Directors at the time of such election or nomination (but shall not include an individual whose election or nomination is in connection with an actual or threatened proxy contest relating to the election of directors to the Company).

(d) **Escrow.** The certificates representing all Granted Shares acquired by the Participant hereunder which from time to time are subject to the Lapsing Forfeiture Right shall be delivered to the Company and the Company shall hold such Granted Shares in escrow as provided in this Subsection 2.1(c). Upon the request of the Participant, the Company shall promptly release from escrow and deliver to the Participant the whole number of Granted Shares, if any, as to which the Company's Lapsing Forfeiture Right has lapsed and without the legend set forth in Section 5. In the event of forfeiture to the Company of Granted Shares subject to the Lapsing Forfeiture Right, the Company shall release from escrow and cancel a certificate for the number of Granted Shares so forfeited. Any cash or securities distributed in respect of the Granted Shares held in escrow, including, without limitation, ordinary cash dividends or shares issued as a result of stock splits, stock dividends or other recapitalizations ("Retained Distributions"), shall also be held in escrow in the same manner as the Granted Shares and all Retained Distributions shall be forfeited to the Company or released from escrow and delivered to the Participant, as the case may be, at such time and in such manner as the Granted Shares to which such Retained Distributions so relate. All ordinary cash dividends retained hereunder shall, during the period in which such dividends are retained by the Company, be deposited into an account at a financial institution selected by the Company, which shall not be required to bear interest or be segregated in a separate account.

(e) Prohibition on Transfer. The Participant recognizes and agrees that all Granted Shares and Retained Distributions which are subject to the Lapsing Forfeiture Right may not be sold, transferred, assigned, hypothecated, pledged, encumbered or otherwise disposed of, whether voluntarily or by operation of law, other than to the Company (or its designee). However, the Participant, with the approval of the Administrator, may transfer the Granted Shares and Retained Distributions for no consideration to or for the benefit of the Participant's Immediate Family (including, without limitation, to a trust for the benefit of the Participant's Immediate Family or to a partnership or limited liability company for one or more members of the Participant's Immediate Family), subject to such limits as the Administrator may establish, and the transferee shall remain subject to all the terms and conditions applicable to this Agreement prior to such transfer and each such transferee shall so acknowledge in writing as a condition precedent to the effectiveness of such transfer. The term "Immediate Family" shall mean the Participant's spouse, former spouse, parents, children, stepchildren, adoptive relationships, sisters, brothers, nieces and nephews and grandchildren and, for this purpose, shall also include the Participant. The Company shall not be required to transfer any Granted Shares or Retained Distributions on its books which shall have been sold, assigned or otherwise transferred in violation of this Subsection 2.1(d), or to treat as the owner of such Granted Shares or Retained Distributions, or to accord the right to vote as such owner or to pay dividends to, any person or organization to which any such Granted Shares or Retained Distributions shall have been so sold, assigned or otherwise transferred, in violation of this Subsection 2.1(d).

(f) Failure to Deliver Granted Shares to be Forfeited. In the event that the Granted Shares to be forfeited to the Company under this Agreement are not in the Company's possession pursuant to Subsection 2.1(c) above or otherwise and the Participant or the Participant's Survivor fails to deliver such Granted Shares to the Company (or its designee), the Company may immediately take such action as is appropriate to transfer record title of such Granted Shares from the Participant to the Company (or its designee) and treat the Participant and such Granted Shares in all respects as if delivery of such Granted Shares had been made as required by this Agreement. The Participant hereby irrevocably grants the Company a power of attorney which shall be coupled with an interest for the purpose of effectuating the preceding sentence.

(g) Adjustments. The Plan contains provisions covering the treatment of Shares in a number of contingencies such as stock splits and mergers. Provisions in the Plan for adjustment with respect to the Shares and the related provisions with respect to successors to the business of the Company are hereby made applicable hereunder and are incorporated herein by reference. These provisions are not intended by this Agreement to be made applicable to Company capital raising transactions.

(h) Clawback. In the event the Company determines it must restate its financial results as reported in a Form 10-K, Form 10-Q or other report filed with the Securities and Exchange Commission to correct an accounting error due to material noncompliance with any financial reporting requirement under the U. S. federal securities laws (a "Restatement"), and the Participant's intentional misconduct during the period from the Grant Date to the fifth (5th) anniversary of the Grant Date caused or contributed to the need for the Restatement, the Company will seek to recover, at the direction of the Compensation Committee of the Board of Directors (the "Committee") after it has reviewed the facts and circumstances that led to the requirement for the Restatement and the costs and benefits of seeking recovery, the Granted Shares. The Committee will determine in its discretion the amount, if any, the Company will seek to recover from the Participant. The Company may offset the recoupment amount against current or future incentive and non-incentive compensation and through cancellation of unvested or vested equity awards. In addition, the Committee may, to the extent permitted by law, take other remedial and recovery action, as determined by the Committee. The recoupment of incentive compensation under this provision is in addition to any other right or remedy available to the Company.

2.2 General Restrictions on Transfer of Granted Shares.

f in connection with a registration statement filed by the Company pursuant to the Securities Act of 1933, as amended (the "1933 Act"), the Company or its underwriter so requests, the Participant will agree not to sell any of his or her Granted Shares whether or not the Lapsing Forfeiture Right has lapsed for a period not to exceed the lesser of: (i) 210 days following the effectiveness of such registration statement or (ii) such period as the officers and directors of the Company agree not to sell their Common Stock of the Company.

(b) The Participant acknowledges and agrees that neither the Company, nor its shareholders nor its directors and officers, has any duty or obligation to disclose to the Participant any material information regarding the business of the Company or affecting the value of the Granted Shares before, at the time of, or following a Termination, including,

without limitation, any information concerning plans for the Company to make a public offering of its securities or to be acquired by or merged with or into another firm or entity.

3. Securities Law Compliance. The Participant specifically acknowledges and agrees that any sales of Granted Shares shall be made in accordance with the requirements of the 1933 Act.

4. Rights as a Stockholder. The Participant shall have all the rights of a stockholder with respect to the Granted Shares, including voting and dividend rights, subject to the transfer and other restrictions set forth herein, including pursuant to Section 2.1(c) hereof, and in the Plan.

5. Legend. In addition to any legend required pursuant to the Plan, all certificates representing the Granted Shares to be issued to the Participant pursuant to this Agreement shall have endorsed thereon a legend substantially as follows:

“The shares represented by this certificate are subject to restrictions set forth in a Restricted Stock Agreement dated as of June 2, 2022 with this Company, a copy of which Agreement is available for inspection at the offices of the Company or will be made available upon request.”

6. Incorporation of the Plan. The Participant specifically understands and agrees that the Granted Shares issued under the Plan are being issued to the Participant pursuant to the Plan, a copy of which Plan the Participant acknowledges he or she has read and understands and by which Plan he or she agrees to be bound. The provisions of the Plan are incorporated herein by reference.

7. Tax Liability of the Participant and Payment of Taxes. The Participant acknowledges and agrees that any income or other taxes due from the Participant with respect to the Granted Shares issued pursuant to this Agreement, including, without limitation, the Lapsing Forfeiture Right, shall be the Participant's responsibility. Without limiting the foregoing, the Participant agrees that, to the extent that the lapsing of restrictions on disposition of any of the Granted Shares or the declaration of dividends on any such shares before the lapse of such restrictions on disposition results in the Participant's being deemed to be in receipt of earned income under the provisions of the Code, the Company shall be entitled to immediate payment from the Participant of the amount of any tax required to be withheld by the Company.

ion of this Agreement, the Participant may file an election under Section 83 of the Code. The Participant acknowledges that if he or she does not file such an election, as the Granted Shares are released from the Lapsing Forfeiture Right in accordance with Section 2.1, the Participant will have income for tax purposes equal to the fair market value of the Granted Shares at such date, less the price paid for the Granted Shares by the Participant.

8. Equitable Relief. The Participant specifically acknowledges and agrees that in the event of a breach or threatened breach of the provisions of this Agreement or the Plan, including the attempted transfer of the Granted Shares by the Participant in violation of this Agreement, monetary damages may not be adequate to compensate the Company, and, therefore, in the event of such a breach or threatened breach, in addition to any right to damages, the Company shall be entitled to equitable relief in any court having competent jurisdiction. Nothing herein shall be construed as prohibiting the Company from pursuing any other remedies available to it for any such breach or threatened breach.

9. No Obligation to Maintain Relationship. The Company is not by the Plan or this Agreement obligated to continue the Participant as an Employee, director or Consultant of the Company or an Affiliate of the Company. The Participant acknowledges: (i) that the Plan is discretionary in nature and may be suspended or terminated by the Company at any time; (ii) that the grant of the Granted Shares is a one-time benefit which does not create any contractual or other right to receive future grants of shares, or benefits in lieu of shares; (iii) that all determinations with respect to any such future grants, including, but not limited to, the times when shares shall be granted, the number of shares to be granted, the purchase price, and the time or times when each share shall be free from a lapsing forfeiture right, will be at the sole discretion of the Company; (iv) that the Participant's participation in the Plan is voluntary; (v) that the value of the Granted Shares is an extraordinary item of compensation; and (vi) that the Granted Shares are not part of normal or expected compensation for purposes of calculating any severance, resignation, redundancy, end of service payments, bonuses, long-service awards, pension or retirement benefits or similar payments.

10. Notices. Any notices required or permitted by the terms of this Agreement or the Plan shall be given by recognized courier service, facsimile, registered or certified mail, return receipt requested, addressed as follows:

If to the Company:

Aspen Aerogels, Inc.
30 Forbes Road, Building B
Northborough, MA 01532
Attn: Stock Plan Administrator

If to the Participant:

C/o Aspen Aerogels, Inc.
30 Forbes Road, Building B
Northborough, MA 01532
Attn: _____

or to such other address or addresses of which notice in the same manner has previously been given. Any such notice shall be deemed to have been given on the earliest of receipt, one business day following delivery by the sender to a recognized courier service, or three business days following mailing by registered or certified mail.

11. Benefit of Agreement. Subject to the provisions of the Plan and the other provisions hereof, this Agreement shall be for the benefit of and shall be binding upon the heirs, executors, administrators, successors and assigns of the parties hereto.

12. Governing Law. This Agreement shall be construed and enforced in accordance with the laws of the State of Delaware, without giving effect to the conflict of law principles thereof. For the purpose of litigating any dispute that arises under this Agreement, whether at law or in equity, the parties hereby consent to exclusive jurisdiction in Massachusetts and agree that such litigation shall be conducted in the courts of the Commonwealth of Massachusetts or the federal courts of the United States for the District of Massachusetts.

13. Severability. If any provision of this Agreement is held to be invalid or unenforceable by a court of competent jurisdiction, then such provision or provisions shall be modified to the extent necessary to make such provision valid and enforceable, and to the extent that this is impossible, then such provision shall be deemed to be excised from this Agreement, and the validity, legality and enforceability of the rest of this Agreement shall not be affected thereby.

14. Entire Agreement. This Agreement, together with the Plan, constitutes the entire agreement and understanding between the parties hereto with respect to the subject matter hereof and supersedes all prior oral or written agreements and understandings relating to the subject matter hereof. No statement, representation, warranty, covenant or agreement not expressly set forth in this Agreement shall affect or be used to interpret, change or restrict the express terms and provisions of this Agreement provided, however, in any event, this Agreement shall be subject to and governed by the Plan.

15. Modifications and Amendments; Waivers and Consents. The terms and provisions of this Agreement may be modified or amended as provided in the Plan. Except as provided in the Plan, the terms and provisions of this Agreement may be waived, or consent for the departure therefrom granted, only by written document executed by the party entitled to the benefits of such terms or provisions. No such waiver or consent shall be deemed to be or shall constitute a waiver or consent with respect to any other terms or provisions of this Agreement, whether or not similar. Each such waiver or consent shall be effective only in the specific instance and for the purpose for which it was given, and shall not constitute a continuing waiver or consent.

16. Consent of Spouse/Domestic Partner. If the Participant has a spouse or domestic partner as of the date of this Agreement, the Participant's spouse or domestic partner shall execute a Consent of Spouse/Domestic Partner in the form of Exhibit A hereto, effective as of the date hereof. Such consent shall not be deemed to confer or convey to the spouse or domestic partner any rights in the Granted Shares that do not otherwise exist by operation of law or the agreement of the parties. If the Participant subsequent to the date hereof, marries, remarries or applies to the Company

for domestic partner benefits, the Participant shall, not later than 60 days thereafter, obtain his or her new spouse/domestic partner's acknowledgement of and consent to the existence and binding effect of all restrictions contained in this Agreement by having such spouse/domestic partner execute and deliver a Consent of Spouse/Domestic Partner in the form of Exhibit A.

17. Counterparts. This Agreement may be executed in one or more counterparts, and by different parties hereto on separate counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument.

18. Data Privacy. By entering into this Agreement, the Participant: (i) authorizes the Company and each Affiliate, and any agent of the Company or any Affiliate administering the Plan or providing Plan record keeping services, to disclose to the Company or any of its Affiliates such information and data as the Company or any such Affiliate shall request in order to facilitate the grant of Shares and the administration of the Plan; and (ii) authorizes the Company and each Affiliate to store and transmit such information in electronic form for the purposes set forth in this Agreement.

[THE NEXT PAGE IS THE SIGNATURE PAGE]

IN WITNESS WHEREOF, the parties hereto have executed this Agreement as of the day and year first above written.

ASPEN AEROGELS, INC.

By:
Name:
Title:

Participant:

EXHIBIT A

CONSENT OF SPOUSE/DOMESTIC PARTNER

I, _____, spouse or domestic partner of _____, acknowledge that I have read the RESTRICTED STOCK AGREEMENT dated as of _____, 20__ (the "Agreement") to which this Consent is attached as Exhibit A and that I know its contents. Capitalized terms used and not defined herein shall have the meanings assigned to such terms in the Agreement. I am aware that by its provisions the Granted Shares granted to my spouse/domestic partner pursuant to the Agreement are subject to a Lapsing Forfeiture Right in favor of Aspen Aerogels, Inc. (the "Company") and that, accordingly, I may be required to forfeit to the Company any or all of the Granted Shares of which I may become possessed as a result of a gift from my spouse/domestic partner or a court decree and/or any property settlement in any domestic litigation.

I hereby agree that my interest, if any, in the Granted Shares subject to the Agreement shall be irrevocably bound by the Agreement and further understand and agree that any community property interest I may have in the Granted Shares shall be similarly bound by the Agreement.

I agree to the Lapsing Forfeiture Right described in the Agreement and I hereby consent to the forfeiture of the Granted Shares to the Company by my spouse/domestic partner or my spouse/domestic partner's legal representative in accordance with the provisions of the Agreement. Further, as part of the consideration for the Agreement, I agree that at my death, if I have not disposed of any interest of mine in the Granted Shares by an outright bequest of the Granted Shares to my spouse or domestic partner, then the Company shall have the same rights against my legal representative to exercise its rights to the Granted Shares with respect to any interest of mine in the Granted Shares as it would have had pursuant to the Agreement if I had acquired the Granted Shares pursuant to a court decree in domestic litigation.

I AM AWARE THAT THE LEGAL, FINANCIAL AND RELATED MATTERS CONTAINED IN THE AGREEMENT ARE COMPLEX AND THAT I AM FREE TO SEEK INDEPENDENT PROFESSIONAL GUIDANCE OR COUNSEL WITH RESPECT TO THIS CONSENT. I HAVE EITHER SOUGHT SUCH GUIDANCE OR COUNSEL OR DETERMINED AFTER REVIEWING THE AGREEMENT CAREFULLY THAT I WILL WAIVE SUCH RIGHT.

Dated as of the _____ day of _____, 20__.

Print name:

CERTIFICATIONS UNDER SECTION 302

I, Donald R. Young, certify that:

1. I have reviewed this Quarterly Report on Form 10-Q of Aspen Aerogels, 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 4, 2022

/s/ Donald R. Young

Donald R. Young
President and Chief Executive Officer
(principal executive officer)

CERTIFICATIONS UNDER SECTION 302

I, Ricardo C. Rodriguez, certify that:

1. I have reviewed this Quarterly Report on Form 10-Q of Aspen Aerogels, 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 4, 2022

/s/ Ricardo C. Rodriguez

Ricardo C. Rodriguez

Senior Vice President, Chief Financial Officer and Treasurer (principal financial officer and principal accounting officer)

CERTIFICATIONS UNDER SECTION 906

Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002 (subsections (a) and (b) of section 1350, chapter 63 of title 18, United States Code), each of the undersigned officers of Aspen Aerogels, Inc., a Delaware corporation (the “Company”), does hereby certify, to such officer’s knowledge, that:

The Quarterly Report on Form 10-Q for the quarter ended June 30, 2022 (the “Form 10-Q”) of the Company fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934, and the information contained in the Form 10-Q fairly presents, in all material respects, the financial condition and results of operations of the Company.

Dated: August 4, 2022

/s/ Donald R. Young

Donald R. Young
President and Chief Executive Officer
(principal executive officer)

Dated: August 4, 2022

/s/ Ricardo C. Rodriguez

Ricardo C. Rodriguez
Senior Vice President, Chief Financial Officer and Treasurer
(principal financial officer and principal accounting officer)

A signed original of this written statement required by Section 906 has been provided to the Company and will be retained by the Company and furnished to the Securities and Exchange Commission or its staff upon request.