

**UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549
FORM 10-K**

(MARK ONE)

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

FOR THE FISCAL YEAR ENDED DECEMBER 31, 2022

OR

 TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934FOR THE TRANSITION PERIOD FROM _____ TO _____
COMMISSION FILE NUMBER 000-52008

LUNA INNOVATIONS INCORPORATED

(Exact name of Registrant as Specified in its Charter)

Delaware
(State or Other Jurisdiction of Incorporation or Organization)

54-1560050
(I.R.S. Employer Identification Number)

301 1st St SW, Suite 200
Roanoke, VA 24011
(Address of Principal Executive Offices)
(540) 769-8400
(Registrant's Telephone Number, Including Area Code)

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

Title of each class	Trading Symbol	Name of each exchange on which registered
Common Stock, \$0.001 par value per share	LUNA	The Nasdaq Stock Market LLC

Securities registered pursuant to Section 12(g) of the Act: None

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes No Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Act. Yes No Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes No Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T during the preceding 12 months (or for such shorter period that the registrant was required to submit such files). Yes No

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, a smaller reporting company or an emerging growth company. See the definitions of "large accelerated filer", "accelerated filer,"

"smaller reporting company," and "emerging growth company" in Rule 12b-2 of the Exchange Act.

Large accelerated filer

Accelerated filer

Non-accelerated filer

Smaller reporting company

Emerging growth company

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act. Indicate by check mark whether the registrant has filed a report on and attestation to its management's assessment of the effectiveness of its internal control over financial reporting under Section 404(b) of the Sarbanes-Oxley Act (15 U.S.C. 7262(b)) by the registered public accounting firm that prepared or issued its audit report. If securities are registered pursuant to Section 12(b) of the Act, indicate by check mark whether the financial statements of the registrant included in the filing reflect the correction of an error to previously issued financial statements. Indicate by check mark whether any of those error corrections are restatements that required a recovery analysis of incentive-based compensation received by any of the registrant's executive officers during the relevant recovery period pursuant to §240.10D-1(b). Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Exchange Act). Yes No

The aggregate market value of the voting and non-voting common equity held by non-affiliates of the registrant on June 30, 2022 based upon the closing price of Common Stock on such date as reported by the Nasdaq Capital Market, was approximately \$182.2 million.

Indicate the number of shares outstanding of each of the issuer's classes of common stock, as of the latest practicable date: As of March 14, 2023 there were 33,420,773 shares of the registrant's common stock outstanding.

DOCUMENTS INCORPORATED BY REFERENCE

Specified portions of the registrant's Proxy Statement with respect to its 2023 Annual Meeting of stockholders, anticipated to be filed within 120 days after the end of its fiscal year ended December 31, 2022, are incorporated by reference into Part III of this annual report on Form 10-K.

LUNA INNOVATIONS INCORPORATED
ANNUAL REPORT ON FORM 10-K
FOR THE YEAR ENDED DECEMBER 31, 2022

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CAUTIONARY NOTE REGARDING FORWARD LOOKING STATEMENTS

This Annual Report on Form 10-K, including the “Management’s Discussion and Analysis of Financial Condition and Results of Operation” section in Item 7 of this report, and other materials accompanying this Annual Report on Form 10-K contain forward-looking statements within the meaning of Section 21E of the Securities Exchange Act of 1934, as amended, and Section 27A of the Securities Act of 1933, as amended. All statements other than statements of historical facts are “forward-looking statements” for purposes of these provisions, including those relating to future events or our future financial performance. In some cases, you can identify these forward-looking statements by words such as “intends,” “will,” “plans,” “anticipates,” “expects,” “may,” “might,” “estimates,” “believes,” “should,” “projects,” “predicts,” “potential” or “continue,” or the negative of those words and other comparable words, and other words or terms of similar meaning in connection with any discussion of future operating or financial performance. Similarly, statements that describe our business strategy, goals, prospects, opportunities, outlook, objectives, plans or intentions are also forward-looking statements. These statements are only predictions and may relate to, but are not limited to, expectations of future operating results or financial performance, capital expenditures, introduction of new products, regulatory compliance, plans for growth and future operations, the potential benefits of our recent acquisitions and dispositions, as well as assumptions relating to the foregoing.

These statements are based on current expectations and assumptions regarding future events and business performance and involve known and unknown risks, uncertainties and other factors that may cause actual events or results to be materially different from any future events or results expressed or implied by these statements. These factors include those set forth in the following discussion and within Item 1A “Risk Factors” of this Annual Report on Form 10-K and elsewhere within this report.

You should not place undue reliance on these forward-looking statements, which apply only as of the filing date of this Annual Report on Form 10-K. You should carefully review the risk factors described in other documents that we file from time to time with the U.S. Securities and Exchange Commission (“SEC”). Except as required by applicable law, including the rules and regulations of the SEC, we do not plan to publicly update or revise any forward-looking statements, whether as a result of any new information, future events or otherwise, other than through the filing of periodic reports in accordance with the Securities Exchange Act of 1934, as amended.

We have proprietary rights to a number of trademarks used in this Annual Report which are important to our business. Solely for convenience, the trademarks and trade names in this prospectus are referred to without the ® and TM symbols, but such references should not be construed as any indicator that their respective owners will not assert, to the fullest extent under applicable law, their rights thereto. All other trademarks, trade names and service marks appearing in this Annual Report are the property of their respective owners.

RISK FACTORS SUMMARY

Our business is subject to a number of risks and uncertainties, including those risks discussed at-length below. These risks include, among others, the following:

- Risks Relating to our Business
 - We depend on third-party vendors for specialized components in our manufacturing operations, making us vulnerable to supply shortages and price fluctuations that could harm our business.
 - As a provider of contract research to the U.S. government, we are subject to federal rules, regulations, audits and investigations, the violation or failure of which could adversely affect our business.
 - Some of our technology is in-licensed from Intuitive Surgical, Inc., which is revocable in certain circumstances. Without this license, we cannot continue to market, manufacture or sell a portion of our fiber-optic products.
 - Our products must meet exacting specifications, and defects and failures may occur, which may cause customers to return or stop buying our products.
 - The markets for many of our products are characterized by changing technology which could cause obsolescence of our products, and we may incur substantial costs in delivering new products.
- Risks Relating to our Operations and Business Strategy
 - If we fail to properly evaluate and execute our strategic initiatives, it could have an adverse effect on our future results and the market price of our common stock.
 - We are experiencing impacts from inflationary pressures, including with respect to labor and materials costs, which could adversely impact our profitability and cash flow.
 - Health epidemics, including the COVID-19 pandemic, have had, and could in the future have, an adverse impact on our business, operations, and the markets and communities in which we and our customers and suppliers operate.

- Risks Relating to our Regulatory Environment
 - Our operations are subject to domestic and foreign laws, regulations and restrictions, and noncompliance with these laws, regulations and restrictions could expose us to fines, penalties, suspension or debarment, which could have a material adverse effect on our profitability and overall financial position.
 - We are or may become subject to a variety of privacy and data security laws, and our failure to comply with them could harm our business.
- Risks Relating to our Intellectual Property
 - Our proprietary rights may not adequately protect our technologies.
 - Third parties may claim that we infringe their intellectual property, and we could suffer significant litigation or licensing expense as a result.
- Risks Relating to our Common Stock
 - Our common stock price has been volatile and we expect that the price of our common stock will fluctuate substantially in the future, which could cause you to lose all or a substantial part of your investment.
 - Anti-takeover provisions in our amended and restated certificate of incorporation and bylaws and Delaware law could discourage or prevent a change in control, even if an acquisition would be beneficial to our stockholders, which could affect our stock price adversely and prevent attempts by our stockholders to replace or remove our current management.

PART I

ITEM 1. BUSINESS

Company Overview and Business Model

Luna Innovations Incorporated ("we" or the "Company") is a leader in advanced optical technology, providing high performance fiber optic test, measurement and control products for the telecommunications and photonics industries; and distributed fiber optic sensing solutions that measure and monitor materials and structures for applications in aerospace, automotive, oil and gas, security and infrastructure. We have a broad range of products for these applications based on proprietary technology covered by a portfolio of over 700 patents either owned or exclusively in-licensed.

Our communications test and control products help customers test their fiber optic networks and assemblies with speed and precision in both lab and production environments. Our test and measurement products accelerate the development of high speed fiber optic components like photonic integrated circuits ("PICs"), coherent receivers and short-run fiber networks.

Our distributed fiber optic sensing products help designers and manufacturers more efficiently develop new and innovative products by measuring stress, strain, and temperature at a high resolution for new designs or manufacturing processes. In addition, our distributed fiber optic sensing products ensure the safety and structural integrity or operational health of critical assets in the field, by monitoring stress, strain, temperature and vibration in large civil and industrial infrastructure such as bridges, roads, pipelines and borders. We manufacture and sell "terahertz" (THz) products for layer thickness measurements for materials like plastics, rubber, and paint. Our THz products are used in the aerospace and automotive/EV sectors. We also provide applied research services, primarily under federally funded development programs that leverage our sensing and instrumentation technologies to meet the specific needs and applications of our customers.

Prior to September 30, 2021, we were organized into two main reporting segments, our Lightwave segment and our Luna Labs segment. We now have one reportable segment, Lightwave, following the determination that our Luna Labs segment met held-for-sale and discontinued operations accounting criteria at the end of the third quarter of 2021. Our Lightwave segment consists of our fiber optics testing, measurement and sensing solutions. On March 8, 2022, we completed the sale of substantially all of our equity interests in Luna Labs. Prior to the sale, our Luna Labs segment performed applied research principally in the areas of sensing and instrumentation, advanced materials, optical technologies and health sciences.

Dispositions and Acquisitions*Luna Labs*

On March 8, 2022, we completed the sale of substantially all of our equity interests in our Luna Labs business to certain members of Luna Labs' senior management team and a group of outside investors for an initial purchase price of \$20.4 million before working capital and escrow adjustments and transaction fees. We had been actively marketing our Luna Labs segment to prospective buyers during 2021 as part of our growth strategy for our Lightwave segment.

LIOS Sensing

On March 10, 2022, we acquired NKT Photonics GmbH and LIOS Technology Inc. (collectively, "LIOS Sensing") for €20.0 million, or \$22.1 million. LIOS Sensing, based in Cologne, Germany and formerly owned by NKT Photonics A/S, provides temperature and strain sensing products which are highly complementary to our existing portfolio of fiber optic offerings.

Lightwave

Our Lightwave segment develops, manufactures and markets optical measurement technologies, including the following:

- Sensing, including
 - short, medium and long-range distributed fiber optic sensing solutions; and
 - Terahertz, "THz" measurement products.
- Communications test and photonic control, including
 - test equipment for communications devices and networks; and
 - specialty laser and photonic components.

Our Lightwave segment also performs applied research principally in the areas of optical sensing and THz technologies.

Our key initiative for long term growth is to become a leading provider of products and solutions in these two markets. For our sensing market, the acquisition of OptaSense Holdings Limited ("OptaSense") in 2020 added distributed acoustic sensing technology to our existing suite of sensing products and provided for expansion into high-growth markets such as security and perimeter detection, smart infrastructure monitoring and oil and gas. Our products have historically been strong shorter-range and discrete applications, which are best when specific, known locations need to be monitored. OptaSense's product offering has helped us fill a gap for long range, fully distributed measurement, which is best for applications where signals can occur anywhere along the length of the sensor.

The addition of the Lios sensing portfolio brings long range, distributed temperature and strain measurement capability to our sensing solutions portfolio. This additional capability compliments our sensing products to bring what we believe is a complete set of fiber optic measurement and monitoring solutions.

Our two primary markets as described above are described in more detail below.

Communications Test and Photonic Controls Products

Test and Measurement Equipment for Fiber Optic Components and Sub-Assemblies

Our optical test and measurement products primarily serve the telecommunications industry, as well as provide valuable applications in other fields. Our test and measurement products test and monitor the integrity of fiber optic network components and sub-assemblies. These products are designed for manufacturers and suppliers of optical components and sub-assemblies allowing them to reduce development, test and production costs and improve the quality of their products.

Our products are particularly useful for characterizing and testing photonic integrated circuits, such as silicon photonics components, which are a critical technology enabling the growing worldwide demand for internet connectivity. Most manufacturers and suppliers of optical components and modules currently use a combination of different types of optical test equipment to measure performance and identify failures in optical networks, such as bad splices, bends, crimps and other reflective and non-reflective events that can cause defects and negatively impact product performance. Our optical test equipment products eliminate the need to employ multiple test products by addressing all stages of the end user's product development lifecycle, including design verification, component qualification, assembly process verification and failure analysis.

Polarization Control

Our polarization control products include components, modules and instruments to measure, manage and control polarization and group delay in fiber optic networks. The laser light that is used in all modern fiber communication and other photonic architectures is polarized in nature. We manufacture the tools used to measure, monitor and manipulate the polarization of laser light in a fiber optic system or network.

Our proprietary fiber optic squeezing technology enables a high- performance polarization control and measurement system for the accurate measurement of polarization properties of light sources and optical materials. We also manufacture and sell fiber optic coils for use in gyroscopes.

Tunable Lasers

Our swept tunable lasers are integrated into current and new products to help customers build faster, more flexible and cost-effective test and measurement products. Our laser has desirable properties in the quality of the laser light produced, the speed at which it can operate, the small size of the package, and the environmental conditions in which it can operate, making it possible to bring these capabilities out of the laboratory, and into more demanding environments such as aircraft structural health monitoring, automotive manufacturing, green energy and industrial applications.

We have developed and/or licensed all of the intellectual property related to our tunable lasers and we manufacture them. These lasers are used in our various different product platforms and are also sold as OEM modules to our customers in applications including fiber sensing and medical robotics.

Single Frequency Lasers

Through the acquisition of OptaSense, we acquired laser manufacturing capabilities for a range of highly coherent, integrated, very narrow line-width lasers for use in long range sensing applications. These lasers are manufactured under our "RIO" trade name and are used as the primary light source for our long range, DAS sensing products. We also sell these lasers as OEM components to other sensing and Light Detection and Ranging ("LiDAR") system manufacturers.

Sensing and Non-Destructive Test Products*ODiSI Sensing Solution*

Our ODiSI products provide fully distributed strain and temperature measurements delivering an extraordinary amount of information by using an optical fiber as a continuous sensor to produce measurements every millimeter for a sensor up to 50 meters in length (x8 sensors per system). Compared to traditional sensing methods, such as electrical strain gages, this technology provides greater insight into the performance, tolerances and failure mechanisms of composite structures and vehicles and can be integrated into locations and environments not accessible with traditional sensors. We believe our ODiSI products provide exceptional value to the aerospace and automotive industries as they continue to adopt electrification and move to lighter weight systems made of composite structures.

ODiSI incorporates multiple channels of fiber optic sensors whose inputs are integrated through an advanced measurement system and software using fiber optic sensing technology with our innovative monitoring system that allows several thousand sensors to be networked along a single optical fiber.

Distributed Temperature Sensing (DTS) System

Our DTS system, which we acquired as part of the LIOS business, monitors temperature over long distances or across large surfaces, such as submarine or underground power cables, by using a single strand of optical fiber as a sensor as an alternative to installing countless numbers of conventional sensors. DTS uses light scattering in the fiber to measure temperature. Because the DTS system can accurately locate the position down the length of the fiber that the scattering is originated, temperature can be mapped with high precision and accuracy over very long lengths.

DTS provides a long range, fully distributed temperature and strain sensing capability that complements our legacy offerings, brings a diverse, blue-chip customer base, representing a significant opportunity for cross-selling, expands our intellectual property portfolio, augments our international presence, building upon our already strong international customer base and sales capability, generates rapid expansion opportunities into high-growth markets such as green energy power generation, smart infrastructure monitoring and oil and gas, and leverages our acquisition of LIOS to grow our operations, customer base, offerings, and financial profile.

Because DTS uses passive optical fibers as distributed sensors, a LIOS sensing system is immune to vibration, electromagnetic noise, dust, cryogenic temperatures, and moisture. Our DTS sensing systems have been installed worldwide in critical applications such as fire detection in road and rail tunnels, special hazardous buildings, power cable and aerial transmission line monitoring, in oil & gas exploration, and in industrial induction furnaces and LNG tanks.

Hyperion Sensing Solution

Our Hyperion sensing products expand our capabilities in fiber optic sensing by providing distributed sensing using hundreds of Fiber-Bragg Grating ("FBG") or Extrinsic Fabry-Perot ("FP") sensors integrated into long-range sensors of up to 40km in length, measured at sampling rates up to 5KHz. Hyperion enables rapid full-spectrum data acquisition and flexible peak detect algorithms of FBGs, Long Period FBGs and FP sensors with low-latency access to data for closed-loop feedback applications. Our Hyperion products target fiber optic sensing applications that require more dynamic measurement capabilities or longer distances than provided by our ODiSI platform, like monitoring of large, civil and industrial infrastructure.

Terahertz Sensing Systems

Our THz gauging and imaging product line uses pulsed THz waves to provide precise single- and multi-layer thickness, density, basis weight and caliper thickness measurements to serve the industrial, non-destructive testing, and research markets. Similar to x-ray images, THz wavelengths penetrate through most non-conductive materials and can easily reveal imperfections such as voids, cracks, and density variations. THz offers a significant advantage over x-rays because the radiation is non-ionizing and thus is completely safe. THz technology, unlike other traditional methods, is non-contact, works with both opaque and translucent materials, and works well for multilayer structures. The ability to accurately measure layer thickness is critical for ensuring consistent quality, minimizing defects and reducing material usage for products such as tubing, tires, plastic bottles, adhesives and coatings. Handheld THz sensors can measure and scan specialty coatings and multilayer structures to check thickness consistency and locate subsurface defects. THz systems can be used to inspect the high-performance coatings used on military aircraft, verifying thickness of applied coatings with submicron accuracy.

Distributed Acoustic Sensing Products

Our line of advanced DAS interrogator units delivers superior measurements for a wide range of applications from advanced industrial monitoring through high performance geophysical measurements. Applications of these units include real-time pipeline monitoring preventing disruption flow, advance monitoring and evaluation of reservoir and wellbore to reduce risk and optimize recovery, real-time information detection on highways and railways for traffic management and ensuring safety, cost-effective surveillance of borders and national assets and the precise detection of faults in power and utility infrastructure. Our DAS operations include a market leading laser technology company that supports and vertically integrates the most critical element of the DAS system, its internal laser.

Sales and Marketing

We primarily market our fiber optic test, measurement and control products to telecommunications companies, defense agencies, government system integrators, researchers, original equipment manufacturers, distributors, testing labs and strategic partners worldwide. We have a regional sales force that markets and sells our products directly as well as through manufacturer representative organizations to customers in North America and through partner and distribution channels for sales outside of North America, including the EMEA, LATAM and APAC regions. We have a dedicated sales force for direct marketing of our distributed sensing products, with an initial focus on customers in the automotive, aerospace, and energy industries.

We sell and market our THz instruments primarily to original equipment manufacturers through a mix of technical sales engineers, value added resellers and independent sales representatives. We market these products and capabilities through industry specific channels, including the internet, industry trade shows and through trade journals.

We believe that we provide a high level of support in developing and maintaining our long-term relationships with our customers. Customer service and support are provided through our offices and those of our partners that are located throughout the world.

Intellectual Property

We seek patent protection on inventions that we consider important to the operations of our business. We rely on a combination of patent, trademark, copyright and trade secret laws in the United States and other jurisdictions, as well as confidentiality procedures and contractual provisions to protect our proprietary technology and our brand. We control access to our proprietary technology and enter into confidentiality and invention assignment agreements with our employees and consultants and confidentiality agreements with other third parties.

Our success depends in part on our ability to develop patentable products and obtain, maintain and enforce patent and trade secret protection for our products, including successfully defending our patents against third-party challenges both in the United States and in other countries. We will only be able to protect our technologies from unauthorized use by third parties to the extent that we own or have licensed valid and enforceable patents or trade secrets that cover them. Furthermore, the degree of future protection of our proprietary rights is uncertain because we may not be able to obtain patent protection on some or all of our technology and because legal means afford only limited protection and may not adequately protect our rights or permit us to gain or keep our competitive advantage.

Currently, we own or license approximately 745 U.S. and international patents and approximately 68 U.S. and international patent applications. Our issued patents generally have terms that are scheduled to expire between 2023 and 2042. The patents scheduled to expire in 2023 are not expected to have a significant impact on our revenues or results of operations. Patents may not be issued for any pending or future pending patent applications owned by or licensed to us. Claims allowed under any issued patent or future issued patent owned or licensed by us may not be valid or sufficiently broad to protect our technologies. Any issued patents owned by or licensed to us now or in the future may be challenged, invalidated or circumvented, and, in addition, the rights under such patents may not provide us with competitive advantages. In addition, competitors may design around our technology or develop competing technologies. To the extent we elect to pursue, intellectual property rights may also be unavailable or limited in some foreign countries, which could make it easier for competitors to capture or increase their market share with respect to related technologies.

A discussion of our material in-licensed patents is set forth below.

Shape Sensing Patents

As a part of our sale of assets associated with our fiber optic shape sensing technology in the medical field to Intuitive Surgical, Inc. ("Intuitive") in 2014, we transferred our related patents to Intuitive. Also, as a part of this transaction, we entered into a license agreement with Intuitive pursuant to which we have the right to use all of our transferred technology outside the field of medicine and in respect of our existing non-shape sensing products in certain non-robotic medical fields. The license is

revocable with ability to remedy, but only in the case that Luna were to enter competitively into the medical robotics space. Two U.S. patents that we now license back from Intuitive cover the use of optical frequency domain reflectometry and multiple, closely spaced Bragg gratings for shape sensing, and the use of the inherent scatter as a strain sensor for shape sensing. These two patents expire in July 2025. We also license back from Intuitive patents and patent applications that cover certain refinements to the measurements covered in the foregoing two patents and related technologies, which are necessary in order to achieve the necessary accuracies for medical and other applications. These patent applications were filed in the United States, the European Patent Office, China, India, Russia, Brazil, Japan, Indonesia and elsewhere. These patents and patent applications can support other nonmedical applications of our fiber optic shape sensing technology.

Corporate History

We were incorporated in the Commonwealth of Virginia in 1990 and reincorporated in the State of Delaware in April 2003. We completed our initial public offering in June 2006. Our executive offices are located at 301 1st St SW, Suite 200, Roanoke, Virginia 24011 and our main telephone number is (540) 769-8400.

Competition

We compete with a variety of companies in several different product markets. The products that we have developed or are currently developing will compete with other technologically innovative products, as well as products incorporating conventional materials and technologies. We expect that we will compete with companies that manufacture test and measurement equipment for a wide range of industries, including aerospace, defense, healthcare, telecommunications, energy (including oil and gas and green energy), industrial measurement, and security applications. Although there can be no assurance that we will continue to do so, we believe that we compete favorably in these areas because our products leverage advanced technologies to offer superior performance. If we are unable to effectively compete in these areas in the future, we could lose business to our competitors, which could harm our operating results.

We also compete, or will compete, for government, university and corporate research contracts relating to a broad range of technologies. Competition for contract research is intense and the industry has few barriers to entry. We compete against a number of in-house research and development departments of major corporations, as well as a number of small, limited-service contract research providers and companies backed by large venture capital firms. The contract research industry continues to experience consolidation, which has resulted in greater competition for clients. Increased competition might lead to price and other forms of competition that could harm our operating results. We compete for contract research on the basis of a number of factors, including reliability, past performance, expertise and experience in specific areas, scope of service offerings, technological capabilities and price.

Government Regulation

Environmental, Health and Safety Regulation

Our facilities and current and proposed activities involve the use of a broad range of materials that are considered hazardous under applicable laws and regulations. Accordingly, we are subject to a number of domestic and foreign laws and regulations and other requirements relating to employee health and safety, protection of the environment, product labeling and product take back. Regulated activities include the storage, use, transportation and disposal of, and exposure to, hazardous or potentially hazardous materials and wastes. Our current and proposed activities also include potential exposure to physical hazards associated with work environment and equipment. We could incur costs, fines, civil and criminal penalties, personal injury and third-party property damage claims, or we could be required to incur substantial investigation or remediation costs, if we were to violate or become liable under environmental, health and safety laws and regulations or requirements. Liability under environmental, health and safety laws can be joint and several and without regard to fault. There can be no assurance that violations of environmental, health and safety laws will not occur in the future as a result of the inability to obtain permits in a timely manner, human error, equipment failure or other causes. Environmental, health and safety laws could also become more stringent over time, imposing greater compliance costs and increasing risks and penalties associated with violations, which could harm our business. Further, violations of present and future environmental, health and safety laws could restrict our ability to expand facilities and pursue certain technologies, as well as require us to acquire costly equipment or to incur potentially significant costs to comply with environmental, health and safety regulations and other requirements.

We have made, and will continue to make, expenditures to comply with current and future environmental, health and safety laws. We anticipate that we could incur additional capital and operating costs in the future to comply with existing environmental, health and safety laws and new requirements arising from new or amended statutes and regulations. In addition, because the applicable regulatory agencies have not yet promulgated final standards for some existing environmental, health and safety programs, we cannot at this time reasonably estimate the cost for compliance with these additional requirements. The

amount of any such compliance costs could be material. We cannot predict the impact that future regulations will impose upon our business.

Human Capital Management

We seek to fulfill our mission by attracting talented people, fostering innovation and managing aspects of our business in an ethical manner that benefits our stakeholders, including the communities in which we operate. We promote and empower a diverse workforce who are dedicated to helping solve our customers' toughest challenges. As of December 31, 2022, we had 337 full-time employees and 7 part-time employees, including approximately 23% employed in research, development and engineering positions, approximately 52% employed in operations, approximately 11% employed in sales and marketing, and approximately 14% in administrative positions. None of our employees are covered by a collective bargaining agreement, and we consider our relationship with our employees to be good.

Website Access to Reports

Our website address is www.lunainc.com. We make available, free of charge under "SEC Filings" on the Investor Relations portion of our website, access to our annual report on Form 10-K, our quarterly reports on Form 10-Q and our current reports on Form 8-K, as well as amendments to those reports filed or furnished pursuant to Section 13(a) or 15(d) of the Securities Exchange Act of 1934, as amended, as soon as reasonably practicable after such material is electronically filed with or furnished to the SEC. Information appearing on our website is not incorporated by reference in and is not a part of this annual report. The SEC maintains an internet site that contains reports, proxy and information statements, and other information regarding our filings at www.sec.gov.

ITEM 1A. RISK FACTORS

You should carefully consider the risks described below before deciding whether to invest in our common stock. The risks described below are not the only ones we face. Additional risks not presently known to us or that we currently believe are immaterial may also impair our business operations and financial results. If any of the following risks actually occurs, our business, financial condition or results of operations could be adversely affected. In such case, the trading price of our common stock could decline and you could lose all or part of your investment. Our filings with the Securities and Exchange Commission also contain forward-looking statements that involve risks or uncertainties. Our actual results could differ materially from those anticipated or contemplated by these forward-looking statements as a result of a number of factors, including the risks we face described below, as well as other variables that could affect our operating results. Past financial performance should not be considered to be a reliable indicator of future performance, and investors should not use historical trends to anticipate results or trends in future periods.

RISKS RELATING TO OUR BUSINESS

We depend on third-party vendors for specialized components in our manufacturing operations, making us vulnerable to supply shortages and price fluctuations that could harm our business.

We primarily rely on third-party vendors for the manufacture of the specialized components used in our products. The highly specialized nature of our supply requirements poses risks that we may not be able to locate additional sources of the specialized components required in our business. For example, there are few manufacturers who produce the special lasers used in our optical test equipment. Our reliance on these vendors subjects us to a number of risks that could negatively affect our ability to manufacture our products and harm our business, including interruption of supply. Although we are now manufacturing tunable lasers in low-rate initial production, we expect our overall reliance on third-party vendors to continue. Any significant delay or interruption in the supply of components, or our inability to obtain substitute components or materials from alternate sources at acceptable prices and in a timely manner could impair our ability to meet the demand of our customers and could harm our business.

We depend upon outside contract manufacturers for a portion of the manufacturing process for some of our products. Our operations and revenue related to these products could be adversely affected if we encounter problems with these contract manufacturers.

Many of our products are manufactured internally. However, we also rely upon contract manufacturers to produce the finished portion of certain products and lasers. Our reliance on contract manufacturers for these products makes us vulnerable to possible capacity constraints and reduced control over delivery schedules, manufacturing yields, manufacturing quality

control and costs. If the contract manufacturer for our products were unable or unwilling to manufacture our products in required volumes and at high quality levels or to continue our existing supply arrangement, we would have to identify, qualify and select an acceptable alternative contract manufacturer or move these manufacturing operations to internal manufacturing facilities. An alternative contract manufacturer may not be available to us when needed or may not be in a position to satisfy our quality or production requirements on commercially reasonable terms, including price. Any significant interruption in manufacturing our products would require us to reduce the supply of products to our customers, which in turn would reduce our revenue, harm our relationships with the customers of these products and cause us to forego potential revenue opportunities.

As a U.S. government contractor, we are subject to federal rules, regulations, audits and investigations, the violation or failure of which could adversely affect our business.

We must comply with and are affected by laws and regulations relating to the award, administration and performance of U.S. government contracts. Government contract laws and regulations affect how we do business with our government customers and, in some instances, impose added costs on our business. A violation of a specific law or regulation could result in the imposition of fines and penalties, termination of our contracts or debarment from bidding on future contracts. In some instances, these laws and regulations impose terms or rights that are more favorable to the government than those typically available to commercial parties in negotiated transactions. Such terms or rights may allow government customers, among others, to:

- terminate existing contracts for convenience with short notice;
- reduce orders or otherwise modify contracts;
- for contracts subject to the Truth in Negotiations Act, reduce the contract price or cost where it was increased because a contractor or subcontractor furnished cost or pricing data during negotiations that was not complete, accurate, and current;
- For some contracts, (i) demand a refund, make a forward price adjustment, or terminate a contract for default if a contractor provided inaccurate or incomplete data during the contract negotiation process, and (ii) reduce the contract price under triggering circumstances, including the revision of price lists or other documents upon which the contract award was predicated;
- cancel multi-year contracts and related orders if funds for contract performance for any subsequent year become unavailable;
- decline to exercise an option to renew a multi-year contract or issue task orders in connection with indefinite delivery/indefinite quantity ("IDIQ") contracts;
- claim rights in solutions, systems, or technology produced by us, appropriate such work-product for their continued use without continuing to contract for our services, and disclose such work-product to third parties, including other government agencies and our competitors, which could harm our competitive position;
- prohibit future procurement awards with a particular agency due to a finding of organizational conflicts of interest based upon prior related work performed for the agency that would give a contractor an unfair advantage over competing contractors, or the existence of conflicting roles that might bias a contractor's judgment;
- subject the award of contracts to protest by competitors, which may require the contracting federal agency or department to suspend our performance pending the outcome of the protest and may also result in a requirement to resubmit offers for the contract or in the termination, reduction, or modification of the awarded contract; and suspend or debar us from doing business with the applicable government.

In addition, U.S. government agencies, including the Defense Contract Audit Agency and the Department of Labor, routinely audit and investigate government contractors. These agencies review a contractor's performance under its contracts, cost structure and compliance with applicable laws, regulations and standards. The U.S. government also may review the adequacy of, and a contractor's compliance with, its internal control systems and policies, including the contractor's purchasing, property, estimating, compensation and management information systems. Any costs found to be improperly allocated to a specific contract will not be reimbursed, while such costs already reimbursed must be refunded. If an audit uncovers the inclusion of certain claimed costs deemed to be expressly unallowable, or improper or illegal activities, we may be subject to civil and criminal penalties and administrative sanctions, including termination of contracts, forfeiture of profits, suspension of payments, fines and suspension or prohibition from doing business with the U.S. government. In addition, our reputation could suffer serious harm if allegations of impropriety were made against us.

In addition to the risk of government audits and investigations, U.S. government contracts and grants impose requirements on contractors and grantees relating to ethics and business practices, which carry civil and criminal penalties including monetary fines, assessments, loss of the ability to do business with the U.S. government and certain other criminal penalties.

We may also be prohibited from using certain foreign-sourced parts, components, materials, or other items in the performance of our government contracts or from commercially selling certain products that we develop if the U.S. government determines that the commercial availability of those products could pose a risk to national security.

Some of our technology is in-licensed from Intuitive Surgical, Inc., which is revocable in certain circumstances. Without this license, we cannot continue to market, manufacture or sell a portion of our fiber-optic products.

As a part of the sale of certain assets to Intuitive Surgical, Inc. ("Intuitive") in 2014, we entered into a license agreement with Intuitive pursuant to which we received rights to use all of our transferred technology outside the field of medicine and in respect of our existing non-shape sensing products in certain non-robotic medical fields. This license back to us generally covers our Phoenix laser, OVA, OBR and ODISI products. This license is revocable if after notice and certain time periods, we were to (i) challenge the validity or enforceability of the transferred patents and patent applications, (ii) commercialize our fiber optical shape sensing and localization technology in the field of medicine, (iii) violate our obligations related to our ability to sublicense in the field of medicine or (iv) violate our confidentiality obligations in a manner that advantages a competitor in the field of medicine and not cure such violation. Maintaining this license is necessary for us to conduct our business related to the aforementioned products. If this license were to be revoked by Intuitive, we would no longer be able to market, manufacture or sell these products, which could have a material adverse effect on our operations.

Our failure to attract, train and retain skilled employees or members of our senior management and to obtain necessary security clearances for such persons or maintain a facility security clearance would adversely affect our business and operating results.

The availability of highly trained and skilled technical and professional personnel is critical to our future growth and profitability. Competition for scientists, engineers, technicians and professional personnel is intense and our competitors aggressively recruit key employees. In the past, we have experienced difficulties in recruiting and hiring these personnel as a result of the tight labor market in certain fields. Any difficulty in hiring or retaining qualified employees, combined with our growth strategy and future needs for additional experienced personnel, particularly in highly specialized areas such as nanomaterial manufacturing and fiber optic sensing technologies, may make it more difficult to meet all of our needs for these employees in a timely manner. Although we intend to continue to devote significant resources to recruit, train and retain qualified employees, we may not be able to attract and retain these employees, especially in technical fields in which the supply of experienced qualified candidates is limited, or at the senior management level. Any failure to do so would have an adverse effect on our business. Any loss of key personnel could have a material adverse effect on our ability to meet key operational objectives, such as timely and effective project milestones and product introductions, which in turn could adversely affect our business, results of operations and financial condition.

We provide certain services to the U.S. government that require us to maintain a facility security clearance and for certain of our employees and board members to hold security clearances. In general, our failure for to obtain or retain sufficient security clearances, or any public reprimand related to security matters could result in a U.S. government customer terminating an existing contract, choosing not to renew a contract or prevent us from bidding on or winning certain new government contracts.

In addition, our future success depends in a large part upon the continued service of key members of our senior management team. We do not maintain any key-person life insurance policies on our officers. The loss of any members of our management team or other key personnel could seriously harm our business.

Our business is subject to the cyclical nature of the markets in which we compete and any future downturn may reduce demand for our products and revenue.

Many factors beyond our control affect our business, including consumer confidence in the economy, interest rates, inflation, fuel prices, health crises, such as the COVID-19 pandemic, international conflicts, such as the current hostilities between Russia and Ukraine, and the general availability of credit. The overall economic climate and changes in Gross National Product growth have a direct impact on some of our customers and the demand for our products. We cannot be sure that our business will not be adversely affected as a result of an industry or general economic downturn.

Our customers may reduce capital expenditures and have difficulty satisfying liquidity needs because of continued turbulence in the U.S. and global economies, resulting in reduced sales of our products and harm to our financial condition and results of operations.

In particular, our historical results of operations have been subject to substantial fluctuations, and we may experience substantial period-to-period fluctuations in future results of operations. Any future downturn in the markets in which we compete, could significantly reduce the demand for our products and therefore may result in a significant reduction in revenue or increase the volatility of the price of our common stock. Our revenue and results of operations may be adversely affected in the future due to changes in demand from customers or cyclical changes in the markets utilizing our products.

In addition, the telecommunications industry has, from time to time, experienced, and may again experience, a pronounced downturn. To respond to a downturn, many service providers may slow their capital expenditures, cancel or delay new developments, reduce their workforces and inventories and take a cautious approach to acquiring new equipment and technologies from original equipment manufacturers, which would have a negative impact on our business. Weakness in the global economy or a future downturn in the telecommunications industry may cause our results of operations to fluctuate from quarter-to-quarter and year-to-year, harm our business, and may increase the volatility of the price of our common stock.

Customer acceptance of our products is dependent on our ability to meet changing requirements, and any decrease in acceptance could adversely affect our revenue.

Customer acceptance of our products is significantly dependent on our ability to offer products that meet the changing requirements of our customers, including telecommunication, military, medical and industrial corporations, as well as government agencies. Any decrease in the level of customer acceptance of our products could harm our business.

Our products must meet exacting specifications, and defects and failures may occur, which may cause customers to return or stop buying our products.

Our customers generally establish demanding specifications for quality, performance and reliability that our products must meet. However, our products are highly complex and may contain defects and failures when they are first introduced or as new versions are released. Our products are also subject to rough environments as they are integrated into our customer products for use by the end customers. If defects and failures occur in our products, we could experience lost revenue, increased costs, including warranty expense and costs associated with customer support, delays in or cancellations or rescheduling of orders or shipments, product returns or discounts, diversion of management resources or damage to our reputation and brand equity, and in some cases consequential damages, any of which would harm our operating results. In addition, delays in our ability to fill product orders as a result of quality control issues may negatively impact our relationship with our customers. We cannot assure you that we will have sufficient resources, including any available insurance, to satisfy any asserted claims.

The markets for many of our products are characterized by changing technology which could cause obsolescence of our products, and we may incur substantial costs in delivering new products.

The markets for many of our products are characterized by changing technology, new product introductions and product enhancements, and evolving industry standards. The introduction or enhancement of products embodying new technology or the emergence of new industry standards could render existing products obsolete, and result in a write down to the value of our inventory, or result in shortened product life cycles. Accordingly, our ability to compete is in part dependent on our ability to continually offer enhanced and improved products.

The success of our new product offerings will depend upon several factors, including our ability to:

- accurately anticipate customer needs;
- innovate and develop new technologies and applications;
- successfully commercialize new technologies in a timely manner;
- price products competitively and manufacture and deliver products in sufficient volumes and on time; and
- differentiate our product offerings from those of our competitors.

Our inability to find new customers or retain existing customers could harm our business.

Our business is reliant on our ability to find new customers and retain existing customers. In particular, customers normally purchase certain of our products and incorporate them into products that they, in turn, sell in their own markets on an ongoing basis. As a result, the historical sales of these products have been dependent upon the success of our customers.

products and our future performance is dependent upon our success in finding new customers and receiving new orders from existing customers.

In several markets, the quality and reliability of our products are a major concern for our customers, not only upon the initial manufacture of the product, but for the life of the product. Many of our products are used in remote locations for higher value assembly, making servicing of our products unfeasible. Any failure of the quality or reliability of our products could harm our business.

Customer demand for our products is difficult to accurately forecast and, as a result, we may be unable to optimally match production with customer demand, which could adversely affect our business and financial results.

We make planning and spending decisions, including determining the levels of business that we will seek and accept, production schedules, inventory levels, component procurement commitments, personnel needs and other resource requirements, based on our estimates of customer requirements. The short-term nature of commitments by many of our customers and the possibility of unexpected changes in demand for their products reduce our ability to accurately estimate future customer requirements. On occasion, customers may require rapid increases in production, which can strain our resources, cause our manufacturing to be negatively impacted by materials shortages, necessitate higher or more restrictive procurement commitments, increase our manufacturing yield loss and scrapping of excess materials, and reduce our gross margin. We may not have sufficient capacity at any given time to meet the volume demands of our customers, or one or more of our suppliers may not have sufficient capacity at any given time to meet our volume demands. Conversely, a downturn in the markets in which our customers compete can cause, and in the past have caused, our customers to significantly reduce or delay the amount of products ordered or to cancel existing orders, leading to lower utilization of our facilities. Because many of our costs and operating expenses are relatively fixed, reduction in customer demand due to market downturns or other reasons would have a negative effect on our gross margin, operating income and cash flow.

Rapidly changing standards and regulations could make our products obsolete, which would cause our revenue and results of operations to suffer.

We design products to conform to our customers' requirements and our customers' systems may be subject to regulations established by governments or industry standards bodies worldwide. Because some of our products are designed to conform to current specific industry standards, if competing or new standards emerge that are preferred by our customers, we would have to make significant expenditures to develop new products. If our customers adopt new or competing industry standards with which our products are not compatible, or the industry groups adopt standards or governments issue regulations with which our products are not compatible, our existing products would become less desirable to our customers and our revenue and results of operations would suffer.

The results of our operations could be adversely affected by economic and political conditions and the effects of these conditions on our customers' businesses and levels of business activity.

Global economic and political conditions affect our customers' businesses and the markets they serve. A severe or prolonged economic downturn, including during and following the COVID-19 pandemic, or a negative or uncertain political climate could adversely affect our customers' financial conditions and the timing or levels of business activity of our customers and the industries we serve. This may reduce the demand for our products or depress pricing for our products and have a material adverse effect on our results of operations. Changes in global economic conditions could also shift demand to products or services for which we do not have competitive advantages, and this could negatively affect the amount of business we are able to obtain. For example, inflation rates, particularly in the United States, the United Kingdom and Germany, have increased recently to levels not seen in years, and increased inflation may result in decreased demand for our products, increases in our operating costs (including our labor costs), reduced liquidity and limits on our ability to access credit or otherwise raise capital. In addition, the Federal Reserve has raised, and may again raise, interest rates in response to concerns about inflation, which coupled with reduced government spending and volatility in financial markets may have the effect of further increasing economic uncertainty and heightening these risks. Additionally, financial markets around the world have experienced volatility in connection with the current hostilities between Russia and the Ukraine. In addition, if we are unable to successfully anticipate changing economic and political conditions, we may be unable to effectively plan for and respond to those changes, and our business could be negatively affected as a result.

We have experienced net losses in the past, and because our strategy for expansion may be costly to implement, we may experience losses and may not maintain profitability or positive cash flow.

We have experienced net losses in the past. We expect to continue to incur significant expenses as we pursue our strategic initiatives, including increased expenses for research and development, sales and marketing and manufacturing. We may also grow our business in part through acquisitions of additional companies and complementary technologies which could cause us to incur greater than anticipated transaction expenses, amortization or write-offs of intangible assets and other acquisition-related expenses. As a result, we may incur net losses in the future, and these losses could be substantial. At a certain level, continued net losses could impair our ability to comply with Nasdaq continued listing standards, as described further below.

Our ability to generate additional revenues and remain profitable will depend on our ability to execute our key growth initiative regarding the development, marketing and sale of sensing products, develop and commercialize innovative technologies, expand our contract research capabilities and sell the products that result from those development initiatives. We may not be able to sustain or increase our profitability on a quarterly or annual basis.

We have obtained capital by borrowing money under a term loan and revolving line of credit and we might require additional capital to support and expand our business; our term loan and revolving line of credit have various covenants with which we must comply.

We intend to continue to make investments to support our business growth, including developing new products, enhancing our existing products, obtaining important regulatory approvals, enhancing our operating infrastructure, completing our development activities and building our commercial scale manufacturing facilities. To the extent that we are unable to remain profitable and to finance our activities from continuing operations, we may require additional funds to support these initiatives and to grow our business.

If we are successful in raising additional funds through issuances of equity or convertible debt securities, our existing stockholders could suffer significant dilution, including as the result of the issuance of warrants in connection with the financing, and any new equity securities we issue could have rights, preferences and privileges superior to those of our existing common stock. If we raise additional funds through debt financings, these financings may involve significant cash payment obligations and covenants that restrict our ability to operate our business and make distributions to our stockholders.

We have a term loan and borrowings under a revolving line of credit with PNC Bank, National Association ("PNC"), which require us to comply with a number of affirmative and restrictive covenants including, among others, financial covenants regarding minimum net leverage and fixed charge coverage, affirmative covenants regarding delivery of financial statements, payment of taxes, and maintenance of government compliance, and restrictive covenants regarding dispositions of property, acquisitions, incurrence of additional indebtedness or liens, investments and transactions with affiliates. We are also restricted from paying dividends or making other distributions or payments on our capital stock, subject to limited exceptions. Upon the occurrence of certain events, including our failure to satisfy its payment obligations, failure to adhere to the financial covenants, the breach of certain of our other covenants, cross defaults to other indebtedness or material agreements, judgment defaults and defaults related to failure to maintain governmental approvals, PNC will have the right, among other remedies, to declare all principal and interest immediately due and payable, and to exercise secured party remedies.

If we are unable to obtain adequate financing or financing terms satisfactory to us when we require it, our ability to continue to support our business growth and to respond to business challenges could be significantly limited.

We face and will face substantial competition in several different markets that may adversely affect our results of operations.

We face and will face substantial competition from a variety of companies in several different markets. As we focus on developing marketing and selling fiber optic sensing products, we may also face substantial and entrenched competition in that market.

Many of our competitors have longer operating histories, greater name recognition, larger customer bases and significantly greater financial, sales and marketing, manufacturing, distribution, technical and other resources than we do. These competitors may be able to adapt more quickly to new or emerging technologies and changes in customer requirements. In addition, current and potential competitors have established or may establish financial or strategic relationships among themselves or with existing or potential customers or other third parties. Accordingly, new competitors or alliances among competitors could emerge and rapidly acquire significant market share. We cannot assure you that we will be able to compete successfully against current or new competitors, in which case our revenues may fail to increase or may decline.

Intense competition in our markets could result in aggressive business tactics by our competitors, including aggressively pricing their products or selling older inventory at a discount. If our current or future competitors utilize aggressive business

tactics, including those described above, demand for our products could decline, we could experience delays or cancellations of customer orders, or we could be required to reduce our sales prices.

Shifts in product mix may result in declines in gross profit.

Our gross profit margins vary among our product platforms and are generally highest on our test and measurement instruments. Our overall gross profit may fluctuate from period to period as a result of a variety of factors including shifts in product mix, the introduction of new products, and decreases in average selling prices for older products. If our customers decide to buy more of our products with low gross profit margins or fewer of our products with high gross profit margins, our total gross profits could be harmed.

RISKS RELATING TO OUR OPERATIONS AND BUSINESS STRATEGY

If we fail to properly evaluate and execute our strategic initiatives, including the integration of acquired businesses, it could have an adverse effect on our future results and the market price of our common stock.

We evaluate strategic opportunities related to products, technology and business transactions, including acquisitions and divestitures. In the past, we have acquired businesses to support our growth strategy, including the acquisition of LIOS Sensing in March 2022. If we choose to enter into such transactions in the future, we face certain risks including:

- the failure of the acquired business to meet our performance and financial expectations;
- difficulty integrating an acquired business's operations, personnel and financial and reporting systems into our current business
- potential unknown liabilities associated with the acquisition;
- lost sales and customers as a result of customers deciding not to do business with us;
- complexities associated with managing the larger combined company with distant business locations;
- integrating personnel while maintaining focus on providing consistent, high quality products;
- loss of key employees; and
- performance shortfalls as a result of the division of management's attention caused by completing the acquisition and integrating operations.

If any of these events were to occur, our ability to maintain relationships with the customers, suppliers and employees or our ability to achieve the anticipated benefits of the acquisition could be adversely affected, or could reduce our future earnings or otherwise adversely affect our business and financial results and, as a result, adversely affect the market price of our common stock.

If we cannot successfully transition our revenue mix from contract research revenues to product sales and license revenues, we may not be able to fully execute our business model or grow our business.

Our business model and future growth depend on our ability to transition to a revenue mix that contains significantly larger product sales and revenues from the provision of services or from licensing. Product sales and these revenues potentially offer greater scalability than contract research revenues. Our current plan is to increase our sales of commercial products, our licensing revenues and our provision of non-research services to customers so as to represent a larger percentage of our total revenues. If we are unable to develop and grow our product sales and revenues from the provision of services or from licensing to augment our contract research revenues, however, our ability to execute our business model or grow our business could suffer. There can be no assurance that we will be able to achieve increased revenues in this manner.

Failure to develop, introduce and sell new products or failure to develop and implement new technologies, could adversely impact our financial results.

Our success will depend on our ability to develop and introduce new products that customers choose to buy. The new products the market requires tend to be increasingly complex, incorporating more functions and operating at faster speeds than old products. If we fail to introduce new product designs or technologies in a timely manner or if customers do not successfully introduce new systems or products incorporating our products, our business, financial condition and results of operations could be materially harmed.

If we are unable to manage growth effectively, our revenues and net loss could be adversely affected.

We may need to expand our personnel resources to grow our business effectively. We believe that sustained growth at a higher rate will place a strain on our management as well as on our other human resources. To manage this growth, we must continue to attract and retain qualified management, professional, scientific and technical and operating personnel. If we are unable to recruit a sufficient number of qualified personnel, we may be unable to staff and manage projects adequately, which in turn may slow the rate of growth of our contract research revenues or our product development efforts.

We may not be successful in identifying market needs for new technologies or in developing new products.

Part of our business model depends on our ability to correctly identify market needs for new technologies. We intend to identify new market needs, but we may not always have success in doing so in part because our contract research largely centers on identification and development of unproven technologies, often for new or emerging markets. Furthermore, we must identify the most promising technologies from a sizable pool of projects. If our commercialization strategy process fails to identify projects with commercial potential or if management does not ensure that such projects advance to the commercialization stage, we may not successfully commercialize new products and grow our revenues.

Our growth strategy requires that we also develop successful commercial products to address market needs. We face several challenges in developing successful new products. Many of our existing products and those currently under development are technologically innovative and require significant and lengthy product development efforts. These efforts include planning, designing, developing and testing at the technological, product and manufacturing-process levels. These activities require us to make significant investments. Although there are many potential applications for our technologies, our resource constraints require us to focus on specific products and to forgo other opportunities. We expect that one or more of the potential products we choose to develop will not be technologically feasible or will not achieve commercial acceptance, and we cannot predict which, if any, of our products we will successfully develop or commercialize. The technologies we research and develop are new and steadily changing and advancing. The products that are derived from these technologies may not be applicable or compatible with the state of technology or demands in existing markets. Our existing products and technologies may become uncompetitive or obsolete if our competitors adapt more quickly than we do to new technologies and changes in customers' requirements. Furthermore, we may not be able to identify if and when new markets will open for our products given that future applications of any given product may not be readily determinable, and we cannot reasonably estimate the size of any markets that may develop. If we are not able to successfully develop new products, we may be unable to increase our product revenues.

We face risks associated with our international business.

We currently conduct business internationally and we might considerably expand our international activities in the future. Our international business operations are subject to a variety of risks associated with conducting business internationally, including:

- having to comply with U.S. and other export control and economic trade sanctions regulations and policies that restrict certain operations and work involving non-U.S. employees and sale and supply of our products to foreign customers;
- changes in or interpretations of foreign regulations that may adversely affect our ability to sell our products, perform services or repatriate profits to the United States;
- the imposition of tariffs;
- hyperinflation or economic or political instability in foreign countries;
- imposition of limitations on, or increase of withholding and other taxes on remittances and other payments by foreign subsidiaries or joint ventures;
- conducting business in places where business practices and customs are unfamiliar and unknown;
- the imposition of restrictive trade policies;
- the imposition of inconsistent laws or regulations;
- the imposition or increase of investment and other restrictions or requirements by foreign governments;
- uncertainties relating to foreign laws and legal proceedings;

- potential changes in a specific country's or region's political or economic climate, including the current hostilities between Russia and Ukraine;
- having to comply with anti-corruption and anti-money laundering laws, including the U.S. Foreign Corrupt Practices Act ("FCPA"), the UK Bribery Act 2010, and similar laws and regulations in other jurisdiction; and
- having to comply with licensing requirements.

We do not know the impact that these regulatory, geopolitical and other factors may have on our international business in the future. It is unknown how global supply chains may continue to be affected from the COVID-19 pandemic.

We may dispose of or discontinue existing product lines and technology developments, which may adversely impact our future results.

On an ongoing basis, we evaluate our various product offerings and technology developments in order to determine whether any should be discontinued or, to the extent possible, divested. In addition, if we are unable to generate the amount of cash needed to fund the future operations of our business, we may be forced to sell one or more of our product lines or technology developments.

We cannot guarantee that we have correctly forecasted, or that we will correctly forecast in the future, the right product lines and technology developments to dispose or discontinue or that our decision to dispose of or discontinue various investments, product lines and technology developments is prudent if market conditions change. In addition, there are no assurances that the discontinuance of various product lines will reduce operating expenses or will not cause us to incur material charges associated with such decision. Furthermore, the discontinuance of existing product lines entails various risks, including the risk that we will not be able to find a purchaser for a product line or the purchase price obtained will not be equal to at least the book value of the net assets for the product line. Other risks include managing the expectations of, and maintaining good relations with, our historical customers who previously purchased products from a disposed or discontinued product line, which could prevent us from selling other products to them in the future. We may also incur other significant liabilities and costs associated with disposal or discontinuance of product lines, including employee severance costs and excess facilities costs.

We are experiencing impacts from inflationary pressures, including with respect to labor and materials costs, which could adversely impact our profitability and cash flow.

We are experiencing, and may continue to experience, the general impact of inflationary market pressures on our business, particularly with respect to labor and materials costs. We are experiencing pressures on materials and certain labor costs as a result of the inflationary environment and current general labor shortage, which has resulted in increased competition for skilled labor and wage inflation. It is possible that our labor, fuel and materials costs could continue to increase as we expand our operations and volume of work. We have not been, and may not be able to, fully adjust our contract pricing to compensate for these cost increases, which has affected, and may continue to affect, our profitability and cash flows. Inflationary pressures and related recessionary concerns in light of governmental and central bank efforts to mitigate inflation could also cause uncertainties for our customers and affect the level of their project activity, which could also adversely affect our profitability and cash flows.

Health epidemics, including the COVID-19 pandemic, have had, and could in the future have, an adverse impact on our business, operations, and the markets and communities in which we and our customers and suppliers operate.

The ongoing global COVID-19 pandemic has impacted, and will likely continue to impact, the way we conduct our business, including the way in which we interface with customers, suppliers and our employees. The COVID-19 pandemic has affected how we interact with our customers by reducing face-to-face meetings and increasing our on-line and virtual presence. While increasing our on-line and virtual presence has proven effective, we are unsure of the impact if these conditions continue for an extended period. During 2021 and 2022, we experienced an increased level of disruption in our supply chain and from certain customers all of which have resulted in delayed revenue. While we believe these disruptions are temporary, there is no guarantee we will be able to manage through these disruptions. If the demand for our products, or our access to critical components were to be interrupted, it could have a material adverse impact on our results of operations.

In response to the COVID-19 pandemic, many state, local, and foreign governments have put in place, and others in the future may put in place, quarantines, executive orders, shelter-in-place orders, and similar government orders and restrictions in order to control the spread of the disease. Such orders or restrictions, or the perception that such orders or restrictions could occur, have resulted in business closures, work stoppages, slowdowns and delays, work-from-home policies, travel restrictions, and cancellation or postponement of events, among other effects that could negatively impact productivity and disrupt our operations and those of our customers and suppliers. We have implemented alternate work arrangements, including staggered

schedules and shifts, distancing within our offices and working from home for most of our employees, and we may take further actions that alter our operations as may be required by federal, state, or local authorities, or which we determine are in our best interests. While most of our operations can be performed under these alternate work arrangements, there is no guarantee that we will be as effective while working under them because our team is dispersed, many employees may have additional personal needs to attend to (such as looking after children as a result of school closures or family who become sick), and employees may become sick themselves and be unable to work. Decreased effectiveness of our team could adversely affect our results due to our inability to meet in person with potential customers, longer time periods for supply, longer time periods for manufacturing and other decreases in productivity that could seriously harm our business.

In addition, while the potential impact and duration of the COVID-19 pandemic on the global economy and our business in particular may be difficult to assess or predict, the pandemic has resulted in, and may continue to result in, significant disruption of global financial markets, reducing our ability to access capital, which could negatively affect our liquidity in the future.

The global impact of COVID-19 continues to rapidly evolve, and we will continue to monitor the situation closely. The ultimate impact of the COVID-19 pandemic or a similar health epidemic is highly uncertain and subject to change. We do not yet know the full extent of potential delays or impacts on our business, operations, or the global economy as a whole. While the spread of COVID-19 may eventually be contained or mitigated, there is no guarantee that a future outbreak of this or any other widespread epidemics will not occur, or that the global economy will recover, either of which could seriously harm our business.

RISKS RELATING TO OUR REGULATORY ENVIRONMENT

Our operations are subject to domestic and foreign laws, regulations and restrictions, and noncompliance with these laws, regulations and restrictions could expose us to fines, penalties, suspension or debarment, which could have a material adverse effect on our profitability and overall financial position.

Our operations, particularly our international sales, subject us to numerous U.S. and foreign laws and regulations, including, without limitation, regulations relating to imports, exports (including the Export Administration Regulations and the International Traffic in Arms Regulations), technology transfer restrictions, anti-boycott provisions, economic sanctions and anti-corruption.

Our products and solutions are subject to export control and import laws and regulations, including the U.S. Export Administration Regulations, the U.S. International Traffic in Arms Regulations (ITAR), U.S. Customs regulations, and the economic and trade sanctions regulations administered by the U.S. Treasury Department's Office of Foreign Assets Controls. Exports of our products, services, and technology must be made in compliance with these laws and regulations, and in some cases, certain registration, licensing, authorization, or reporting requirements may need to be performed. In addition, these laws may restrict or prohibit altogether the sale or supply of certain of our products, services, and technologies to certain governments, persons, entities, countries, and territories, including those that are the target of comprehensive sanctions, unless there are license exceptions that apply or specific licenses are obtained. Any future changes in export control, import, or economic sanctions laws and regulations may adversely impact our ability to sell our products, services, and technologies in certain markets or, in some cases, prevent the export or import of our products, services, and technologies to or from certain countries, governments, or persons altogether, which could adversely affect our business, results of operations, and growth prospects.

Our products, services, and technologies may have in the past been provided, and could in the future be provided, in violation of export control, import, or sanctions laws and regulations, despite the precautions we take. As a result, we have submitted, and from time to time may continue to submit as warranted, voluntary self-disclosures regarding compliance with U.S. export control and sanctions laws and regulations to relevant governmental authorities. Any failure to comply with applicable export control and sanctions laws may materially affect us through reputational harm, as well as other negative consequences, including government investigations, substantial civil or criminal penalties, and possible loss of export or import privileges.

We are also subject to the FCPA, the U.S. domestic bribery statute contained in 18 U.S.C. § 201, the U.S. Travel Act, the USA PATRIOT Act, the United Kingdom Bribery Act 2010, the Proceeds of Crime Act 2002, and possibly other state and national anti-bribery and anti-money laundering laws in countries in which we conduct activities. Anti-corruption laws are interpreted broadly and prohibit companies and their employees, third-party intermediaries, and other associated persons from authorizing, promising, offering, providing, soliciting, or accepting directly or indirectly, improper payments or benefits to or from any person whether in the public or private sector. These laws also require us to make and keep books and records that accurately and fairly reflect our transactions and to devise and maintain an adequate system of internal accounting controls. We

can be held liable for the corrupt or other illegal activities of our employees, representatives, contractors, business partners, and agents, even if we do not explicitly authorize or have actual knowledge of such activities.

Failure by us or our sales representatives or consultants to comply with the above laws and regulations could result in administrative, civil, or criminal liabilities and could result in suspension of our export privileges, which could have a material adverse effect on our business. Changes in regulation or political environment may affect our ability to conduct business in foreign markets including investment, procurement and repatriation of earnings.

Environmental regulations could increase operating costs and additional capital expenditures and delay or interrupt operations.

The photonics industry, as well as the semiconductor industry, are subject to governmental regulations for the protection of the environment, including those relating to air and water quality, solid and hazardous waste handling, and the promotion of occupational safety. Various federal, state and local laws and regulations require that we maintain certain environmental permits. While we believe that we have obtained all necessary environmental permits required to conduct our manufacturing processes, if we are found to be in violation of these laws, we could be subject to governmental fines and liability for damages resulting from such violations.

Changes in the aforementioned laws and regulations or the enactment of new laws, regulations or policies could require increases in operating costs and additional capital expenditures and could possibly entail delays or interruptions of our operations.

If our manufacturing facilities do not meet Federal, state or foreign country manufacturing standards, we may be required to temporarily cease all or part of our manufacturing operations, which would result in product delivery delays and negatively impact revenues.

Our manufacturing facilities are subject to periodic inspection by regulatory authorities and our operations will continue to be regulated by the FDA for compliance with Good Manufacturing Practice requirements contained in the quality systems regulations. We are also required to comply with International Organization for Standardization ("ISO"), quality system standards in order to produce certain of our products for sale in Europe. If we fail to continue to comply with Good Manufacturing Practice requirements or ISO standards, we may be required to cease all or part of our operations until we comply with these regulations. Obtaining and maintaining such compliance is difficult and costly. We cannot be certain that our facilities will be found to comply with Good Manufacturing Practice requirements or ISO standards in future inspections and audits by regulatory authorities. In addition, if we cannot maintain or establish manufacturing facilities or operations that comply with such standards or do not meet the expectations of our customers, we may not be able to realize certain economic opportunities in our current or future supply arrangements.

We are subject to additional significant foreign and domestic government regulations, including environmental and health and safety regulations, and failure to comply with these regulations could harm our business.

Our facilities and current and proposed activities involve the use of a broad range of materials that are considered hazardous under applicable laws and regulations. Accordingly, we are subject to a number of foreign, federal, state and local laws and regulations relating to health and safety, protection of the environment and the storage, use, disposal of, and exposure to, hazardous materials and wastes. We could incur costs, fines and civil and criminal penalties, personal injury and third-party property damage claims, or could be required to incur substantial investigation or remediation costs, if we were to violate or become liable under environmental, health and safety laws. Moreover, a failure to comply with environmental laws could result in fines and the revocation of environmental permits, which could prevent us from conducting our business. Liability under environmental laws can be joint and several and without regard to fault. There can be no assurance that violations of environmental and health and safety laws will not occur in the future as a result of the inability to obtain permits, human error, equipment failure or other causes. Environmental laws could become more stringent over time, imposing greater compliance costs and increasing risks and penalties associated with violations, which could harm our business. Accordingly, violations of present and future environmental laws could restrict our ability to expand facilities, pursue certain technologies, and could require us to acquire costly equipment or incur potentially significant costs to comply with environmental regulations.

Compliance with foreign, federal, state and local environmental laws and regulations represents a small part of our present budget. If we fail to comply with any such laws or regulations, however, a government entity may levy a fine on us or require us to take costly measures to ensure compliance. Any such fine or expenditure may adversely affect our development. We cannot predict the extent to which future legislation and regulation could cause us to incur additional operating expenses, capital expenditures or restrictions and delays in the development of our products and properties.

We are or may become subject to stringent and evolving U.S. and foreign laws, regulations, rules, contractual obligations, policies and other obligations related to data privacy and security. Our actual or perceived failure to comply with such obligations could lead to regulatory investigations or actions; litigation; fines and penalties; disruptions of our business operations; reputational harm; loss of revenue or profits; and other adverse business consequences.

In the ordinary course of business we collect, receive, store, process, generate, use, transfer, disclose, make accessible, protect, secure, dispose of, transmit, and share (collectively, processing) personal data and other sensitive information, including proprietary and confidential business data, intellectual property, sensitive third-party data, business plans, and transactions (collectively, sensitive data) in connection with our business customers and our employees.

Our data processing activities may subject us to numerous data privacy and security obligations, such as various laws, regulations, guidance, industry standards, external and internal privacy and security policies, contractual requirements, and other obligations relating to data privacy and security.

In the United States, federal, state, and local governments have enacted numerous data privacy and security laws, including data breach notification laws, personal data privacy laws, consumer protection laws (e.g., Section 5 of the Federal Trade Commission Act), and other similar laws (e.g., wiretapping laws).

For example, the California Consumer Privacy Act, or the CCPA, requires businesses to provide specific disclosures in privacy notices and honor requests of California residents to exercise certain privacy rights. The CCPA provides for civil penalties of up to \$7,500 per violation, as well as a private right of action for individuals affected by certain data breaches to recover significant statutory damages. Additionally, the California Privacy Rights Act, or CPRA, which became effective on January 1, 2023, expands the CCPA's requirements, including applying to personal information of business representatives and employees and creating a new regulatory agency that will be vested with authority to implement and enforce the CCPA and the CPRA.

Other states, such as Virginia and Colorado, have also passed comprehensive privacy laws, and similar laws are being considered in several other states, as well as at the federal and local levels. These developments may further complicate compliance efforts, and may increase legal risk and compliance costs for us and the third parties upon whom we rely. Outside the United States, an increasing number of laws, regulations, and industry standards may govern data privacy and security. For example, under the European Union's General Data Protection Regulation, or EU GDPR, and the United Kingdom's so-called 'UK GDPR' companies may face temporary or definitive bans on data processing and other corrective actions; fines of up to 20 million Euros under the EU GDPR / 17.5 million pounds sterling under the UK GDPR or 4% of annual global revenue, whichever is greater; or private litigation related to processing of personal data brought by classes of data subjects or consumer protection organizations authorized at law to represent their interests.

In addition, we may be unable to transfer personal data from Europe and other jurisdictions to the United States or other countries due to data localization requirements or limitations on cross-border data flows. Europe and other jurisdictions have enacted laws requiring data to be localized or limiting the transfer of personal data to other countries. In particular, the European Economic Area, or EEA, and the United Kingdom, or UK, have significantly restricted the transfer of personal data to the United States and other countries whose privacy laws it believes are inadequate. Other jurisdictions may adopt similarly stringent interpretations of their data localization and cross-border data transfer laws. Although there are currently various mechanisms that may be used to transfer personal data from the EEA and UK to the United States in compliance with law, such as the EEA and UK's standard contractual clauses, these mechanisms are subject to legal challenges, and there is no assurance that we can satisfy or rely on these measures to lawfully transfer personal data to the United States. If there is no lawful manner for us to transfer personal data from the EEA, the UK, or other jurisdictions to the United States, or if the requirements for a legally-compliant transfer are too onerous, we could face significant adverse consequences, including the interruption or degradation of our operations, the need to relocate part of or all of our business or data processing activities to other jurisdictions at significant expense, increased exposure to regulatory actions, substantial fines and penalties, the inability to transfer data and work with partners, vendors and other third parties, and injunctions against our processing or transferring of personal data necessary to operate our business. Some European regulators have ordered certain companies to suspend or permanently cease certain transfers of personal data to recipients outside Europe for allegedly violating the EU GDPR's cross-border data transfer limitations. Additionally, companies that transfer personal data to recipients outside of the EEA and/or UK to other jurisdictions, particularly to the United States, are subject to increased scrutiny from regulators individual litigants and activist groups.

In addition to data privacy and security laws, we may be contractually subject to industry standards adopted by industry groups and may become subject to such obligations in the future. We may also be bound by other contractual obligations related to data privacy and security, and our efforts to comply with such obligations may not be successful.

We may publish privacy policies, marketing materials, and other statements, such as compliance with certain certifications or self-regulatory principles, regarding data privacy and security. If these policies, materials or statements are found to be deficient, lacking in transparency, deceptive, unfair, or misrepresentative of our practices, we may be subject to investigation, enforcement actions by regulators, or other adverse consequences.

Obligations related to data privacy and security are quickly changing, becoming increasingly stringent, and creating regulatory uncertainty. Additionally, these obligations may be subject to differing applications and interpretations, which may be inconsistent or conflict among jurisdictions. Preparing for and complying with these obligations may require us to: modify our data processing practices and policies; put in place additional mechanisms ensuring compliance with the new data protection rules; divert resources from other initiatives and projects; and restrict the way products and services involving data are offered, all of which could significantly harm our business, financial condition, results of operations and prospects.

Further, compliance with these and any other applicable privacy and data security laws and regulations is a rigorous and time-intensive process. Moreover, despite our efforts, our personnel or third parties on whom we rely may fail to comply with any such laws or regulations, which could adversely affect our business, financial condition and results of operations. If we or the third parties on which we rely fail, or are perceived to have failed, to address or comply with applicable data privacy and security obligations, we could face significant consequences, including but not limited to: government enforcement actions (e.g., investigations, fines, penalties, audits, inspections, and similar); litigation (including class-action claims); additional reporting requirements and/or oversight; bans on processing personal data; and orders to destroy or not use personal data. Any of these events could have a material adverse effect on our reputation, business, or financial condition, including but not limited to: loss of customers; inability to process personal data or to operate in certain jurisdictions; limited ability to develop or commercialize our products; expenditure of time and resources to defend any claim or inquiry; adverse publicity; or substantial changes to our business model or operations.

RISKS RELATING TO OUR INTELLECTUAL PROPERTY

Our proprietary rights may not adequately protect our technologies.

Our commercial success will depend in part on our obtaining and maintaining patent, trade secret, copyright and trademark protection of our technologies in the United States and other jurisdictions as well as successfully enforcing this intellectual property and defending it against third-party challenges. We will only be able to protect our technologies from unauthorized use by third parties to the extent that valid and enforceable intellectual property protections, such as patents or trade secrets, cover them. In particular, we place considerable emphasis on obtaining patent and trade secret protection for significant new technologies, products and processes. The degree of future protection of our proprietary rights is uncertain because legal means afford only limited protection and may not adequately protect our rights or permit us to gain or keep our competitive advantage. The degree of future protection of our proprietary rights is also uncertain for products that are currently in the early stages of development because we cannot predict which of these products will ultimately reach the commercial market or whether the commercial versions of these products will incorporate proprietary technologies.

Our patent position is highly uncertain and involves complex legal and factual questions. Accordingly, we cannot predict the breadth of claims that may be allowed or enforced in our patents or in third-party patents. For example:

- we or our licensors might not have been the first to make the inventions covered by each of our pending patent applications and issued patents;
- we or our licensors might not have been the first to file patent applications for these inventions;
- others may independently develop similar or alternative technologies or duplicate any of our technologies;
- it is possible that none of our pending patent applications or the pending patent applications of our licensors will result in issued patents;
- patents may issue to third parties that cover how we might practice our technology;
- our issued patents and issued patents of our licensors may not provide a basis for commercially viable technologies, may not provide us with any competitive advantages, or may be challenged and invalidated by third parties; and
- we may not develop additional proprietary technologies that are patentable.

Patents may not be issued for any pending or future pending patent applications owned by or licensed to us, and claims allowed under any issued patent or future issued patent owned or licensed by us may not be valid or sufficiently broad to protect our technologies. Moreover, protection of certain of our intellectual property may be unavailable or limited in the United States or in foreign countries, and we have not sought to obtain foreign patent protection for certain of our products or technologies due to cost, concerns about enforceability or other reasons. Any issued patents owned by or licensed to us now or in the future may be challenged, invalidated, or circumvented, and the rights under such patents may not provide us with competitive advantages. In addition, competitors may design around our technology or develop competing technologies. Intellectual property rights may also be unavailable or limited in some foreign countries, and in the case of certain products no foreign

patents were filed or can be filed. This could make it easier for competitors to capture or increase their market share with respect to related technologies. We could incur substantial costs to bring suits in which we may assert our patent rights against others or defend ourselves in suits brought against us. An unfavorable outcome of any litigation could have a material adverse effect on our business and results of operations.

We also rely on trade secrets to protect our technology, especially where we believe patent protection is not appropriate or obtainable. However, trade secrets are difficult to protect. We regularly attempt to obtain confidentiality agreements and contractual provisions with our collaborators, employees and consultants to protect our trade secrets and proprietary know-how. These agreements may be breached or may not have adequate remedies for such breach. While we use reasonable efforts to protect our trade secrets, our employees, consultants, contractors or scientific and other advisors, or those of our strategic partners, may unintentionally or willfully disclose our information to competitors. If we were to enforce a claim that a third party had illegally obtained and was using our trade secrets, our enforcement efforts would be expensive and time consuming, and the outcome would be unpredictable. In addition, courts outside the United States are sometimes unwilling to protect trade secrets. Moreover, if our competitors independently develop equivalent knowledge, methods and know-how, it will be more difficult for us to enforce our rights and our business could be harmed.

If we are not able to defend the patent or trade secret protection position of our technologies, then we will not be able to exclude competitors from developing or marketing competing technologies and we may not generate enough revenues from product sales to justify the cost of developing our technologies and to achieve or maintain profitability.

We also rely on trademarks to establish a market identity for our company and our products. To maintain the value of our trademarks, we might have to file lawsuits against third parties to prevent them from using trademarks confusingly similar to or dilutive of our registered or unregistered trademarks. Also, we might not obtain registrations for our pending trademark applications, and we might have to defend our registered trademark and pending trademark applications from challenge by third parties. Enforcing or defending our registered and unregistered trademarks might result in significant litigation costs and damages, including the inability to continue using certain trademarks.

Third parties may claim that we infringe their intellectual property, and we could suffer significant litigation or licensing expense as a result.

Various U.S. and foreign issued patents and pending patent applications, which are owned by third parties, exist in our technology areas. Such third parties may claim that we infringe their patents. Because patent applications can take several years to result in a patent issuance, there may be currently pending applications, unknown to us, which may later result in issued patents that our technologies may infringe. For example, we are aware of competitors with patents in technology areas applicable to our optical test equipment products. Such competitors may allege that we infringe these patents. There could also be existing patents of which we are not aware that our technologies may inadvertently infringe. We have from time to time been, and may in the future be, contacted by third parties, including patent assertion entities or intellectual property advisors, about licensing opportunities that also contain claims that we are infringing on third party patent rights. If third parties assert these claims against us, we could incur extremely substantial costs and diversion of management resources in defending these claims, and the defense of these claims could have a material adverse effect on our business, financial condition and results of operations. Even if we believe we have not infringed on a third party's patent rights, we may have to settle a claim on unfavorable terms because we cannot afford to litigate the claim. In addition, if third parties assert claims against us and we are unsuccessful in defending against these claims, these third parties may be awarded substantial damages as well as injunctive or other equitable relief against us, which could effectively block our ability to make, use, sell, distribute or market our products and services in the United States or abroad.

In the event that a claim relating to intellectual property is asserted against us, or third parties not affiliated with us hold pending or issued patents that relate to our products or technology, we may seek licenses to such intellectual property or challenge those patents. However, we may be unable to obtain these licenses on commercially reasonable terms, if at all, and our challenge of the patents may be unsuccessful. Our failure to obtain the necessary licenses or other rights could prevent the sale, manufacture or distribution of our products and, therefore, could have a material adverse effect on our business, financial condition and results of operations.

A substantial portion of our technology is subject to retained rights of our licensors, and we may not be able to prevent the loss of those rights or the grant of similar rights to third parties.

A substantial portion of our technology is licensed from academic institutions, corporations and government agencies. Under these licensing arrangements, a licensor may obtain rights over the technology, including the right to require us to grant a license to one or more third parties selected by the licensor or that we provide licensed technology or material to third parties for non-commercial research. The grant of a license for any of our core technologies to a third party could have a material and adverse effect on our business. In addition, some of our licensors retain certain rights under the licenses, including the right to

grant additional licenses to a substantial portion of our core technology to third parties for non-commercial academic and research use. It is difficult to monitor and enforce such non-commercial academic and research uses, and we cannot predict whether the third-party licensees would comply with the use restrictions of such licenses. We have incurred and could incur substantial expenses to enforce our rights against them. We also may not fully control the ability to assert or defend those patents or other intellectual property which we have licensed from other entities, or which we have licensed to other entities.

In addition, some of our licenses with academic institutions give us the right to use certain technology previously developed by researchers at these institutions. In certain cases, we also have the right to practice improvements on the licensed technology to the extent they are encompassed by the licensed patents and are within our field of use. Our licensors may currently own and may in the future obtain additional patents and patent applications that are necessary for the development, manufacture and commercial sale of our anticipated products. We may be unable to agree with one or more academic institutions from which we have obtained licenses whether certain intellectual property developed by researchers at these academic institutions is covered by our existing licenses. In the event that the new intellectual property is not covered by our existing licenses, we would be required to negotiate a new license agreement. We may not be able to reach agreement with current or future licensors on commercially reasonable terms, if at all, or the terms may not permit us to sell our products at a profit after payment of royalties, which could harm our business.

Some of our patents may cover inventions that were conceived or first reduced to practice under, or in connection with, U.S. government contracts or other federal funding agreements. With respect to inventions conceived or first reduced to practice under such agreement, the U.S. government may retain a non-exclusive, non-transferable, irrevocable, paid-up license to practice or have practiced for or on behalf of the United States the invention throughout the world. We may not succeed in our efforts to retain title in patents, maintain ownership of intellectual property or in limiting the U.S. government's rights in our proprietary technologies and intellectual property when an issue exists as to whether such intellectual property was developed in the performance of such agreement or developed at private expense.

If we fail to obtain the right to use the intellectual property rights of others which are necessary to operate our business, and to protect their intellectual property, our business and results of operations will be adversely affected.

In the past, we have licensed certain technologies for use in our products. In the future, we may choose, or be required, to license technology or intellectual property from third parties in connection with the development of our products. We cannot assure you that third-party licenses will be available on commercially reasonable terms, if at all. Our competitors may be able to obtain licenses, or cross-license their technology, on better terms than we can, which could put us at a competitive disadvantage. Also, we often enter into confidentiality agreements with such third parties in which we agree to protect and maintain their proprietary and confidential information, including at times requiring our employees to enter into agreements protecting such information. There can be no assurance that the confidentiality agreements will not be breached by any of our employees or that such third parties will not make claims that their proprietary information has been disclosed.

RISKS RELATING TO OUR COMMON STOCK

Our common stock price has been volatile and we expect that the price of our common stock will fluctuate substantially in the future, which could cause you to lose all or a substantial part of your investment.

The public trading price for our common stock is volatile and may fluctuate significantly. Since January 1, 2009, our common stock has traded between a high of \$12.85 per share and a low of \$0.26 per share. Among the factors, many of which we cannot control, that could cause material fluctuations in the market price for our common stock are:

- sales of our common stock by our significant stockholders, or the perception that such sales may occur;
- changes in earnings estimates, investors' perceptions, recommendations by securities analysts or our failure to achieve analysts' earnings estimates;
- quarterly variations in our or our competitors' results of operations;
- challenges integrating our recent or future acquisitions, including the inability to realize any expected synergies;
- general market conditions and other factors unrelated to our operating performance or the operating performance of our competitors;
- announcements by us, or by our competitors, of acquisitions, new products, significant contracts, commercial relationships or capital commitments;
- pending or threatened litigation;
- any major change in our board of directors or management or any competing proxy solicitations for director nominees;
- changes in governmental regulations or in the status of our regulatory approvals;
- announcements related to patents issued to us or our competitors;

- a lack of, limited or negative industry or securities analyst coverage;
- health epidemics, including the COVID-19 pandemic;
- political, economic and social instability, including, for example, the military incursion of Russia into Ukraine, terrorist activities and any disruption these events may cause to the broader global industrial economy;
- discussions of our company or our stock price by the financial and scientific press and online investor communities; and
- general developments in our industry.

In addition, the stock prices of many technology companies have experienced wide fluctuations that have often been unrelated to the operating performance of those companies. These factors may materially and adversely affect the market price of our common stock.

If our estimates relating to our critical accounting policies are based on assumptions or judgments that change or prove to be incorrect, our operating results could fall below expectations of financial analysts and investors, resulting in a decline in our stock price.

The preparation of financial statements in conformity with U.S. GAAP requires our management to make estimates, assumptions and judgments that affect the amounts reported in the consolidated financial statements and accompanying notes. We base our estimates on historical experience and on various other assumptions that we believe to be reasonable under the circumstances, the results of which form the basis for making judgments about the carrying values of assets, liabilities, equity, revenue and expenses that are not readily apparent from other sources. Our operating results may be adversely affected if our assumptions change or if actual circumstances differ from those in our assumptions, which could cause our operating results to fall below the expectations of financial analysts and investors, resulting in a decline in our stock price. Significant assumptions and estimates used in preparing our consolidated financial statements include those related to revenue recognition, stock-based compensation and income taxes. Moreover, the revenue recognition guidance, ASC Topic 606, Revenue from Contracts with Customers, requires more judgment than did the prior guidance.

Anti-takeover provisions in our amended and restated certificate of incorporation and bylaws and Delaware law could discourage or prevent a change in control, even if an acquisition would be beneficial to our stockholders, which could affect our stock price adversely and prevent attempts by our stockholders to replace or remove our current management.

Our amended and restated certificate of incorporation and bylaws and Delaware law contain provisions that might delay or prevent a change in control, discourage bids at a premium over the market price of our common stock and adversely affect the market price of our common stock and the voting and other rights of the holders of our common stock. These provisions include:

- a classified board of directors serving staggered terms;
- advance notice requirements to stockholders for matters to be brought at stockholder meetings;
- a supermajority stockholder vote requirement for amending certain provisions of our amended and restated certificate of incorporation and bylaws; and
- the right to issue preferred stock without stockholder approval, which could be used to dilute the stock ownership of a potential hostile acquirer.

We are also subject to provisions of the Delaware General Corporation law that, in general, prohibit any business combination with a beneficial owner of 15% or more of our common stock for three years unless the holder's acquisition of our stock was approved in advance by our board of directors or certain other conditions are satisfied.

The existence of these provisions could adversely affect the voting power of holders of common stock and limit the price that investors might be willing to pay in the future for shares of our common stock.

Our amended and restated bylaws provide that the Court of Chancery of the State of Delaware and the U.S. federal district courts will be the exclusive forums for substantially all disputes between us and our stockholders, which could limit our stockholders' ability to obtain a favorable judicial forum for disputes with us or our directors, officers or employees.

Our amended and restated bylaws provide that the Court of Chancery of the State of Delaware is the exclusive forum for the following types of actions or proceedings under Delaware statutory or common law:

- any derivative claim or cause of action brought on our behalf;
- any claim or cause of action asserting a breach of fiduciary duty;
- any claim or cause of action against us arising under DGCL;

- any claim or cause of action arising under or seeking to interpret our amended and restated certificate of incorporation or our amended and restated bylaws; and
- any claim or cause of action against us that is governed by the internal affairs doctrine.

The provisions would not apply to suits brought to enforce a duty or liability created by the Exchange Act. Furthermore, Section 22 of the Securities Act creates concurrent jurisdiction for federal and state courts over all such Securities Act actions. Accordingly, both state and federal courts have jurisdiction to entertain such claims. To prevent having to litigate claims in multiple jurisdictions and the threat of inconsistent or contrary rulings by different courts, among other considerations, our amended and restated bylaws further provide that, unless we consent to the selection of an alternate forum, the U.S. federal district courts will be the exclusive forum for resolving any complaint asserting a cause or causes of action arising under the Securities Act.

While the Delaware courts have determined that such choice of forum provisions are facially valid, a stockholder may nevertheless seek to bring a claim in a venue other than those designated in the exclusive forum provisions. In such instance, we would expect to vigorously assert the validity and enforceability of the exclusive forum provisions of our amended and restated bylaws. This may require significant additional costs associated with resolving such action in other jurisdictions and there can be no assurance that the provisions will be enforced by a court in those other jurisdictions.

These exclusive forum provisions may limit a stockholder's ability to bring a claim in a judicial forum that it finds favorable for disputes with us or our directors, officers, or other employees, which may discourage lawsuits against us and our directors, officers and other employees. If a court were to find either exclusive-forum provision in our amended and restated bylaws to be inapplicable or unenforceable in an action, we may incur further significant additional costs associated with resolving the dispute in other jurisdictions, all of which could seriously harm our business.

GENERAL RISK FACTORS

If our information technology systems or data, or those of third parties upon which we rely, are or were compromised, we could experience adverse consequences resulting from such compromise.

In the ordinary course of our business, we and the third parties upon which we rely, face a variety of evolving cybersecurity related threats, including but not limited to phishing, malware, or ransomware attacks, which could cause security incidents. Cyber-attacks, malicious internet-based activity, online and offline fraud, and other similar activities threaten the confidentiality, integrity, and availability of our sensitive data and information technology systems, and those of the third parties upon which we rely. Such threats are prevalent and continue to rise, are increasingly difficult to detect, and come from a variety of sources, including traditional computer "hackers," threat actors, "hacktivists," organized criminal threat actors, personnel (such as through theft or misuse), sophisticated nation states, and nation-state-supported actors. Any of these or similar threats could cause a security incident or other interruption that could result in unauthorized, unlawful, or accidental acquisition, modification, destruction, loss, alteration, encryption, disclosure of, or access to our sensitive data or our information technology systems, or those of the third parties upon whom we rely. A security incident or other interruption could disrupt our ability (and that of third parties upon whom we rely) to provide our services.

As the numerous and evolving cybersecurity threats continue to become increasingly more complex and sophisticated, it becomes necessary for us to become cyber incident resilient. We have experienced security incidents in the past, and may do so in the future, resulting in the unauthorized, unlawful, or inappropriate access to sensitive and/or confidential data. For example, in January 2023, we detected a cyber incident impacting certain of our technology systems. Promptly upon our detection of the incident, we launched an investigation, notified federal law enforcement and engaged the services of incident response professionals (including a nationally recognized third-party forensic investigator) and specialized cybersecurity legal counsel. Where necessary, we disclosed the incident to customers in accordance with our contractual requirements regarding cyber incident disclosure. While we were able to manage this incident without any significant disruption to our operations, there is no guarantee that we will have similar success with other attacks in the future should one occur.

In addition, our reliance on third-party service providers could introduce new cybersecurity risks and vulnerabilities, including supply-chain attacks, and other threats to our business operations. We rely on third-party service providers and technologies to operate critical business systems to process sensitive data in a variety of contexts, including, without limitation, cloud-based infrastructure, data center facilities, encryption and authentication technology, employee email, content delivery to customers, and other functions. We also rely on third-party service providers to provide other products, services, parts, or otherwise to operate our business. Our ability to monitor these third parties' information security practices is limited, and these third parties may not have adequate information security measures in place. If our third-party service providers experience a security incident or other interruption, we could experience adverse consequences.

If we (or a third party upon whom we rely) experience a security incident or are perceived to have experienced a security incident, we may experience adverse consequences such as government enforcement actions (for example, investigations, fines, penalties, audits, and inspections); additional reporting requirements and/or oversight; restrictions on processing sensitive data (including personal data); litigation (including class claims); indemnification obligations; negative publicity; reputational harm; monetary fund diversions; interruptions in our operations (including availability of data); financial loss; and other similar harms. Security incidents and attendant consequences may cause customers to stop using our services, deter new customers from using our services, and negatively impact our ability to grow and operate our business.

While we have implemented security measures designed to protect against security incidents and take steps to become increasingly cyber incident resilient, there can be no assurance that these measures will be effective against an ever-evolving cyber threat landscape. We take steps designed to detect and mitigate vulnerabilities, but we may not be able to detect and remediate all vulnerabilities because the threats and techniques used to exploit the vulnerability change frequently and are often sophisticated in nature. Therefore, such vulnerabilities could be exploited but may not be detected until after a security incident has occurred. Further, we may experience delays in developing and deploying remedial measures designed to address any such identified vulnerabilities. These vulnerabilities pose material risks to our business. While we maintain cyber insurance coverage to mitigate against the costs associated with a cyber incident, we cannot be certain that our cyber insurance coverage will be adequate or sufficient to protect us from or to mitigate liabilities arising out of our privacy and security practices, that such coverage will continue to be available on commercially reasonable terms or at all, or that such coverage will pay future claims.

If there are substantial sales of our common stock, or the perception that such sales may occur, our stock price could decline.

If any of our stockholders were to sell substantial amounts of our common stock, the market price of our common stock may decline, which might make it more difficult for us to sell equity or equity-related securities in the future at a time and price that we deem appropriate. Substantial sales of our common stock, or the perception that such sales may occur, may have a material adverse effect on the prevailing market price of our common stock.

We may become involved in securities class action litigation that could divert management's attention and harm our business and our insurance coverage may not be sufficient to cover all costs and damages.

The stock market has from time to time experienced significant price and volume fluctuations that have affected the market prices for the common stock of technology companies. These broad market fluctuations may cause the market price of our common stock to decline. In the past, following periods of volatility in the market price of a particular company's securities, securities class action litigation has often been brought against that company. Securities class litigation also often follows certain significant business transactions, such as the sale of a business division or a change in control transaction. We may become involved in this type of litigation in the future. Litigation often is expensive and diverts management's attention and resources, which could adversely affect our business.

We are obligated to develop and maintain proper and effective internal controls over financial reporting and any failure to maintain the adequacy of these internal controls may adversely affect investor confidence in our company and, as a result, the value of our common stock.

We are required, pursuant to Section 404 of the Sarbanes-Oxley Act to furnish a report by management on, among other things, the effectiveness of our internal control over financial reporting on an annual basis. This assessment includes disclosure of any material weaknesses identified by our management in our internal control over financial reporting.

During the evaluation and testing process of our internal controls, if we identify one or more material weaknesses in our internal control over financial reporting, we will be unable to assert that our internal control over financial reporting is effective. While we have established certain procedures and controls over our financial reporting processes, we cannot assure you that these efforts will prevent restatements of our financial statements in the future. We may not be able to remediate any future material weaknesses, or to complete our evaluation, testing and any required remediation in a timely fashion.

Any failure to maintain internal control over financial reporting could severely inhibit our ability to accurately report our financial condition or results of operations. If we are unable to conclude that our internal control over financial reporting is effective, we could lose investor confidence in the accuracy and completeness of our financial reports, the market price of our common stock could decline, and we could be subject to sanctions or investigations by the Nasdaq Stock Market, the SEC or other regulatory authorities. Failure to remedy any material weakness in our internal control over financial reporting, or to implement or maintain other effective control systems required of public companies, could also restrict our future access to the capital markets.

Uncertainties in the interpretation and application of existing, new and proposed tax laws and regulations could materially affect our tax obligations and effective tax rate.

The tax regimes to which we are subject or under which we operate are unsettled and may be subject to significant change. The issuance of additional guidance related to existing or future tax laws, or changes to tax laws or regulations proposed or implemented by the current or a future U.S. presidential administration, Congress, or taxing authorities in other jurisdictions, including jurisdictions outside of the United States, could materially affect our tax obligations and effective tax rate. To the extent that such changes have a negative impact on us, our suppliers, manufacturers, or our customers, including as a result of related uncertainty, these changes may adversely impact our business, financial condition, results of operations, and cash flows. For example, beginning in 2022, the Tax Cuts and Jobs Act of 2017 eliminated the option to deduct research and development expenditures immediately in the year incurred and requires taxpayers to amortize such expenditures over five years for tax purposes. While the most significant impact of this provision is to cash tax liability for 2022, the tax year in which the provision took effect, the impact will decline annually over the five-year amortization period to an immaterial amount in year six.

The amount of taxes we pay in different jurisdictions depends on the application of the tax laws of various jurisdictions, including the United States, to our international business activities, tax rates, new or revised tax laws, or interpretations of tax laws and policies, and our ability to operate our business in a manner consistent with our corporate structure and intercompany arrangements. The taxing authorities of the jurisdictions in which we operate may challenge our methodologies for pricing intercompany transactions pursuant to our intercompany arrangements or disagree with our determinations as to the income and expenses attributable to specific jurisdictions. If such a challenge or disagreement were to occur, and our position was not sustained, we could be required to pay additional taxes, interest, and penalties, which could result in one-time tax charges, higher effective tax rates, reduced cash flows, and lower overall profitability of our operations. Our financial statements could fail to reflect adequate reserves to cover such a contingency. Similarly, a taxing authority could assert that we are subject to tax in a jurisdiction where we believe we have not established a taxable connection, often referred to as a "permanent establishment" under international tax treaties, and such an assertion, if successful, could increase our expected tax liability in one or more jurisdictions.

Our ability to use our net operating loss carryforwards may be limited.

We have incurred net operating losses during our history. Subject to the limitations described below, unused net operating losses generally may carry forward to offset future taxable income if we achieve profitability in the future, unless such net operating losses expire under applicable tax laws. Under current law, unused U.S. federal net operating losses generated in tax years beginning after December 31, 2017, will not expire and may be carried forward indefinitely, but the deductibility of such federal net operating loss carryforwards is limited to 80% of taxable income. It is uncertain if and to what extent various states will conform to current federal tax law. In addition, our ability to utilize our federal net operating carryforwards may be limited under Section 382 of the Internal Revenue Code of 1986, as amended, or the Code. The limitations apply if we experience an "ownership change," which is generally defined as a greater than 50 percentage point change (by value) in the ownership of our equity by certain stockholders or groups of stockholders over a rolling three-year period. Similar provisions of state tax law may also apply to limit the use of our state net operating loss carryforwards. Past or future changes in our stock ownership, including as a result of our initial public offering, some of which may be outside of our control, may have triggered or may trigger an ownership change that materially impacts our ability to utilize pre-change net operating loss carryforwards. Moreover, there may be periods during which the use of net operating loss carryforwards in various jurisdictions is suspended or otherwise subject to additional limitations. Accordingly, our ability to use our net operating loss carryforwards to offset taxable income may be subject to such limitations or special rules that apply at the state level, which could adversely affect our results of operations.

ITEM 1B. UNRESOLVED STAFF COMMENTS

Not applicable.

ITEM 2. PROPERTIES

The following table summarizes the location, ownership status and total square footage of space utilized for our operations and principal corporate offices as of December 31, 2022:

	Location	Square Footage
Operations facilities	11 locations in 5 US states, 2 UK counties, 1 CAN province, 1 GER county and 1 UAE city	171,500
Principal corporate offices:		
Corporate headquarters	Roanoke, Virginia (US)	6,500
OptaSense corporate office	Farnborough, Hampshire (UK)	6,200
Lios corporate office	Cologne, Germany	2,400

All of our properties are leased with various end dates through 2026. We believe that our existing facilities are adequate for our current needs and suitable additional or substitute space will be available as needed to accommodate expansion of our operations.

ITEM 3. LEGAL PROCEEDINGS

From time to time, we may become involved in litigation or claims arising from our operations in the normal course of business. Management currently believes the amount of ultimate liability, if any, with respect to these actions will not materially affect our financial position, results of operations, or liquidity.

Refer to Note 15, *Commitments and Contingencies*, of the Notes to the Consolidated Financial Statements included herein for information relating to certain legal proceedings.

ITEM 4. MINE SAFETY DISCLOSURES

Not applicable.

PART II

ITEM 5. MARKET FOR REGISTRANT'S COMMON EQUITY, RELATED STOCKHOLDER MATTERS AND ISSUER PURCHASES OF EQUITY SECURITIES

STOCKHOLDERS

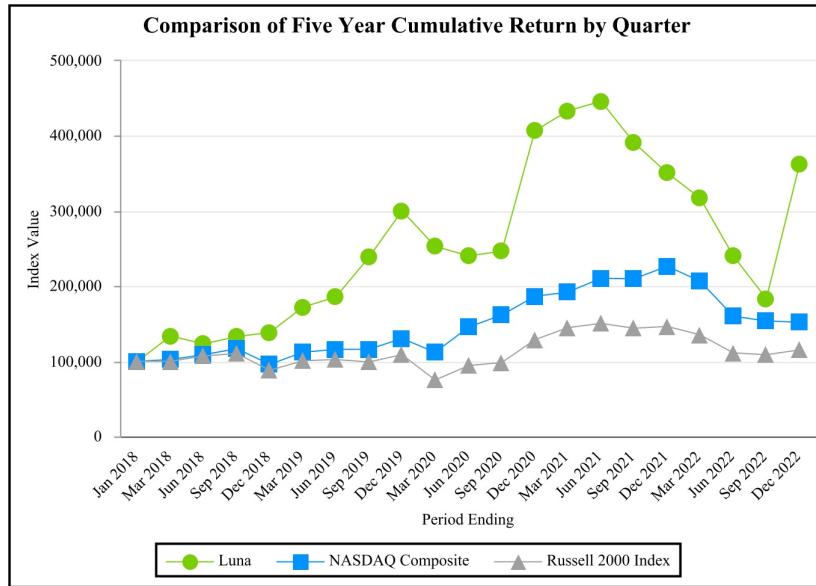
Our common stock is listed on the Nasdaq Capital Market under the symbol "LUNA." As of March 14, 2023, we had 33,420,773 shares of common stock outstanding held by 83 holders of record. The actual number of stockholders is greater than this number of record holders and includes stockholders who are beneficial owners but whose shares are held in street name by brokers and other nominees. This number of holders of record also does not include stockholders whose shares may be held in trust by other entities.

STOCK PERFORMANCE GRAPH

The graph set forth below compares the cumulative total stockholder return on our common stock for the previous five years, during which our common stock was traded on the Nasdaq Capital Market, as compared to the cumulative total return of the Nasdaq Composite Index and the Russell 2000 Index over the same period. This graph assumes the investment of \$100,000 in our common stock at the closing price on January 1, 2018, and an equivalent amount in the Nasdaq Composite Index and the Russell 2000 Index on that date, and assumes the reinvestment of dividends, if any. We have never paid dividends on our common stock and have no present plans to do so.

Since there is no published industry or line-of-business index for our business reflective of our performance, nor do we believe we can reasonably identify a peer group, we measure our performance against issuers with similar market capitalizations. We selected the Russell 2000 Index because it measures the performance of a broad range of companies with lower market capitalizations than those companies included in the S&P 500 Index.

The comparisons shown in the graph below are based upon historical data. We caution that the stock price performance shown in the graph below is not necessarily indicative of, nor is it intended to forecast, the potential future performance of our common stock.



The preceding Stock Performance Graph is not deemed filed with the Securities and Exchange Commission and shall not be incorporated by reference in any of our filings under the Securities Act of 1933, as amended, or the Securities Exchange Act of 1934, as amended, whether made before or after the date hereof and irrespective of any general incorporation language in any such filing.

DIVIDEND POLICY

Since our inception, we have never declared or paid any cash dividends on our common stock. We currently expect to retain any future earnings for use in the operation and expansion of our business, and therefore do not anticipate paying any cash dividends in the foreseeable future. In addition, our debt facility with PNC Bank restricts us from paying cash dividends on our capital stock without the bank’s prior written consent.

Unregistered Sales of Equity Securities

Not applicable.

Purchases of Equity Securities by the Issuer and Affiliated Parties-

The following table summarizes repurchases of our common stock during the three months ended December 31, 2022.

Period	Total Number of Shares Purchased	Average Price Paid per Share	Total Number of Shares Purchased as Part of a Publicly Announced Program	Approximate Dollar Value of Shares that May Yet be Purchased Under the Program
10/1/2022 - 10/31/2022	1,360 (1) \$	4.85	—	\$
11/1/2022 - 11/30/2022	5,036 (1) \$	5.23	—	\$
12/1/2022 - 12/31/2022	5,509 (1) \$	8.37	—	\$

(1) These shares of common stock were repurchased from employees to satisfy tax withholding obligations triggered upon vesting of restricted stock units.

ITEM 6. RESERVED**ITEM 7. MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS**

The following discussion and analysis of our financial condition and results of operations should be read in conjunction with our consolidated financial statements and the related notes to those statements included elsewhere in this report. In addition to historical financial information, the following discussion and analysis contains forward-looking statements that involve risks, uncertainties and assumptions. Our actual results and timing of selected events may differ materially from those anticipated in these forward-looking statements as a result of many factors, including those discussed under "Risk Factors" and elsewhere in this report.

Business Overview

We are a leader in advanced optical technology, providing high performance fiber optic test, measurement and control products for the telecommunications and photonics industries; and distributed fiber optic sensing solutions that measure, or "sense," the structures for industries ranging from aerospace, automotive, oil and gas, security and infrastructure.

Our communications test and control products help customers test their fiber optic networks and assemblies with speed and precision in both lab and production environments. Our test and measurement products accelerate the development of high speed fiber optic components like photonic integrated circuits ("PICs"), coherent receivers and short-run fiber networks.

Our distributed fiber optic sensing products help designers and manufacturers more efficiently develop new and innovative products by measuring stress, strain, and temperature at a high resolution for new designs or manufacturing processes. In addition, our distributed fiber optic sensing products ensure the safety and structural integrity or operational health of critical assets in the field, by monitoring stress, strain, temperature and vibration in large civil and industrial infrastructure such as bridges, roads, pipelines and borders. We manufacture and sell "terahertz" (THz) products for layer thickness measurements for materials like plastics, rubber, and paint. Our THz products are used in the aerospace and automotive/EV sectors. We also provide applied research services, primarily under federally funded development programs that leverage our sensing and instrumentation technologies to meet the specific needs and applications of our customers.

Prior to September 30, 2021, we were organized into two main reporting segments, our Lightwave segment and our Luna Labs segment. We have one reportable segment, Lightwave, following the determination that our Luna Labs segment met held-for-sale and discontinued operations accounting criteria at the end of the third quarter of 2021. Our Lightwave segment consists of our fiber optics testing, measurement and sensing solutions. On March 8, 2022, we completed the sale of substantially all of our equity interests in Luna Labs. Prior to the sale, our Luna Labs segment performed applied research principally in the areas of sensing and instrumentation, advanced materials, optical technologies and health sciences.

Our Lightwave segment develops, manufactures and markets optical measurement technologies, including the following:

- Sensing, including
 - short, medium and long-range distributed fiber optic sensing solutions; and
 - Terahertz, “THz” measurement products.
- Communications test and photonic control, including
 - test equipment for communications devices and networks; and
 - specialty laser and photonic components.

Our Lightwave segment also performs applied research principally in the areas of optical sensing and THz technologies. Revenues from product sales are mostly derived from the sales of our sensing and communications test, measurement and control products that make use of light-transmitting optical fibers, or fiber optics.

As we develop and commercialize new products, our revenues will reflect a broader and more diversified mix of products. Our key initiative for long term growth is to become a leading provider of fiber optic communications test, measurement, control and sensing equipment. Recent acquisitions have added strategic technologies and products that complement our existing suite of sensing products and provided for expansion into high-growth markets such as security and perimeter detection, smart infrastructure monitoring and oil and gas. Our products have historically been strong in long-range, discrete sensing and short range, fully distributed sensing which are best when specific, known locations need to be monitored. Additional product offerings from these strategic acquisitions have helped us fill a gap for long range, fully distributed acoustic, temperature and strain measurement, which is best for applications where signals can occur anywhere along the length of the sensor.

We may incur increasing expenses as we seek to expand our business, including expenses for research and development, sales and marketing and manufacturing capabilities. We may continue to grow our business in part through acquisitions of additional companies and complementary technologies, which could cause us to incur transaction expenses, amortization or write-offs of intangible assets and goodwill and other acquisition-related expenses. As a result, we may incur net losses in future periods, and these losses could be substantial.

Backlog

Our backlog of purchase orders received for which the related goods have not been shipped or recognized as revenue was \$52.9 million and \$38.4 million at December 31, 2022 and 2021, respectively. We define backlog as the dollar amount of obligations payable to us under negotiated contracts upon completion of a specified portion of work that has not yet been completed, exclusive of revenues previously recognized for work already performed under these contracts, if any. Total backlog includes funded backlog, which is the amount for which money has been directly authorized by the U.S. government or for which a purchase order has been received from a commercial customer, and unfunded backlog, which represents firm orders for which funding has not yet been appropriated.

Discontinued Operations

On March 8, 2022, we completed the sale of substantially all of our equity interests in our Luna Labs business to certain members of Luna Labs’ senior management team and a group of outside investors for an initial purchase price of \$20.4 million before working capital and escrow adjustments and transaction fees. We had been actively marketing our Luna Labs segment to prospective buyers during 2021 as part of our growth strategy for our Lightwave segment. We have separately reported the results of our Luna Labs segment as discontinued operations in our consolidated statement of operations for the year ended December 31, 2022 and 2021, and presented the related assets and liabilities as held for sale in the consolidated balance sheet as of December 31, 2021.

Acquisition of LIOS Sensing

On March 10, 2022, we acquired NKT Photonics GmbH and LIOS Technology Inc. (collectively, “LIOS Sensing”) for €20.0 million, or \$22.1 million. LIOS Sensing, based in Cologne, Germany and formerly owned by NKT Photonics A/S, provides temperature and strain sensing products which are highly complementary to our existing portfolio of fiber optic offerings. Similar to past acquisitions, we believe the acquisition of LIOS Sensing will accelerate our technology roadmap and overall growth.

Description of Our Revenues, Costs and Expenses

Revenues

We generate revenues from product sales, commercial product development and licensing and technology development activities. Our Lightwave segment revenues reflect amounts that we receive from sales of our products or development of products for third parties and, to a lesser extent, fees paid to us in connection with licenses or sub-licenses of certain patents and other intellectual property.

We derived Luna Labs segment revenues, which are presented as discontinued operations, from providing research and development services to third parties, including government entities, academic institutions and corporations, and from achieving milestones established by some of these contracts and in collaboration agreements. In general, we completed contracted research over periods ranging from six months to three years and recognize these revenues over the life of the contract as costs are incurred. Following our sale of Luna Labs in March 2022, we no longer derive revenues from Luna Labs.

Cost of Revenues

Cost of revenues associated with Lightwave segment revenues consists of license fees for use of certain technologies, product manufacturing costs including all direct material and direct labor costs, amounts paid to our contract manufacturers, manufacturing, shipping and handling, provisions for product warranties and inventory obsolescence, as well as overhead allocated to each of these activities.

Cost of revenues associated with Luna Labs segment revenues, which are presented as discontinued operations, consisted of costs associated with performing the related research activities including direct labor, amounts paid to subcontractors and overhead allocated to Luna Labs segment activities.

Operating Expense

Operating expense consists of selling, general and administrative expense, as well as expenses related to research, development and engineering, depreciation of fixed assets, amortization of intangible assets and costs related to merger and acquisitions activities. These expenses also include compensation for employees in executive and operational functions including certain non-cash charges related to expenses from equity awards, facilities costs, professional fees, salaries, commissions, travel expense and related benefits of personnel engaged in sales, marketing, and administrative activities; costs of marketing programs and promotional materials; salaries, bonuses and related benefits of personnel engaged in our own research and development beyond the scope and activities of our historical Luna Labs segment; product development activities not provided under contracts with third parties; and overhead costs related to these activities. The operating expense of our Luna Labs segment is presented in discontinued operations.

Investment Income

Investment income consists of amounts earned on our cash equivalents. We sweep, on a daily basis, a portion of our cash on hand into a fund invested in U.S. government obligations.

Interest Expense

Interest expense is composed of interest paid under our term and revolving loans as well as interest accrued on our finance lease obligations.

Critical Accounting Policies and Estimates**Revenue Recognition***Products and Services*

We evaluate whether two or more contracts should be combined and accounted for as one single contract and whether the combined or single contract should be accounted for as more than one performance obligation. We recognize revenue when the performance obligation has been satisfied by transferring control of the product or service to the customer. For tangible products that contain software that is essential to the tangible product's functionality, we consider the product and software to be a single performance obligation. For contracts with multiple performance obligations, we allocate the contract's transaction price to each performance obligation based on their relative stand-alone selling prices. In such circumstances, we use the observable price of goods or services which are sold separately in similar circumstances to similar customers. If these prices are not observable, then we will estimate the stand-alone selling price using information that is reasonably available. For the majority of our standard products and services, price list and discount structures related to customer type are available. Shipping and handling activities primarily occur after a customer obtains control and are considered fulfillment costs rather than separate performance obligations.

For standard products, we recognize revenue at a point in time when control passes to the customer. Absent substantial product acceptance clauses, this is based on the shipping terms. In instances where acceptance of the product is specified by the customer, revenue for the product and any related installation services is deferred until such required acceptance criteria have been met. For custom products that require engineering and development based on customer requirements, we will recognize revenue over time using the input method based on cost incurred to date. For extended warranties and product rentals, revenue is recognized over time using the output method based on the time elapsed for the warranty or service period. In the case of warranties, we record a contract liability for amounts billed but that are not recognized until subsequent periods. For monitoring services where we are performing monitoring of an asset the customer controls, revenue is recognized over time based on the duration of the underlying contract.

Research and Development Contracts

Our contracts with agencies of the U.S. government are subject to periodic funding by the respective contracting agency. Funding for a contract may be provided in full at inception of the contract or ratably throughout the contract as the services are provided. In evaluating the probability of funding for purposes of assessing collectability of the contract price, we consider our previous experience with our customers, communication with our customers regarding funding status and our knowledge of available funding for the contract or program. If funding is not assessed as probable it is not included in the transaction price and the related revenue is not recorded until it is determined that it is probable we will collect the consideration for the related goods or services.

Because of control transferring over time, revenue is recognized based on the extent of progress towards completion of the performance obligation. The selection of the method to measure progress towards completion requires judgment and is based on the nature of the services to be provided. We generally use the input method, more specifically the cost-to-cost measure of progress for our contracts because it best depicts the transfer of control to the customer, which occurs as we incur costs on our contracts. Under the cost-to-cost measure of progress, the extent of progress towards completion is measured based on the ratio of costs incurred to date to the total estimated costs at completion of the performance obligation. The underlying bases for estimating our contract research revenues are measurable expenses, such as labor, subcontractor costs and materials, and data that are updated on a regular basis for purposes of preparing our cost estimates. Our research contracts generally have a period of performance of six months to three years, and our estimates of contract costs have historically been consistent with actual results. Revisions in these estimates between accounting periods to reflect changing facts and circumstances have not had a material impact on our operating results, and we do not expect future changes in these estimates to be material. The cumulative impact of any revisions to estimates and the full impact of anticipated losses on any type of contract are recognized in the period in which they become known.

Income Taxes

We are subject to income taxes primarily in the United States, United Kingdom and Germany. We estimate our tax liability through calculating our current tax liability, together with assessing temporary and permanent differences resulting from the different treatment of items for tax and accounting purposes. The temporary differences result in deferred tax assets and liabilities, which we record on our balance sheet. Management then assesses the likelihood that deferred tax assets will be recovered in future periods. In assessing the need for a valuation allowance against the net deferred tax asset, management considers factors such as future reversals of existing taxable temporary differences, taxable income in prior carry back years, whether carry back is permitted under the tax law, tax planning strategies and estimated future taxable income exclusive of reversing temporary differences and carryforwards. To the extent that we cannot conclude that it is more likely than not that the benefit of such assets will be realized, we establish a valuation allowance to reduce their net carrying value. As of December 31, 2022, our valuation allowance was \$3.6 million.

The tax rates used to determine deferred tax assets or liabilities are the enacted tax rates in effect for the year in which the differences are expected to reverse. Based on the evaluation of all available information, we recognize future tax benefits, such as net operating loss ("NOL") carryforwards, to the extent that realizing these benefits is considered more likely than not. Although a portion of NOLs included in deferred taxes are subject to limitation under IRC Section 382, there is no expectation that realization will not occur.

We recognize tax benefits from an uncertain tax position only if it is more likely than not that the tax position will be sustained on examination by taxing authorities. While it is often difficult to predict the final outcome of timing of the resolution of any particular tax matter, we establish a liability at the time we determine it is more likely than not we will be required to pay additional taxes related to certain matters. These liabilities are recorded in accrued liabilities in our consolidated balance sheets. We adjust this provision, including any impact on the related interest and penalties, in light of changing facts and circumstances, such as the progress of a tax audit. A number of years may elapse before a particular matter for which we have established a liability is audited and finally resolved. The number of years with open tax audits varies depending on the tax jurisdiction. Settlement of any particular issue would usually require the use of cash. We recognize favorable resolutions of tax matters for which we have previously established liabilities as a reduction to our income tax expense when the amounts involved become known.

Our future effective tax rates could be adversely affected if actual earnings are different than our estimates, by changes in the valuation of our deferred tax assets or liabilities, outcomes resulting from income tax examinations, or by changes or interpretations in tax laws, regulations or accounting principles.

Intangible Assets

Definite-lived intangible assets are amortized over their respective estimated useful lives and are reviewed for impairment whenever events or changes in circumstances indicate that the carrying amount of an asset might not be recoverable. Recoverability of assets to be held and used is measured by a comparison of the carrying amount of an asset to future undiscounted net cash flows expected to be generated by the asset. If such assets fail the recoverability test, the impairment to be recognized is measured by the amount by which the carrying amount of the asset exceeds the fair value of the asset. If the estimates of the useful lives should change, we will amortize the remaining book value over the remaining useful lives. As of December 31, 2022, our intangible assets, which were primarily acquired from previous acquisitions, consisted of developed technology, trade names / trademarks, backlog and customer relationships with a total carrying value of \$18.8 million.

Goodwill

Goodwill is tested annually for impairment as of the first day of our fourth quarter (October 1st) and whenever events or changes in circumstances indicate the carrying value of goodwill may not be recoverable. As of December 31, 2022, we had one reporting unit which contained goodwill. Our goodwill impairment evaluation consisted of a qualitative assessment. A qualitative assessment can be performed to determine whether it is more likely than not the fair value of the reporting unit is less than its carrying value. If the reporting unit does not pass the qualitative assessment, we compare the fair value of each reporting unit to its carrying value using a quantitative assessment. If the fair value of the reporting unit exceeds its carrying value, goodwill is considered not impaired. If the fair value of the reporting unit is less than the carrying value, the difference is recorded as an impairment loss.

For the quantitative assessment, we estimate the fair value of each reporting unit using a combination of an income approach using a discounted cash flow ("DCF") analysis and a market-based valuation approach based on comparable public company trading values. Determining the fair value of a reporting unit requires the exercise of significant management judgments, including the amount and timing of projected future revenues, earnings and cash flows after considering factors

such as recent operating performance, general market and industry conditions, existing and expected future contracts, changes in working capital and long-term business plans and growth initiatives. The carrying value of each reporting unit includes the assets and liabilities employed in its operations and goodwill.

As of December 31, 2022, the carrying value of our goodwill was \$26.9 million. We completed our annual goodwill impairment test in the fourth quarter of 2022 and determined that no impairment existed.

Business Combinations

We account for business combinations under the acquisition method of accounting, in accordance with ASC 805 - *Business Combinations*. Under ASC 805, the total estimated purchase consideration is allocated to the acquired tangible and intangible assets and assumed liabilities based on their estimated fair values as of the acquisition date. Any excess of the fair value of acquisition consideration over the fair value of identifiable assets acquired and liabilities assumed is recorded as goodwill. Determining the fair value of acquired intangible assets is judgmental in nature and requires the use of significant estimates and assumptions, including the discount rate, revenue growth rates, projected gross margins, estimated research and development expenses, and operating profit margins.

Results of Operations

The following table shows information derived from our consolidated statements of operations expressed as a percentage of total revenues for the periods presented.

	Years ended December 31,	
	2022	2021
Revenue	100.0 %	100.0 %
Cost of revenue	39.3	41.1
Gross profit	60.7	58.9
Operating expense	62.5	61.9
Operating loss	(1.8)	(3.0)
Total other expense	(0.6)	(0.5)
Loss from continuing operations before income taxes	(2.4)	(3.5)
Income tax benefit	0.2	2.3
Net loss from continuing operations	(2.2)	(1.2)
Income from discontinued operations, net of income taxes	10.6	2.8
Net income	8.4 %	1.6 %

Year Ended December 31, 2022 Compared to Year Ended December 31, 2021*Revenues*

Revenues for the year ended December 31, 2022 increased \$22.0 million, or 25%, to \$109.5 million compared to \$87.5 million for the year ended December 31, 2021. The increase in revenues was due to the revenues from Lios, which was acquired in March 2022, and growth in our sensing and communications test product sales.

Cost of Revenues and Gross Margin

Cost of revenues increased \$7.0 million, or 20%, to \$43.0 million for the year ended December 31, 2022 compared to \$36.0 million for the year ended December 31, 2021. This increase in cost of revenues was in line with our sales growth. Our overall gross margin for the year ended December 31, 2022 was 61% compared to 59% for the year ended December 31, 2021. This increase in gross margin was primarily due to product sales representing a larger portion of our total sales.

Operating Expense

(in thousands)	Years ended December 31,		\$ Difference	% Difference
	2022	2021		
Selling, general and administrative expense	\$ 57,544	\$ 43,956	\$ 13,588	30.9 %
Research, development and engineering expense	10,837	10,190	647	6.3 %
Total operating expense	\$ 68,381	\$ 54,146	\$ 14,235	26.3 %

Selling, general and administrative expense increased \$13.6 million to \$57.5 million for the year ended December 31, 2022 compared to \$44.0 million for the year ended December 31, 2021. Selling, general and administrative expense increased primarily due to the acquired Lios operations, higher variable costs supporting our sales growth and higher share-based compensation.

Research, development and engineering expenses increased \$0.6 million to \$10.8 million for the year ended December 31, 2022 compared to \$10.2 million for the year ended December 31, 2021 primarily due to the acquired Lios operations.

Loss from Continuing Operations Before Income Taxes

During the year end December 31, 2022, we recognized a loss from continuing operations before income taxes of \$2.5 million compared to \$3.1 million for the year ended December 31, 2021.

Income Tax Benefit

For the years ended December 31, 2022 and December 31, 2021, we recorded an income tax benefit of \$0.2 million and \$2.0 million, respectively. The income tax benefit for 2022 was primarily related to the benefit from pre-tax losses, research and development credits and foreign derived intangible income, partially offset by losses in jurisdictions where those losses are not expected to be realized. The income tax benefit for 2021 was primarily related to the pre-tax loss and deductions on vested RSUs and stock option exercises during the year.

Net Income from Discontinued Operations

For the years ended December 31, 2022 and December 31, 2021, we recognized income from discontinued operations, net of income taxes, of \$11.6 million and \$2.5 million, respectively. The results of our discontinued operations for both years include the operations of our former Luna Lab segment that were classified as held for sale. The results of our discontinued operations for the year ended December 31, 2022 included a gain of \$9.8 million, net of tax, on the sale of Luna Labs.

Liquidity and Capital Resources

At December 31, 2022, our total cash and cash equivalents were \$6.0 million. We require cash to: (i) fund our operating expenses, working capital requirements, and outlays for strategic acquisitions and investments, (ii) service our debt, including principal and interest; (iii) conduct research and development; (iv) incur capital expenditures; and (v) repurchase our common stock. As part of our business strategy, we review acquisition and divestiture opportunities on a regular basis. In March 2022, we completed the disposition of Luna Labs and the acquisition of LIOS Sensing, which are discussed elsewhere in this Form 10-K. The LIOS Sensing acquisition price of \$22.1 million was funded from \$13.0 million of initial proceeds from the disposition of Luna Labs with the remainder of funding coming from availability under our revolver and operating cash. In June 2022, we completed a refinancing of our previous credit facility to, among other things, extend the maturity date of our Term Loan and Revolving Line and increase our total borrowing capacity.

We believe that the key factors that could affect our internal and external sources of cash include:

- Changes in demand for our products, competitive pricing pressures, supply chain constraints, effective management of our manufacturing capacity, our ability to achieve further reductions in operating expenses, our ability to make progress on the achievement of our business strategy goals, and our ability to make the research and development expenditures required to remain competitive in our business.
- Our access to bank financing and the debt and equity capital markets that could impair our ability to obtain needed financing on acceptable terms or to respond to business opportunities and developments as they arise, including interest rate fluctuations, macroeconomic conditions, sudden reductions in the general availability of lending from banks or the related increase in cost to obtain bank financing and our ability to maintain compliance with covenants under our debt agreements in effect from time to time.

As of December 31, 2022, we had outstanding borrowings under our Term Loan and Revolving Loan of \$18.9 million and \$4.3 million, respectively. We may repay and reborrow advances under the Revolving Line from time to time pursuant to the Revolving Line of Credit Note.

The Term Loan matures on June 21, 2027. The Term Loan amortizes at a rate equal to 10% for the first year, 15% for years two and three and 20% in years four and five, in each case paid on a quarterly basis. Accrued interest is due and payable on June 21, 2027. The Term Loan bears interest at a floating per annum rate equal to the sum of (a) the daily simple secured overnight financing rate, or Daily Simple SOFR, plus (b) an SOFR adjustment of ten basis points (0.10%), plus (c) an applicable margin. The applicable margin ranges from 1.75% to 2.50% depending on the Net Leverage Ratio (as defined in the Loan Agreement). We may prepay the Term Loan without penalty or premium.

The Revolving Line expires on June 21, 2027. Borrowings under the Revolving Line bear interest at a floating per annum rate equal to the sum of (a) Daily Simple SOFR, plus (b) a SOFR adjustment of ten basis points (0.10%), plus (c) an applicable margin. The applicable margin ranges from 1.75% to 2.50% per annum, depending on the Net Leverage Ratio. Accrued interest is due and payable on the first day of each month and the outstanding principal balance and any accrued but unpaid interest will

be due and payable on June 21, 2027. The unused portion of the Revolving Line will accrue a fee equal to 0.20% per annum multiplied by the quarterly average unused amount. The unused Revolving Line totaled \$10.7 million at December 31, 2022.

Additional details of our Loan Agreement can be found in Note 10, "Debt" in the notes to our audited consolidated financial statements included elsewhere in this Form 10-K.

We believe that our cash and cash equivalents as of December 31, 2022 in addition to amounts available to us under our Revolving Line will provide adequate liquidity for us to meet our working capital needs over the next twelve months from the date of issuance of the consolidated financial statements included elsewhere in this Annual Report on Form 10-K. Additionally, we believe that should we have the need for increased capital spending to support our planned growth, we will be able to fund such growth through either third-party financing on competitive market terms or through our available cash. However, these estimates are based on assumptions that may prove to be incorrect. If we require additional capital beyond our current balances of cash and cash equivalents and borrowing capacity under the Revolving Line described above, this additional capital may not be available when needed, on reasonable terms, or at all. Moreover, our ability to raise additional capital may be adversely impacted by potential worsening global economic conditions and the recent disruptions to and volatility in the credit and financial markets in the United States and worldwide resulting from the ongoing COVID-19 pandemic.

Discussion of Cash Flows

<i>(in thousands)</i>	Years ended December 31,	
	2022	2021
Net cash (used in)/provided by operating activities	\$ (8,567)	\$ 4,483
Net cash used in investing activities	(11,055)	(1,768)
Net cash provided by/(used in) financing activities	9,512	(1,264)
Effect of exchange rate changes on cash and cash equivalents	(994)	311
Net (decrease)/increase in cash and cash equivalents	\$ (11,104)	\$ 1,762

During 2022, net cash used in operating activities was \$8.6 million, compared to net cash provided by operating activities of \$4.5 million during 2021. Overall, this net increase in use of operating cash was driven by an increase in working capital, including higher inventory levels to support our sales growth and to mitigate longer order lead times because of global supply chain issues.

During 2022, cash used in investing activities was \$11.1 million which was an increase from \$1.8 million in cash used in investing activities during 2021. The increase in net cash used in investing activities was primarily due to the acquisition of LIOS totaling \$22.1 million partially offset from the proceeds from the sale of Luna Labs totaling \$14.0 million.

During 2022, cash provided by financing activities was \$9.5 million, compared to cash used in financing activities of \$1.3 million in 2021. This increase is primarily due to net proceeds of \$7.4 million from new borrowings used to partially fund the acquisition of Lios in March 2022. The remaining change in borrowing activity was due to the refinancing of our credit facility in the second quarter of 2022.

Summary of Cash Requirements

The following table sets forth information concerning our current and long-term material cash requirements as of December 31, 2022 that are fixed and determinable.

<i>(in thousands)</i>	Total	Less than 1 year	1 - 3 years	3 - 5 years
Debt financing (1)	\$ 23,226	\$ 2,500	\$ 6,500	\$ 14,226
Operating facility leases (2)	5,386	2,484	2,762	140
Finance leases (3)	153	53	100	—
Purchase order obligation (4)	6,560	6,560	—	—
Total	\$ 35,325	\$ 11,597	\$ 9,362	\$ 14,366

(1) In December 2020, we entered into a Loan Agreement with the Lender which provided us with a \$12.5 million Term Loan and a \$15.0 million Revolving Line. We borrowed the full amount of the Term Loan, subject to quarterly repayments, and \$7.6 million against the Revolving Line. In March 2022 and in June 2022 we amended the Loan

Agreement to increase the Term Loan to \$20.0 million and to extend the maturity of the Term Loan and expiration of the Revolving Line. The Term Loan matures in December 2027 and the Revolving Line expires in December 2027.

- (2) We lease our facilities for all of our locations under operating leases that as of December 31, 2022, are scheduled to expire between September 2023 and August 2026. Upon expiration of our office leases, we may exercise certain renewal options as specified in the leases. Rental payments associated with these option periods are not included in the table above.
- (3) Our office equipment leases expire in 2023 and 2025, respectively.
- (4) Purchase order obligations included outstanding orders for inventory purchases. In 2022, we executed non-cancelable purchase orders for a total amount of \$9.4 million for multiple shipments of tunable lasers and component parts to be delivered over periods up to 15 months between in January 2023 and December 2024.

ITEM 7A. 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. We do not hold or issue financial instruments for trading purposes or have any derivative financial instruments. Our exposure to market risk is limited to interest rate fluctuations, due to changes in the general level of U.S. interest rates, and foreign currency exchange rates.

Interest Rate Risk

We do not use derivative financial instruments as a hedge against interest rate fluctuations, and, as a result, we are subject to interest rate risk on our Term Loan and Revolving Line with interest rates at a floating per annum rate equal to the sum of (a) Daily Simple SOFR, plus (b) a SOFR adjustment of ten basis points (0.10%), plus (c) an applicable margin. The applicable margin ranges from 1.75% to 2.50% per annum, depending on the Net Leverage Ratio as defined in the credit agreement governing the Term Loan and Revolving Loan. As of December 31, 2022, we had outstanding borrowings under our Term Loan and Revolving Loan of \$18.9 million and \$4.3 million, respectively, at the weighted-average variable interest rate of 6.7%. At this borrowing level, a 0.25% increase in interest rates would have had an unfavorable annual impact on our pre-tax earnings and cash flows by approximately \$0.06 million.

Foreign Currency Exchange Rate Risk

Our foreign currency exposure is primarily related to our net investment in foreign subsidiaries. Foreign exchange rate gains or losses resulting from the translation of our foreign operations into U.S. dollars are reflected as a cumulative translation adjustment and do not affect our results of operations.

ITEM 8. FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA

Luna Innovations Incorporated

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REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Shareholders and the Board of Directors of Luna Innovations Incorporated

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheet of Luna Innovations Incorporated (the Company) as of December 31, 2022, the related consolidated statements of operations, comprehensive income, changes in stockholders' equity and cash flows for the year ended December 31, 2022, and the related notes and financial statement schedule included under Item 15 (a) (collectively referred to as the "consolidated financial statements"). In our opinion, the consolidated financial statements present fairly, in all material respects, the financial position of the Company at December 31, 2022, and the results of its operations and its cash flows for the year ended December 31, 2022, in conformity with U.S. generally accepted accounting principles.

Basis for Opinion

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

We conducted our audit in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud. The Company is not required to have, nor were we engaged to perform, an audit of its internal control over financial reporting. As part of our audit, we are required to obtain an understanding of internal control over financial reporting but not for the purpose of expressing an opinion on the effectiveness of the Company's internal control over financial reporting. Accordingly, we express no such opinion.

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

Critical Audit Matters

The critical audit matters communicated below are matters arising from the current period audit of the financial statements that were communicated or required to be communicated to the audit committee and that: (1) relate to accounts or disclosures that are material to the financial statements and (2) involved our especially challenging, subjective, or complex judgments. The communication of critical audit matters does not alter in any way our opinion on the consolidated financial statements, taken as a whole, and we are not, by communicating the critical audit matters below, providing separate opinions on the critical audit matters or on the accounts or disclosures to which they relate.

Revenue recognition – Identification of Performance Obligations and Allocation of Transaction Price to Performance Obligations*Description of the Matter*

As described in Notes 1 and 13 to the consolidated financial statements, the Company primarily recognizes revenue from sales of commercial products and services. Some of the Company's contracts contain multiple performance obligations. For these contracts, the Company assesses the performance obligations and accounts for those obligations separately if they are distinct. In such cases, the transaction price is allocated to the distinct performance obligations based on a relative standalone selling price.

Auditing the Company's determination of distinct performance obligations and the allocation of the transaction price to these performance obligations was challenging. For example, there were nonstandard terms and conditions that required judgment to determine the distinct performance obligations and relative standalone selling prices.

<i>How We Addressed the Matter in Our Audit</i>	To test the Company's identification of distinct performance obligations and determination of estimated standalone selling prices, our audit procedures included, among others, reading a sample of contracts to evaluate management's conclusions regarding distinct performance obligations and the assumptions used in the allocation of the transaction price. As part of our procedures, we also evaluated the accuracy and completeness of the underlying data used in management's determination of the relative standalone selling prices.
<i>Description of the Matter</i>	<p>Accounting for the Acquisition of Lios</p> <p>As discussed in Note 3 to the consolidated financial statements, in March 2022, the Company completed its acquisition of NKT Photonics GmbH and LIOS Technologies, Inc. (collectively "Lios") for aggregate consideration of \$22.1 million. The transaction was accounted for as a business combination. As part of the allocation of the purchase price, the Company estimated the fair value of intangible assets other than goodwill to be \$6.4 million, comprised primarily of customer relationships and developed technology intangible assets.</p> <p>Auditing the Company's accounting for its business combination was complex due to the significant estimation uncertainty in the determination of the fair value of identified intangible assets. Significant estimation was required due to the application of the valuation models and assumptions used to measure the fair value of the customer relationships and developed technology intangible assets. The significant assumptions used in determining the fair value included the revenue growth rates and operating profit margins. These assumptions relate to the future performance of the acquired businesses and are forward-looking.</p>
<i>How We Addressed the Matter in Our Audit</i>	To test the estimated fair value of the acquired customer-related and developed technology intangible assets, our audit procedures included, among others, evaluating the models and significant assumptions used by the Company's valuation specialist. For example, we tested the completeness and accuracy of the underlying data and compared the significant assumptions to current industry, market and economic trends, historical results of the acquired business, and other guideline public companies within the same industry. We involved our valuation specialists to assist in evaluating the Company's use of its valuation models and significant assumptions included in the fair value estimates. We performed a sensitivity analysis of the significant assumptions to evaluate the change in the fair values that would result from changes in assumptions.

/s/ Ernst & Young LLP

We have served as the Company's auditor since 2022.

Richmond, Virginia
March 16, 2023

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

Board of Directors and Stockholders
Luna Innovations Incorporated

Opinion on the financial statements

We have audited the accompanying consolidated balance sheets of Luna Innovations Incorporated (a Delaware corporation) and subsidiaries (the "Company") as of December 31, 2021 and 2020, the related consolidated statements of operations, comprehensive income, changes in stockholders' equity, and cash flows for the years then ended, and the related notes and financial statement schedule included under Item 15(a) (collectively referred to as the "financial statements"). In our opinion, the financial statements present fairly, in all material respects, the financial position of the Company as of December 31, 2021 and 2020, and the results of its operations and its cash flows for the years then ended, in conformity with accounting principles generally accepted in the United States of America.

Basis for opinion

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

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud. The Company is not required to have, nor were we engaged to perform, an audit of its internal control over financial reporting. As part of our audits we are required to obtain an understanding of internal control over financial reporting but not for the purpose of expressing an opinion on the effectiveness of the Company's internal control over financial reporting. Accordingly, we express no such opinion.

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

Critical audit matter

The critical audit matter communicated below is a matter arising from the current period audit of the financial statements that were communicated or required to be communicated to the audit committee and that: (1) relate to accounts or disclosures that are material to the financial statements and (2) involved our especially challenging, subjective, or complex judgments. The communication of critical audit matters does not alter in any way our opinion on the financial statements, taken as a whole, and we are not, by communicating the critical audit matter below, providing separate opinions on the critical audit matter or on the accounts or disclosures to which it relates.

Revenue recognition for fixed price contracts

As described further in Note 1 to the consolidated financial statements, the Company performs technology research under fixed price contracts with the associated revenue recognized over time. The Company has revenue from fixed price contracts in both revenue from continuing operations as well as in net loss from discontinued operations. For fixed price revenue contracts recognized over time, management utilizes the input method to measure progress toward the complete satisfaction of the performance obligations based upon the cost incurred to date as a percentage of the total estimated cost. We identified revenue recognition for fixed price contracts as a critical audit matter.

The principal consideration for our determination that revenue recognition for fixed price contracts was a critical audit matter is that the measure of progress towards completion utilizes assumptions for future costs to complete the performance obligations, and those assumptions have significant estimation uncertainty. A significant change in the assumptions could affect the profitability of the contract. Auditing such assumptions required extensive audit effort due to the volume and complexity of these contracts and a high degree of auditor judgment when performing audit procedures and evaluating the results of those procedures.

Our audit procedures related to testing revenue recognition of fixed-price contracts included the following, among others.

- We evaluated the design effectiveness of controls over the Company's process for recognizing revenue over time. This included the design of controls over the initial budgeting process and proportional performance determination.
- For a sample of contracts, we inquired regarding the status of the project and obtained an understanding for significant changes in budgeted to actual costs.
- For a sample of contracts, we tested the completeness and accuracy of costs incurred to date.

/s/ GRANT THORNTON LLP

We have served as the Company's auditor since 2005.

Philadelphia, Pennsylvania
March 14, 2022

Luna Innovations Incorporated
Consolidated Balance Sheets
(in thousands, except share data)

Assets	December 31, 2022	December 31, 2021
Current assets:		
Cash and cash equivalents	\$ 6,024	\$ 17,128
Accounts receivable, net	33,249	20,913
Contract assets	7,691	5,166
Inventory	36,582	22,493
Prepaid expenses and other current assets	4,328	3,793
Assets held for sale	—	12,952
Total current assets	87,874	82,445
Property and equipment, net	4,893	2,988
Intangible assets, net	18,750	17,177
Goodwill	26,927	18,984
Operating lease right-of-use asset	4,661	5,075
Other non-current assets	3,255	247
Deferred tax assets	4,647	3,321
Total assets	\$ 151,007	\$ 130,237
Liabilities and stockholders' equity		
Current liabilities:		
Current portion of long-term debt obligations	\$ 2,500	\$ 4,167
Accounts payable	8,109	2,809
Accrued and other current liabilities	16,694	9,258
Contract liabilities	4,089	4,649
Current portion of operating lease liability	2,239	2,101
Current liabilities held for sale	—	9,703
Total current liabilities	33,631	32,687
Long-term debt obligations	20,726	11,673
Long-term portion of operating lease liability	2,804	3,509
Other long-term liabilities	444	445
Total liabilities	57,605	48,314
Commitments and contingencies (Note 15)		
Stockholders' equity:		
Common stock, par value \$0.001, 100,000,000 shares authorized, 34,901,954 and 33,855,725 shares issued, 33,105,080 and 32,116,270 shares outstanding at December 31, 2022 and 2021, respectively	35	34
Treasury stock at cost, 1,796,862 and 1,744,206 shares at December 31, 2022 and 2021, respectively	(5,607)	(5,248)
Additional paid-in capital	104,893	98,745
Accumulated deficit	(2,296)	(11,575)
Accumulated other comprehensive loss	(3,623)	(33)
Total stockholders' equity	93,402	81,923
Total liabilities and stockholders' equity	\$ 151,007	\$ 130,237

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

Luna Innovations Incorporated
Consolidated Statements of Operations
(in thousands, except share and per share data)

	Years ended December 31,	
	2022	2021
Revenue	\$ 109,497	\$ 87,513
Cost of revenue (exclusive of amortization)	43,000	35,957
Gross profit	66,497	51,556
Operating expense:		
Selling, general and administrative	57,544	43,956
Research, development and engineering	10,837	10,190
Total operating expense	68,381	54,146
Operating loss	(1,884)	(2,590)
Other income/(expense):		
Other income, net	216	—
Investment income	46	—
Interest expense	(898)	(479)
Total other expense	(636)	(479)
Loss from continuing operations before income taxes	(2,520)	(3,069)
Income tax benefit	220	1,980
Net loss from continuing operations	(2,300)	(1,089)
Operating income from discontinued operations, net of income tax expenses of \$516 and \$584	1,730	2,471
Gain on sale of discontinued operations, net of income tax expenses of \$3,189	9,849	—
Income from discontinued operations, net of income taxes	11,579	2,471
Net income	<u>\$ 9,279</u>	<u>\$ 1,382</u>
Net loss per share from continuing operations:		
Basic	\$ (0.07)	\$ (0.03)
Diluted	\$ (0.07)	\$ (0.03)
Net income per share from discontinued operations:		
Basic	\$ 0.36	\$ 0.08
Diluted	\$ 0.36	\$ 0.08
Net income per share attributable to common stockholders:		
Basic	\$ 0.28	\$ 0.04
Diluted	\$ 0.28	\$ 0.04
Weighted average shares:		
Basic	32,591,973	31,658,085
Diluted	32,591,973	31,658,085

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

Luna Innovations Incorporated
Consolidated Statements of Comprehensive Income
(in thousands)

	Years ended December 31,	
	2022	2021
Net income	\$ 9,279	\$ 1,382
Other comprehensive (loss)/income	(3,590)	215
Total other comprehensive income	\$ 5,689	\$ 1,597

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

Luna Innovations Incorporated
Consolidated Statements of Changes in Stockholders' Equity
(in thousands, except share data)

	Common Stock		Treasury Stock		Additional Paid in Capital	Accumulated Deficit	Accumulated Other Comprehensive Loss	Total
	Shares	\$	Shares	\$				
Balance, December 31, 2020	31,024,537	\$ 33	1,699,975	\$ (4,789)	\$ 92,403	\$ (12,957)	\$ (248)	\$ 74,442
Exercise of stock option	818,267	1	—	—	2,256	—	—	2,257
Stock-based compensation	169,793	—	—	—	2,955	—	—	2,955
ESPP issuance	147,724	—	—	—	1,131	—	—	1,131
Purchase of treasury stock	(44,051)	—	44,051	(459)	—	—	—	(459)
Net income	—	—	—	—	—	1,382	—	1,382
Foreign currency translation adjustment	—	—	—	—	—	—	215	215
Balance, December 31, 2021	32,116,270	\$ 34	1,744,026	\$ (5,248)	\$ 98,745	\$ (11,575)	\$ (33)	\$ 81,923
Exercise of stock option	577,129	1	—	—	1,587	—	—	1,588
Stock-based compensation	278,677	—	—	—	3,617	—	—	3,617
ESPP issuance	185,840	—	—	—	944	—	—	944
Purchase of treasury stock	(52,836)	—	52,836	(359)	—	—	—	(359)
Net income	—	—	—	—	—	9,279	—	9,279
Foreign currency translation adjustment	—	—	—	—	—	—	(3,590)	(3,590)
Balance, December 31, 2022	33,105,080	\$ 35	1,796,862	\$ (5,607)	\$ 104,893	\$ (2,296)	\$ (3,623)	\$ 93,402

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

Luna Innovations Incorporated
Consolidated Statements of Cash Flows
(in thousands, except share data)

	Years ended December 31,	
	2022	2021
Cash flows (used in)/provided by operating activities:		
Net income	\$ 9,279	\$ 1,382
Adjustments to reconcile net income to net cash (used in)/provided by operating activities:		
Depreciation and amortization	5,449	4,628
Stock-based compensation	4,232	2,955
Loss on disposal of property and equipment	53	—
Gain from discontinued operations, net of tax	(9,849)	—
Deferred tax benefit	(2,363)	(1,501)
Changes in operating assets and liabilities:		
Accounts receivable	(9,151)	113
Contract assets	(5,008)	(1,672)
Inventory	(10,028)	939
Prepaid expenses and other current assets	(386)	582
Other long-term assets	1,108	—
Accounts payable and accrued liabilities	6,122	(3,213)
Contract liabilities	1,973	186
Other long-term liabilities	2	84
Net cash (used in)/provided by operating activities	(8,567)	4,483
Cash flows used in investing activities:		
Acquisition, net of cash acquired	(22,085)	—
Acquisition of property and equipment	(2,888)	(1,412)
Purchase of intangibles	(50)	(356)
Proceeds from sale of discontinued operations	13,968	—
Net cash used in investing activities	(11,055)	(1,768)
Cash flows provided by/(used in) financing activities:		
Proceeds from debt obligations	24,150	—
Payments on debt obligations	(16,763)	(4,144)
Payments on finance lease obligations	(48)	(48)
Repurchase of common stock	(359)	(459)
Proceeds from ESPP	944	1,131
Proceeds from the exercise of options	1,588	2,256
Net cash provided by/(used in) financing activities	9,512	(1,264)
Net change in cash and cash equivalents	(10,110)	1,451
Effect of exchange rate changes on cash and cash equivalents	(994)	311
Cash and cash equivalents—beginning of period	17,128	15,366
Cash and cash equivalents—end of period	\$ 6,024	\$ 17,128
Supplemental disclosure of cash flow information		
Cash paid for interest	\$ 805	\$ 458
Net cash received for income taxes	\$ 39	\$ 113

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

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

1. Organization and Summary of Significant Accounting Policies

Luna Innovations Incorporated ("we," "our" or the "Company"), headquartered in Roanoke, Virginia, was incorporated in the Commonwealth of Virginia in 1990 and reincorporated in the State of Delaware in April 2003.

We are a leader in advanced optical technology, providing high performance fiber optic test, measurement and control products for the telecommunications and photonics industries, and distributed fiber optic sensing solutions that measure, or "sense" the structures for industries ranging from aerospace, automotive, oil and gas, security and infrastructure. Our communications test and control products help customers test their fiber optic networks and assemblies with speed and precision in both lab and production environments. Our test and measurement products accelerate the development of high speed fiber optic components like photonic integrated circuits, coherent receivers and short-run fiber networks. Our distributed fiber optic sensing products help designers and manufacturers more efficiently develop new and innovative products by measuring stress, strain, and temperature at a high resolution for new designs or manufacturing processes. Our distributed fiber optic sensing products ensure the safety and structural integrity or operational health of critical assets in the field, by monitoring stress, strain, temperature, and vibration in large civil and industrial infrastructure such as bridges, roads, pipelines and borders. We manufacture and sell "terahertz" (THz) products for layer thickness measurements for materials like plastics, rubber, and paint. Our THz products are used in the aerospace and automotive/EV sector. We also provide applied research services, primarily under federally funded development programs, that leverage our sensing and instrumentation technologies to meet the specific needs and applications of our customers.

Consolidation Policy

Our consolidated financial statements are prepared in accordance with accounting principles generally accepted in the United States ("GAAP") and include our accounts and the accounts of our wholly-owned subsidiaries. We eliminate from our financial results all intercompany transactions.

Use of Estimates

The preparation of our consolidated financial statements in accordance with GAAP requires us to make estimates and assumptions that affect the reported amounts of assets, liabilities, revenues and expenses and the disclosure of contingent assets and liabilities in our consolidated financial statements and accompanying notes.

Although these estimates are based on our knowledge of current events and actions we may undertake in the future, actual results may differ from such estimates and assumptions.

*Revenue Recognition**Products and Services*

Revenues from product sales are generated by the sale of commercial products and services under various sales programs to the end user and through distribution channels. We sell fiber optic test and sensing systems to end users for use in numerous fiber optic-based measurement applications. Revenues are recorded net of applicable sales taxes collected from customers and payable to state or local governmental entities.

We evaluate whether two or more contracts should be combined and accounted for as one single contract and whether the combined or single contract should be accounted for as more than one performance obligation. We recognize revenue when the performance obligation has been satisfied by transferring control of the product or service to the customer. For tangible products that contain software that is essential to the tangible product's functionality, we consider the product and software to be a single performance obligation. For contracts with multiple performance obligations, we allocate the contract's transaction price to each performance obligation based on their relative stand-alone selling prices. In such circumstances, we use the observable price of goods or services which are sold separately in similar circumstances to similar customers. If these prices are not observable, then we will estimate the stand-alone selling price using information that is reasonably available. For the majority of our standard products and services, price list and discount structures related to customer type are available. Shipping and handling activities primarily occur after a customer obtains control and are considered fulfillment costs rather than separate performance obligations.

For standard products, we recognize revenue at a point in time when control passes to the customer. Absent substantial product acceptance clauses, this is based on the shipping terms. In instances where acceptance of the product is specified by the customer, revenue for the product and any related installation services is deferred until such required acceptance criteria have

been met. For custom products that require engineering and development based on customer requirements, we will recognize revenue over time using the input method based on cost incurred to date. For extended warranties and product rentals, revenue is recognized over time using the output method based on the time elapsed for the warranty or service period. In the case of warranties, we record a contract liability for amounts billed but that are not recognized until subsequent periods. For monitoring services where we are performing monitoring of an asset the customer controls, revenue is recognized over time based on the duration of the underlying contract.

Research and Development Contracts

We perform research and development for U.S. Federal government agencies, educational institutions and commercial organizations. We account for a research contract when a contract has been executed, the rights of the parties are identified, payment terms are identified, the contract has commercial substance, and collectability of the contract price is considered probable. Revenue is earned under cost reimbursable, time and materials and fixed price contracts. Direct contract costs are expensed as incurred.

Our contracts with agencies of the U.S. government are subject to periodic funding by the respective contracting agency. Funding for a contract may be provided in full at inception of the contract or ratably throughout the contract as the services are provided. In evaluating the probability of funding for purposes of assessing collectability of the contract price, we consider our previous experience with our customers, communication with our customers regarding funding status and our knowledge of available funding for the contract or program. If funding is not assessed as probable it is not included in the transaction price and the related revenue is not recorded until it is determined that it is probable we will collect the consideration for the related goods or services.

Under the typical payment terms of our U.S. government contracts, the customer pays us either performance-based payments ("PBPs") or progress payments. PBPs, which are typically used in firm fixed price contracts, are interim payments based on quantifiable measures of performance or on the achievement of specified events or milestones. Progress payments, which are typically used in our cost type contracts, are interim payments based on costs incurred as the work progresses. For our U.S. government cost-type contracts, the customer generally pays us during the performance period for 80% to 90% of our actual costs incurred. Because the customer retains a small portion of the contract price until completion of the contract and audit of allowable costs, cost type contracts generally result in revenue recognized in excess of billings which we present as contract assets on the balance sheet. Amounts billed and due from our customers are classified as receivables on the balance sheet. For non-U.S. government contracts, we typically receive interim payments as work progresses, although for some contracts, we may be entitled to receive an advance payment. We recognize a liability for these advance payments and PBPs paid in advance which are in excess of the revenue recognized and present these amounts as contract liabilities on the balance sheet.

To determine the proper revenue recognition method for research and development contracts, we evaluate whether two or more contracts should be combined and accounted for as one single modified contract and whether the combined or single contract should be accounted for as more than one performance obligation. For instances where a contract has options that were bid with the initial contract and awarded at a later date, we combine the options with the original contract when options are awarded. For most of our contracts, the customer contracts for research with multiple milestones that are interdependent. Consequently, the entire contract is accounted for as one performance obligation. The effect of the combined or modified contract on the transaction price and measure of progress for the performance obligation to which it relates, is recognized as an adjustment to revenue (either as an increase in or a reduction of revenue) on a cumulative catch-up basis.

Contract revenue recognition is measured over time as we perform because of continuous transfer of control to the customer. For U.S. government contracts which are typically subject to the Federal Acquisition Regulation, this continuous transfer of control to the customer is supported by clauses in the contract that allow the customer to unilaterally terminate the contract for convenience, pay us for cost incurred plus a reasonable profit and take control of any work in process. From time to time, as part of normal management processes, facts may change, causing revisions to estimated total costs or revenues expected. The cumulative impact of any revisions to estimates and the full impact of anticipated losses on any type of contract are recognized in the period in which they become known.

Because of control transferring over time, revenue is recognized based on the extent of progress towards completion of the performance obligation. The selection of the method to measure progress towards completion requires judgment and is based on the nature of the services to be provided. We generally use the input method, more specifically the cost-to-cost measure of progress for our contracts because it best depicts the transfer of control to the customer, which occurs as we incur costs on our contracts. Under the cost-to-cost measure of progress, the extent of progress towards completion is measured based on the ratio

of costs incurred to date to the total estimated costs at completion of the performance obligation. The underlying bases for estimating our contract research revenues are measurable expenses, such as labor, subcontractor costs and materials, and data that are updated on a regular basis for purposes of preparing our cost estimates. Our research contracts generally have a period of performance of six months to three years, and our estimates of contract costs have historically been consistent with actual results. Revisions in these estimates between accounting periods to reflect changing facts and circumstances have not had a material impact on our operating results, and we do not expect future changes in these estimates to be material. The cumulative impact of any revisions to estimates and the full impact of anticipated losses on any type of contract are recognized in the period in which they become known.

Under cost reimbursable contracts, we are reimbursed for costs that are determined to be reasonable, allowable and allocable to the contract and paid a fixed fee representing the profit negotiated between us and the contracting agency. Revenue from cost reimbursable contracts is recognized as costs are incurred plus an estimate of applicable fees earned. We consider fixed fees under cost reimbursable contracts to be earned in proportion to the allowable costs incurred in performance of the contract. Revenue from time and materials contracts is recognized based on direct labor hours expended at contract billing rates plus other billable direct costs. Fixed price contracts may include either a product delivery or specific service performance throughout a period. For fixed price contracts that provide for the development and delivery of a specific prototype or product, revenue is recognized over time using the input method based upon the percentage of completion of costs incurred to date versus total estimated costs.

Whether certain costs under government contracts are allowable is subject to audit by the government. Certain indirect costs are charged to contracts using provisional or estimated indirect rates, which are subject to later revision based on government audits of those costs. Management is of the opinion that costs subsequently disallowed, if any, would not likely have a significant impact on revenues recognized for those contracts.

Allowance for Uncollectible Receivables

Accounts receivable are recorded at their face amount, less an allowance for doubtful accounts. We review the status of our uncollected receivables on a regular basis. In determining the need for an allowance for uncollectible receivables, we consider our customers' financial stability, past payment history and other factors that bear on the ultimate collection of such amounts. The allowance was \$0.8 million and \$0.9 million at December 31, 2022 and 2021, respectively.

Cash and Cash Equivalents

We consider all highly liquid investments with maturities of three months or less when purchased to be cash equivalents. To date, we have not incurred losses related to cash and cash equivalents. Our foreign currency risk on cash and cash equivalents held outside of the US is not material. At December 31, 2022 there were no cash equivalents invested in U.S. Treasury obligations. At December 31, 2021, \$1.0 million was invested in U.S. Treasury obligations through a sweep account with our bank. The full value of amounts invested through the sweep account are convertible to cash on a daily basis. Our cash transactions are processed through reputable commercial banks. We regularly maintain cash balances with financial institutions which exceed Federal Deposit Insurance Corporation ("FDIC") insurance limits. At December 31, 2022 and 2021, we had approximately \$1.6 million and \$9.5 million, respectively, in excess of FDIC insured limits.

Fair Value Measurements

Our financial assets and liabilities are measured at fair value, which is defined as the price that would be received to sell an asset, or paid to transfer a liability, in an orderly transaction between market participants. Valuation techniques are based on observable or unobservable inputs. Observable inputs reflect market data obtained from independent sources, while unobservable inputs reflect our market assumptions. These two types of inputs have created the following fair value hierarchy:

- Level 1—Quoted prices for identical instruments in active markets.
- Level 2—Quoted prices for similar instruments in active markets; quoted prices for identical or similar instruments in markets that are not active; and model-derived valuations in which significant value drivers are observable.
- Level 3—Valuations derived from valuation techniques in which significant value drivers are unobservable.

The carrying values of cash and cash equivalents, accounts receivable, accounts payable and accrued liabilities approximate fair value because of the short-term nature of these instruments. The carrying amount of lease liabilities approximate fair value because these financial instruments bear interest at rates that approximate current market rates for similar agreements with similar maturities and credit. We consider the terms of the PNC Bank, National Association debt

facility, including its interest rate of SOFR plus a margin ranging from 1.75% to 2.50%, to be at market based upon similar instruments that would be available to us.

Property and Equipment, net

Property and equipment, net, are stated at cost less accumulated depreciation. We record depreciation using the straight-line method over the following estimated useful lives:

Equipment	3 – 7 years
Furniture and fixtures	7 years
Software	3 years
Leasehold improvements	Lesser of lease term or life of improvements

Intangible Assets, net

Intangible assets consist of patents related to certain intellectual property that we have developed or acquired, and identifiable intangible assets recognized in connection with our acquisition of LIOS Technologies Inc. ("Lios") in March 2022 and other companies prior to 2022. We amortize our identified intangible assets over their estimated useful lives ranging between one and fifteen years.

Goodwill is tested annually for impairment as of the first day of our fourth quarter (October 1st) and whenever events or changes in circumstances indicate the carrying value of goodwill may not be recoverable. Goodwill is tested for impairment at the reporting unit level. As of December 31, 2022, we had one reporting unit which contained goodwill. When changes occur in the composition of one or more reporting units, goodwill is reassigned to the reporting units affected based on their relative fair value. Our goodwill impairment evaluation consisted of a qualitative assessment. A qualitative assessment can be performed to determine whether it is more likely than not the fair value of the reporting unit is less than its carrying value. If the reporting unit does not pass the qualitative assessment, we compare the fair value of each reporting unit to its carrying value using a quantitative assessment. If the fair value of the reporting unit exceeds its carrying value, goodwill is considered not impaired. If the fair value of the reporting unit is less than the carrying value, the difference is recorded as an impairment loss.

For the quantitative assessment, the fair value of each reporting unit is estimated using a combination of an income approach using a discounted cash flow ("DCF") analysis and a market-based valuation approach based on comparable public company trading values. Determining the fair value of a reporting unit requires the exercise of significant management judgment, including the amount and timing of projected future revenues, earnings and cash flows after considering factors such as recent operating performance, general market and industry conditions, existing and expected future contracts, changes in working capital and long-term business plans and growth initiatives. The carrying value of each reporting unit includes the assets and liabilities employed in its operations and goodwill. We have not recorded any goodwill impairment for the years ended December 31, 2022 and 2021.

Research, Development and Engineering

Research, development and engineering expense not related to contract performance is expensed as incurred. We expensed \$10.8 million and \$10.2 million of non-contract related research, development and engineering expense for the years ended December 31, 2022 and 2021, respectively.

Impairment of Long-Lived Assets

We review our long-lived assets for impairment whenever events or changes in circumstances indicate that the carrying amount of an asset may not be recoverable. Recoverability of assets is measured by comparing the carrying amount of an asset to future undiscounted net cash flows expected to be generated by the asset. If such assets fail the recovery test, the impairment to be recognized is measured by the amount by which the carrying amount of the assets exceeds their fair value. Assets to be disposed of by sale are reflected at the lower of their carrying amount or fair value less cost to sell.

Inventory

Inventory consists of finished goods, work in process and raw materials valued at the lower of cost (determined on the first-in, first-out basis) or net realizable value.

Net Income per Share

Basic per share data is computed by dividing net income by the weighted average number of shares outstanding during the period. Diluted per share data is computed by dividing net income attributable to common stockholders by the weighted average shares outstanding during the period increased to include, if dilutive, the number of additional common share equivalents that would have been outstanding if potential common shares had been issued using the treasury stock method. Diluted per share data would also include the potential common share equivalents relating to convertible securities by application of the if-converted method. There were no adjustments for common stock equivalents for the diluted per share data for the years ended December 31, 2022 and 2021.

The following shares have been excluded from the computation of diluted weighted average shares outstanding because the effect would be anti-dilutive:

	Years ended December 31,	
	2022	2021
Stock options	680,000	1,234,000
Restricted stock units	1,124,000	814,000

Stock-Based Compensation

We have two stock-based compensation plans, which are described further in Note 12. We recognize compensation expense based upon the fair value of the underlying equity award as of the date of grant. We have elected to use the Black-Scholes option pricing model to value any stock options granted. Restricted stock and restricted stock units awarded are valued at the closing price of our common stock on the date of the award. We recognize stock-based compensation for such awards on a straight-line basis over the requisite service period of the awards taking into account the effects of the expected exercise. We reduce stock-based compensation expense for the value of any forfeitures of unvested awards as such forfeitures occur.

Income Taxes

We account for income taxes using the liability method. Deferred tax assets or liabilities are determined based on the difference between the financial statement and tax basis of assets and liabilities as measured by the enacted tax rates, which will be in effect when the differences reverse. A valuation allowance against net deferred tax assets is provided unless we conclude it is more likely than not that the deferred tax assets will be realized.

We recognize deferred tax assets and liabilities for the expected future tax consequences of temporary differences between the financial statement carrying amounts of existing assets and liabilities and their respective tax bases. Deferred tax assets and liabilities are measured using enacted tax rates in effect for the year in which those temporary differences are expected to be recovered or settled. We evaluate our ability to benefit from all deferred tax assets and establish valuation allowances for amounts we believe are not more-likely-than-not to be realizable. For uncertain tax positions, we use a more-likely-than-not threshold, greater than 50%, based on the technical merits of the income tax position taken. Income tax positions that meet the more-likely-than-not recognition threshold are measured in order to determine the tax benefit recognized in the financial statements. Penalties, if probable and reasonably estimable, and interest expense related to uncertain tax positions are recognized as a component of the tax provision.

Foreign Currency

For our non-U.S. dollar functional currency subsidiaries, assets and liabilities are translated into U.S. dollars using fiscal year end exchange rates. Revenues and expenses are translated at average monthly exchange rates. Foreign currency translation gains and losses are included as a component of accumulated other comprehensive loss within equity. Gains and losses resulting from foreign currency transactions are included in earnings.

Business Combinations

We account for business combinations under the acquisition method of accounting, in accordance with ASC 805 - *Business Combinations*. Under ASC 805, the total estimated purchase consideration is allocated to the acquired tangible and intangible assets and assumed liabilities based on their estimated fair values as of the acquisition date. Any excess of the fair value of acquisition consideration over the fair value of identifiable assets acquired and liabilities assumed is recorded as goodwill. Determining the fair value of acquired intangible assets is judgmental in nature and requires the use of significant estimates and assumptions, including the discount rate, revenue growth rates, projected gross margins, estimated research and development expenses, and operating profit margins.

Recently Issued Pronouncements

In June 2016, the FASB issued ASU 2016-13 *Financial Instruments - Credit Losses (Topic 326) - Measurement of Credit Losses on Financial Instruments*, which requires companies to measure financial assets at an amortized cost basis to be presented at the net amount expected to be collected. The new accounting rules eliminate the probable initial recognition threshold and, instead, reflect an entity's current estimate of all expected credit losses. ASU 2016-13 is applicable to our trade receivables. This pronouncement was amended under ASU 2019-10 to allow an extension on the adoption date for entities that qualify as a small reporting company. We have elected this extension and the effective date for us to adopt this standard will be for fiscal years beginning after December 15, 2022. We do not expect the adoption of this new accounting pronouncement to have a significant impact on our consolidated financial statements.

In October 2021, the FASB issued ASU 2021-08 *Business Combinations (Topic 805) - Accounting for Contract Assets and Contract Liabilities from Contracts with Customers*, which improves the accounting acquired revenue contracts with customers in a business combination by addressing diversity in practice and inconsistency related to (1) recognition of an acquired contract and (2) payment terms and their effect on subsequent revenue recognized by the acquirer. We early adopted ASU 2021-08 during the year ended December 31, 2022 in conjunction with a business combination. The adaptation did not have a material impact on our consolidated financial statements.

2. Discontinued Operations

On March 8, 2022, we completed the sale of substantially all of our equity interests in our Luna Labs business to certain members of Luna Labs' senior management team and a group of outside investors for an initial purchase price of \$20.4 million before working capital and escrow adjustments and transaction expenses. Total consideration included \$13.0 million of cash received at closing, \$2.5 million in the form of a convertible note, \$1.7 million in the form of 60-day promissory notes and an earn out potential of \$1.0 million in future payments from Luna Labs upon the achievement by Luna Labs of certain financial goals. The full amount of the 60-day promissory notes has been collected as of December 31, 2022. The convertible note is included in the other non-current assets line item of the consolidated balance sheet. During the fourth quarter of 2022, it was determined that the earn out potential was not achieved. The gain on the transaction was \$9.8 million, net of taxes of \$3.2 million.

We have separately reported the financial results of Luna Labs as discontinued operations in our consolidated statements of operations for the years ended December 31, 2022 and 2021, respectively, and presented the related assets and liabilities as held for sale in the consolidated balance sheet as of December 31, 2021. These changes have been applied to all periods presented. The operating results of the discontinued operations only reflect revenues and expenses that are directly attributable to the Luna Labs segment that will be eliminated from continuing operations. Previously reported expenses for the Luna Labs segment have been restated to exclude certain allocated expenses that are not directly attributable to the Luna Labs segment.

The key components from discontinued operations related to the Luna Labs segment are as follows (*in thousands*):

	Years ended December 31,	
	2022	2021
Revenues	\$ 6,473	\$ 23,722
Cost of revenues	3,692	19,009
Gross profit	2,781	4,713
Selling, general and administrative expenses	535	1,634
Research, development & engineering expenses	—	24
Operating income	2,246	3,055
Income tax expense	516	584
Net income from discontinued operations, net of tax	\$ 1,730	\$ 2,471

Assets and liabilities of discontinued operations classified as held for sale in the consolidated balance sheets as of December 31, 2021 consist of the following (*in thousands*):

	December 31, 2021
Accounts receivable, net	\$ 2,967
Inventory, net	282
Contract assets	4,051
Prepaid expenses and other current assets	132
Property and equipment, net	330
Intangible assets, net	165
Operating lease right-of-use asset	4,884
Other non-current assets	141
Assets held for sale	\$ 12,952
Accounts payable	1,042
Accrued and other current liabilities	821
Contract liabilities	2,626
Current portion of operating lease liability	388
Long-term portion of operating lease liability	4,826
Liabilities associated with assets held for sale	\$ 9,703

The cash flows related to discontinued operations have not been segregated and are included in the consolidated statements of cash flows. The following table presents cash flow and non-cash information related to discontinued operations for the years ended December 31, 2022 and 2021 (*in thousands*):

	Years ended December 31,	
	2022	2021
Depreciation and amortization	\$ 23	\$ 112
Share-based compensation	177	129
Acquisition of property and equipment	34	—

3. Business Acquisition

On March 10, 2022, we entered into and closed a Share Purchase Agreement (the "Share Purchase Agreement") with NKT Photonics A/S ("NKT Photonics") to purchase all of the shares of NKT Photonics GmbH and LIOS Technologies Inc. (collectively "Lios") for aggregate consideration of \$22.1 million (€20.0 million). Subsequent to the acquisition, the name of the Lios parent company was changed to Luna Innovations Germany GmbH. Lios is a provider of distributed fiber optic monitoring solutions for power cable, pipelines, oilfield services, security, highways, railways and industrial fire detection systems. The acquisition of Lios provides us with long range, fully distributed temperature and strain sensing capabilities, intellectual property, products and expertise that are highly complementary to Luna, which we believe will accelerate our technology and overall growth roadmap. The Share Purchase Agreement contains customary representations and warranties and indemnities.

During the fourth quarter of 2022, we completed the purchase accounting for Lios after recording a number of measurement period adjustments since the initial purchase price allocation reported in our first quarter Form 10-Q. These adjustments to the fair values of assets and liabilities resulted in a cumulative decrease in goodwill of \$1.5 million as of December 31, 2022.

The following table summarizes the allocation of the purchase consideration for the acquisition of Lios:

	<i>(in thousands)</i>	
Accounts receivable	\$	3,069
Inventory		5,176
Prepaid expenses and other current assets		96
Property and equipment		858
Intangible assets		6,437
Goodwill		8,788
Operating lease right-of-use asset		512
Accounts payable and accrued expenses		(903)
Accrued and other current liabilities		(1,073)
Contract liabilities		(314)
Current portion of operating lease liability		(322)
Long-term portion of operating lease liability		(191)
Other long-term liabilities		(48)
Total purchase consideration	\$	<u>22,085</u>

The identifiable intangible assets and their estimated useful lives were as follows:

	Estimated Useful Life	<i>(in thousands)</i>	
Developed technology	6 years	\$	1,998
Customer relationships	8 years		3,662
Trade names and trademarks	7 years		333
Backlog	1 year		444
		\$	<u>6,437</u>

Lios's developed technology primarily consists of its distributed fiber optic monitoring solutions that provide a wide range of applications using fully distributed temperature and strain sensing. The developed technologies were valued using the "relief from royalty method" under the income approach. A discount rate of 14.5% was used to discount the cash flows to the present value.

Trade names and trademarks are considered a type of guarantee of a certain level of recognizability, quality or performance represented by the Lios brand. Trade names and trademarks were valued using the "relief from royalty" method under the income approach. A discount rate of 14.5% was used to discount the cash flows to the present value.

Backlog arises from unfulfilled purchase or sales order contracts. The value of Lios's backlog as of the acquisition date was calculated using the "multi-period excess earnings" method under the income approach. A discount rate of 13.5% was used to discount the cash flows attributable solely to the backlog to the present value.

Customer relationships represent the fair value of either (i) the avoidance of cost associated with the creation of a new customer relationship or (ii) the projected cash flows that will be derived from the sale of products to existing customers as of the acquisition date. Lios's customer relationships were valued using the "multi-period excess earnings" method under the income approach. A discount rate of 15.5% was used to discount these cash flows to the present value.

Goodwill represents the excess of consideration transferred over the net of the acquisition date fair values of the assets acquired and the liabilities assumed in connection with the acquisition. Goodwill generated from our business acquisition was primarily attributable to expected synergies from future customer and sales growth. We do not expect this goodwill to be deductible for tax purposes. We incurred \$1.1 million of acquisition-related costs that have been included in selling, general and administrative expenses for the year ended December 31, 2022.

4. Accounts Receivable, net

Accounts receivable, net, consists of the following:

	December 31,	
	2022	2021
<i>(in thousands)</i>		
Billed	\$ 33,542	\$ 21,790
Other	487	48
	34,029	21,838
Less: allowance for doubtful accounts	(780)	(925)
Accounts receivable, net	<u>\$ 33,249</u>	<u>\$ 20,913</u>

5. Inventory

Components of inventory are as follows:

	December 31,	
	2022	2021
<i>(in thousands)</i>		
Finished goods	\$ 9,930	\$ 10,
Work-in-process	3,113	2,
Raw materials	23,539	10,
Inventory	<u>\$ 36,582</u>	<u>\$ 22,</u>

6. Property and Equipment, net

Property and equipment, net, consists of the following:

<i>(in thousands)</i>	December 31,	
	2022	2021
Building	\$ 219	\$ 226
Equipment	15,801	10,255
Furniture and fixtures	1,017	1,316
Software	126	72
Leasehold improvements	2,466	2,292
Construction in process	1,383	646
	<u>21,012</u>	<u>14,807</u>
Less—accumulated depreciation	(16,119)	(11,819)
Property and equipment, net	<u>\$ 4,893</u>	<u>\$ 2,988</u>

Depreciation for the years ended December 31, 2022 and 2021 was approximately \$1.7 million and \$1.4 million, respectively, and is included primarily in selling, general and administrative expense in our consolidated statements of operations.

7. Intangible Assets, net

Intangible assets, net consist of the following:

<i>(in thousands)</i>	Estimated Life	December 31,	
		2022	2021
Patent costs	1 - 18 years	\$ 9,086	\$ 9,230
Developed technology	6 - 10 years	15,924	14,440
In-process research and development	N/A	2,631	2,732
Customer relationships	5 - 8 years	4,117	700
Trade names	7 - 15 years	880	550
Backlog	1 - 3 years	331	—
		<u>32,969</u>	<u>27,652</u>
Patent costs		(4,128)	(3,254)
Developed technology		(6,830)	(5,043)
In-process research and development		(1,763)	(1,476)
Customer relationships		(574)	(170)
Trade names		(586)	(532)
Backlog		(338)	—
Accumulated amortization		<u>(14,219)</u>	<u>(10,475)</u>
Intangible assets, net		<u>\$ 18,750</u>	<u>\$ 17,177</u>

Amortization for the years ended December 31, 2022 and 2021 was approximately \$3.7 million and \$3.1 million, respectively, and is included primarily in selling, general and administrative expense in our consolidated statements of operations.

Estimated aggregate amortization, based on the net value of intangible assets at December 31, 2022, for each of the next five years and beyond is as follows:

<i>(in thousands)</i>	
Year Ending December 31,	
2023	\$ 3,800
2024	3,270
2025	2,942
2026	2,801
2027	2,023
2028 and beyond	3,914
	<u>\$ 18,750</u>

We did not recognize any intangible asset impairment charges during the years ended December 31, 2022 or 2021.

8. Goodwill

The change in the carrying value of goodwill during the years ended December 31, 2022 and December 31, 2021 were as follows:

<i>(in thousands)</i>	
Balance as of December 31, 2020	\$ 18,121
Measurement period adjustment	929
Foreign currency translation	(66)
Balance as of December 31, 2021	<u>18,984</u>
Goodwill resulting from business acquisition	8,788
Foreign currency translation	(845)
Balance as of December 31, 2022	<u>\$ 26,927</u>

After completing a qualitative assessment of our goodwill during the fourth quarter of 2022, we concluded the carrying value of goodwill was not impaired as of December 31, 2022.

9. Accrued Liabilities

Accrued liabilities consist of the following:

<i>(in thousands)</i>		December 31,	
		2022	2021
Accrued compensation	\$	8,962	\$ 6,798
Contingent consideration		—	225
Accrued professional fees		720	503
Accrued income tax		3,788	328
Current portion of finance lease liability		50	48
Accrued interest		64	17
Accrued liabilities-other		3,110	1,339
Total accrued liabilities	\$	<u>16,694</u>	<u>\$ 9,258</u>

10. Debt

Long-term debt consists of the following:

(in thousands)	Years ended December 31,	
	2022	2021
Term Loan (net of debt issuance costs of \$74, 6.65% at December 31, 2022)	\$ 18,926	\$ 8,290
Revolving Loan (6.65% at December 31, 2022)	4,300	7,550
	23,226	15,840
Less: Current portion of long-term debt obligations	(2,500)	(4,167)
Long-term debt obligations	\$ 20,726	\$ 11,673

PNC Bank Facility

On June 21, 2022 (the "Effective Date"), we entered into a Loan Modification Agreement (the "Second Amendment") in respect of our Loan Agreement, dated as of December 1, 2020 (the "Original Loan Agreement" and as amended by that certain First Amendment to Loan Agreement, dated as of March 10, 2022, and the Second Amendment, the "Loan Agreement") with PNC Bank, National Association, as lender (the "Lender") and certain of our domestic subsidiaries as guarantors, to, among other things, extend the maturity date of the Term Loan and Revolving Line (each as defined below) to June 21, 2027 and increase the total commitments to us.

The Loan Agreement provides a \$15.0 million revolving credit facility (the "Revolving Line") and a \$20 million term loan facility (the "Term Loan"). On the Effective Date, we borrowed the full amount of the Term Loan from the Lender according to a term note (the "Term Note"), a portion of the proceeds of which were used to refinance the remaining principal amount of the \$12.5 million in term loans issued under the Original Loan Agreement, and the remainder of which were used to pay down approximately \$13.7 million of the \$15.0 million in revolving loans outstanding under the Revolving Line (the "Revolving Loan") according to a revolving line of credit note (the "Revolving Line of Credit Note"). We may repay and reborrow advances under the Revolving Line from time to time according to the Revolving Line of Credit Note.

The Term Loan matures on June 21, 2027, which was extended from December 1, 2023 as part of the loan modification. The Term Loan amortizes at a rate equal to 10% for the first year, 15% for years two and three and 20% in years four and five, in each case payable on a quarterly basis. Accrued interest is due and payable on the first day of each month and the outstanding principal balance and any accrued but unpaid interest will be due and payable on June 21, 2027. The Term Loan bears interest at a floating per annum rate equal to the sum of (a) the daily simple secured overnight finance rate ("Daily Simple SOFR"), plus (b) an SOFR adjustment of ten basis points (0.10%), plus (c) an applicable margin. The applicable margin ranges from 1.75% to 2.50% per annum, depending on our Net Leverage Ratio (as defined in the Loan Agreement). We may prepay the Term Loan without penalty or premium.

The Revolving Line expires on June 21, 2027, which was extended from December 1, 2023 as part of the loan modification. Borrowings under the Revolving Line bear interest at a floating per annum rate equal to the sum of (a) the Daily Simple SOFR, plus (b) an SOFR adjustment of ten basis points (0.10%), plus (c) an applicable margin. The applicable margin ranges from 1.75% to 2.50% per annum, depending on our Net Leverage Ratio. Accrued interest is due and payable on the first day of each month and the outstanding principal balance and any accrued but unpaid interest is due and payable on June 21, 2027. The unused portion of the Revolving Line accrues a fee equal to 0.20% per annum multiplied by the quarterly average unused amount. The unused Revolving Line totaled \$10.7 million at December 31, 2022.

The Loan Agreement includes a number of affirmative and restrictive covenants applicable to us and our subsidiaries, including, among others, financial covenants regarding minimum net leverage and fixed charge coverage (beginning in the third quarter ended September 30, 2022), affirmative covenants regarding delivery of financial statements, payment of taxes, and maintenance of government compliance, and restrictive covenants regarding dispositions of property, acquisitions, incurrence of additional indebtedness or liens, investments and transactions with affiliates. We are also restricted from paying dividends or making other distributions or payments on our capital stock, subject to limited exceptions. We were in compliance with these covenants as of December 31, 2022.

Upon the occurrence of certain events, including failure to satisfy our payment obligations under the Loan Agreement, failure to adhere to the financial covenants, the breach of certain of our other covenants under the Loan Agreement, cross defaults to other indebtedness or material agreements, judgment defaults and defaults related to failure to maintain

governmental approvals, the Lender will have the right, among other remedies, to declare all principal and interest immediately due and payable, and to exercise secured party remedies.

Maturities on debt are as follows (in thousands):

<u>Year Ending December 31,</u>	<u>Amount</u>	
2023	\$	2,500
2024		3,000
2025		3,500
2026		4,000
2027		10,300
Total maturities	\$	23,300
Less: deferred issuance costs		(74)
Total	\$	<u>23,226</u>

Interest expense, net for the years ended December 31, 2022 and 2021 consisted of the following:

<i>(in thousands)</i>	<u>Years ended December 31,</u>			
	<u>2022</u>		<u>2021</u>	
Interest expense on Term Loans	\$	642	\$	247
Interest expense on Revolving Line of Credit		210		164
Amortization of debt issuance costs		43		44
Other interest expense		5		27
Interest income		(2)		(3)
Total interest expense, net	\$	<u>898</u>	\$	<u>479</u>

II. Leases

We have operating leases for our facilities, which have remaining terms ranging from 1 to 5 years. Our leases do not have an option to extend the lease period beyond the stated term unless the new term is agreed by both parties. They also do not have an early termination clause included. Our operating lease agreements do not contain any material restrictive covenants. Some of our operating lease agreements contain variable payment provisions that provide for rental increases based on consumer price indices. The change in rent expense resulting from changes in these indices are included within variable rent.

We also have finance leases for equipment which have remaining terms ranging from 1 to 4 years. These lease agreements are for general office equipment with a 5-year useful life. These lease agreements do not have an option to extend the lease beyond the stated terms nor do they have an early termination clause. These lease agreements do not have any variable payment provisions included. The finance lease costs consist of interest expense and amortization, and are included primarily in selling, general and administrative expense in our consolidated statement of operations.

The discount rate for both our operating and finance leases was not readily determinable in the specific lease agreements. As a result, our incremental borrowing rate was used as the discount rate when establishing the ROU assets and corresponding lease liabilities. As of December 31, 2022, we had no operating or finance leases that have not yet commenced.

Rent expense is recognized on a straight-line basis over the life of the lease. For the year ended December 31, 2022 and 2021, rent expense consisted of operating lease costs that totaled \$2.5 million and \$2.1 million, respectively.

Future minimum lease payments under non-cancelable operating and finance leases were as follows as of December 31, 2022:

<i>(in thousands)</i>				
Year Ending December 31,	Operating Leases		Finance Leases	
2023	\$	2,484	\$	53
2024		1,735		52
2025		1,027		48
2026		140		—
2027		—		—
2028 and beyond		—		—
Total future minimum lease payments		5,386		153
Less: Interest		343		5
Total lease liabilities	\$	5,043	\$	148
Current lease liability	\$	2,239	\$	50
Long-term lease liability		2,804		98
Total lease liabilities	\$	5,043	\$	148

Other information related to leases is as follows:

<i>(in thousands, except weighted-average data)</i>	Year Ended			
	December 31, 2022		December 31, 2021	
Finance lease cost:				
Amortization of right-of-use assets	\$	53	\$	48
Interest on lease liabilities		(4)		(4)
Total finance lease cost	\$	49	\$	44
Other information:				
Cash paid for amounts included in the measurement of lease liabilities:				
Operating cash flows from operating leases	\$	2,064	\$	2,115
Finance cash flows from finance leases	\$	48	\$	48
Right-of-use assets obtained in exchange for new operating lease liabilities	\$	782	\$	865
Weighted-average remaining lease term (years) - operating leases		6.0		8.0
Weighted-average remaining lease term (years) - finance leases		3.2		3.9
Weighted-average discount rate - operating leases		8 %		9 %
Weighted-average discount rate - finance leases		3 %		3 %

12. Stockholders' Equity

Equity Incentive Plans

In April 2016, we adopted our 2016 Equity Incentive Plan (the "2016 Plan") as a successor to the 2006 Plan. Under the 2016 Plan, our Board of Directors is authorized to grant both incentive and non-statutory stock options to purchase common stock and restricted stock awards to our employees, directors, and consultants. The 2016 Plan provides for the issuance of 3,500,000 shares plus any amounts forfeited from grants under the 2006 Plan after the expiration date of the 2006 Plan. Options generally have a life of 10 years and exercise price equal to or greater than the fair market value of the Common Stock as determined by the Board of Directors. Vesting typically occurs over a four-year period.

The following table sets forth the activity of the options to purchase common stock under the 2006 Plan and the 2016 Plan. The prices represent the closing price of our Common Stock on the Nasdaq Capital Market on the dates respective

	Options Outstanding				Options Exercisable		
	Number of Shares	Price per Share Range	Weighted Average Exercise Price	Aggregate Intrinsic Value (1)	Number of Shares	Weighted Average Exercise Price	Aggregate Intrinsic Value (1)
<i>(in thousands, except share, per share and weighted-average data)</i>							
Balance at December 31, 2020	2,329,416	\$1.18 - 7.59	\$ 2.76	\$ 16,574	1,408,119	\$ 2.26	\$ 10,734
Forfeited	(58,860)	\$3.37 - 11.40	5.91				
Exercised	(818,267)	\$1.18 - 7.59	2.73				
Granted	80,735	\$11.00 - 11.94	9.13				
Balance at December 31, 2021	1,533,024	\$1.18 - 11.40	\$ 3.00	\$ 8,439	1,050,177	\$ 2.45	\$ 6,314
Forfeited	(96,858)	\$3.04 - \$11.40	6.03				
Exercised	(577,129)	\$1.27 - \$7.37	2.48				
Balance at December 31, 2022	859,037	\$1.27 - 11.40	\$ 3.01	\$ 5,040	797,529	\$ 2.74	\$ 4,856

(1) The intrinsic value of an option represents the amount by which the market value of the stock exceeds the exercise price of the option of in-the-money options only.

The fair value of each option granted is estimated as of the grant date using the Black-Scholes option pricing model with the following assumptions:

	Years ended December 31,
	2021
Risk-free interest rate range	0.975%
Expected life of option-years	7
Expected stock price volatility	55%

The risk-free interest rate is based on U.S. Treasury interest rates, the terms of which are consistent with the expected life of the stock options. Expected volatility is based upon the average historical volatility of our common stock over the period commensurate with the expected term of the related instrument. The expected life and estimated post-employment termination behavior is based upon historical experience of homogeneous groups, executives and non-executives, within our company. We do not currently pay dividends on our common stock nor do we expect to in the foreseeable future.

	Options Outstanding				Options Exercisable			
	Range of Exercise Prices	Options Outstanding	Weighted Average Remaining Life in Years	Weighted Average Exercise Price	Options Exercisable	Weighted Average Remaining Life in Years	Weighted Average Exercise Price of Options Exercisable	
Year ended December 31, 2021	\$1.18 - 11.40	1,533,024	4.73	\$3.00	1,050,177	3.95	\$2.45	
Year ended December 31, 2022	\$1.27 - 11.40	859,037	4.00	\$3.01	797,529	3.76	\$2.74	
					Total Intrinsic Value of Options Exercised		Total Fair Value of Options Vested	
<i>(in thousands)</i>								
Year ended December 31, 2021					\$ 6,288	\$ 2,571		
Year ended December 31, 2022					\$ 2,173	\$ 2,189		

For the year ended December 31, 2021, the weighted average grant date fair value of options granted was \$11.30 per share. We estimate the fair value of options at the grant date using the Black-Scholes model. For all stock options granted through December 31, 2021, the weighted average remaining service period is 7.0 years. There were no new stock options granted during the year ended December 31, 2022.

Unamortized stock option expense at December 31, 2022 that will be amortized over the weighted-average remaining service period of 0.6 years totaled \$0.2 million.

Restricted Stock and Restricted Stock Units

Historically, we have granted shares of restricted stock to certain employees that have vested in three equal annual installments on the anniversary dates of their grant. However, beginning in 2019, we altered our approach for these grants to replace the grant of restricted stock subject to time-based vesting with the grant of a combination of restricted stock units ("RSUs") subject to time-based vesting and performance-based vesting. Each RSU represents the contingent right to receive a single share of our common stock upon the vesting of the award. For the year ended December 31, 2022, we granted an aggregate of 930,661 RSUs to certain employees. Of the RSUs granted during 2022, 816,740 of such RSUs are subject to time-based vesting and are scheduled to vest in three equal annual installments on the anniversary dates of the grant. The remaining 113,921 RSUs are performance-based awards that will vest based on our achievement of long-term performance goals, in particular, based on our levels of 2023 revenue and operating income. The 113,921 shares issuable upon vesting of the performance-based RSUs represent the probable payout under our performance-based awards, based upon 100% of our target performance for 2023 revenue and operating income. In the case of the time-based and performance-based RSUs, vesting is also subject to the employee's continuous service with us through vesting. In 2022, 169,576 shares of restricted stock and 52,174 RSUs granted to employees vested.

In addition, in conjunction with our 2020, 2021 and 2022 Annual Meetings of Stockholders, we granted RSUs to certain members of our Board of Directors in respect of the annual equity compensation under our non-employee director compensation policy (other members of our Board of Directors elected to receive their annual equity compensation for Board service in the form of stock units under our Deferred Compensation Plan as described below). RSUs granted to our non-employee Directors vest at the earlier of the one-year anniversary of their grant or the next annual stockholders' meeting. In 2022 and 2021, we granted 11,819 and 3,384, respectively, RSUs to non-employee members of our Board of Directors in respect of the annual equity compensation under our non-employee director compensation policy. In 2022 and 2021, 3,384 and 10,652 RSUs granted to directors, respectively, vested.

The following table summarizes the number of unvested shares underlying our restricted stock awards and RSUs and the value of our unvested restricted stock awards and RSUs in 2022 and 2021:

<i>(in thousands, except share and weighted-average share data)</i>	Number of Unvested Shares	Weighted Average Grant Date Fair Value	Aggregate Grant Date Fair Value of Unvested Shares
Balance at January 1, 2020	429,467	\$ 4.48	\$ 1,924
Granted	281,384	10.71	3,014
Vested	(234,367)	4.22	(989)
Forfeitures	(7,500)	11.94	(90)
Balance at December 31, 2021	468,984	\$ 8.58	\$ 3,859
Granted	930,661	6.17	5,742
Vested	(225,134)	6.96	(1,567)
Forfeitures	(111,588)	9.54	(1,065)
Balance at December 31, 2022	1,062,923	\$ 6.72	\$ 6,969

We recognized \$4.2 million and \$3.0 million in stock-based compensation expense, which is recorded in selling, general and administrative expense on the consolidated statements of operations for the years ended December 31, 2022 and 2021, respectively.

Unamortized RSUs expense at December 31, 2022 that will be amortized over the weighted-average remaining service period of 2.1 years totaled \$5.1 million.

Employee Stock Purchase Plan

On April 7, 2020, our board of directors approved, and on May 11, 2020, our stockholders approved, the Luna Innovations Incorporated 2020 Employee Stock Purchase Plan (the "2020 ESPP"). The 2020 ESPP grants our eligible employees a purchase right to purchase up to that number of shares of common stock purchasable either with a percentage or with a maximum dollar amount, as designed by the Board of Directors, during the period that begins on the offering date and ends on the date stated in the offering. The maximum number of shares of common stock that may be issued under the 2020 ESPP is 1,200,000 shares. The 2020 ESPP is considered a compensatory plan and the fair value of the discount and the look-back period will be estimated using the Black-Scholes option pricing model and expense will be recognized over the six-month withholding period prior to the purchase date. For the years ended December 31, 2022 and 2021, we recognized \$0.3 million and \$0.4 million in share-based compensation expense related to the 2020 ESPP, respectively, which is included in our selling, general and administrative expense in the accompanying consolidated statements of operations.

Non-employee Director Deferred Compensation Plan

We maintain a non-employee director deferred compensation plan (the "Deferred Compensation Plan") that permits our non-employee directors to defer receipt of certain compensation that they receive for serving on our board and board committees. The Deferred Compensation Plan has historically permitted the participants to elect to defer cash fees to which they were entitled for board and committee service. For participating directors, in lieu of payment of cash fees, we credit their accounts under the Deferred Compensation Plan with a number of stock units based on the trading price of our common stock as of the date of the deferral. These stock units vest immediately, although the participating directors do not receive the shares represented by such units until a future qualifying event.

Pursuant to our Deferred Compensation Plan, non-employee directors can also elect to defer the receipt of some or all of the equity compensation that they receive for board and committee service. Stock units representing this equity compensation vest at the earlier of the one-year anniversary of their grant or the next annual stockholders' meeting.

The following is a summary of our stock unit activity under the Deferred Compensation Plan for 2022 and 2021:				
<i>(in thousands, except stock units and weighted-average share data)</i>	Number of Stock Units	Weighted Average Grant Date Fair Value per Share	Intrinsic Value Outstanding	
Balance, December 31, 2020	635,383	2.41	\$	6,278
Granted	40,576	10.6		
Issued	(47,377)	2.4		
Balance, December 31, 2021	628,582	3.06	\$	5,334
Granted	118,175	5.64		
Issued	(47,377)	1.15		
Balance, December 31, 2022	699,380	3.61	\$	6,148

As of December 31, 2022, 68,476 outstanding stock units had not yet vested.

Stock Repurchases

We have historically repurchased shares of our common stock during previous stock repurchase programs. We currently maintain all repurchased shares under those stock repurchase programs as treasury stock. In addition, we repurchased 52,836 and 44,051 shares of our common stock at an aggregate cost of \$0.4 million and \$0.5 million, or an average price of \$6.79 and \$10.41 per share, in connection with the net settlement of shares issued as a result of the vesting of restricted stock units in 2022 and 2021, respectively.

13. Revenue Recognition

Disaggregation of Revenue

We disaggregate our revenue from contracts with customers by geographic location, customer type, contract type, timing of recognition, and major categories, as we believe it best depicts how the nature, amount, timing and uncertainty of our revenue and cash flows are affected by economic factors. We disaggregate revenue on the basis of where the physical goods are shipped. We also classify revenue by the customer type of entity for which it does business, which is an indicator of the diversity of our client base. We attribute revenues generated from being a subcontractor to a commercial company as government revenue when the ultimate client is a government agency or department. Disaggregation by contract mix provides insight in terms of the degree of performance risk that we have assumed. Fixed-price contracts are considered to provide the highest amount of performance risk as we are required to deliver a scope of work or level of effort for a negotiated fixed price. Cost-based contracts are considered to provide the lowest amount of performance risk since we are generally reimbursed for all contract costs incurred in performance of contract deliverables with only the amount of incentive or award fees (if applicable) dependent on the achievement of negotiated performance requirements. By classifying revenue by major product and service, we attribute revenue from a client to the major product or service that we believe to be the client's primary market.

The details are listed in the table below for the years ended December 31, 2022 and 2021:

<i>(in thousands)</i>	Years ended December 31,	
	2022	2021
Total Revenue by Geographic Location		
United States	\$ 48,256	\$ 45,334
Asia	22,327	17,183
Europe	29,340	16,928
Canada, Central and South America	8,516	8,068
All others	1,058	—
Total	\$ 109,497	\$ 87,513
Total Revenue by Major Customer Type		
Sales to the U.S. government	\$ 8,700	\$ 9,525
U.S. direct commercial sales and other	39,556	35,410
Foreign commercial sales & other	61,241	42,578
Total	\$ 109,497	\$ 87,513
Total Revenue by Contract Type		
Fixed-price contracts	\$ 105,919	\$ 84,490
Cost-type contracts	3,578	3,023
Total	\$ 109,497	\$ 87,513
Total Revenue by Timing of Recognition		
Goods transferred at a point in time	\$ 91,982	\$ 69,522
Goods/services transferred over time	17,515	17,991
Total	\$ 109,497	\$ 87,513
Total Revenue by Major Products/Services		
Technology development	\$ 7,608	\$ 7,136
Test, measurement and sensing systems	99,419	78,528
Other	2,470	1,849
Total	\$ 109,497	\$ 87,513

Contract Balances

Our contract assets consist of unbilled amounts for research contracts as well as custom product contracts. Contract liabilities include excess billings, subcontractor accruals, and customer deposits. During the year ended December 31, 2022, we recognized \$2.7 million of revenue that was included in contract liabilities as of December 31, 2021.

As of December 31, 2022, contract assets reflect \$1.9 million of additional revenue following the approval of our 2021 Incurred Cost Submission (ICS) from the Defense Contract Management Agency (DCMA). A portion of the corresponding revenue related to our former Luna Labs segment is classified as discontinued operations.

The following table shows the components of our contract balances as of December 31, 2022 and 2021:

<i>(in thousands)</i>	December 31,	
	2022	2021
Contract assets	\$ 7,691	\$ 5,166
Contract liabilities	(4,089)	(4,649)
Net contract assets/(liabilities)	\$ 3,602	\$ 517

Performance Obligations

Unfulfilled performance obligations represent amounts expected to be earned on executed contracts. Indefinite delivery and quantity contracts and unexercised options are not reported in total unfulfilled performance obligations. Unfulfilled performance obligations include funded obligations, which is the amount for which money has been directly authorized by the U.S. government and for which a purchase order has been received by a commercial customer, and unfunded obligations represent firm orders for which funding has not yet been appropriated. The approximate value of our unfulfilled performance obligations was \$52.9 million at December 31, 2022. We expect to satisfy 64% of the performance obligations in 2023, 33% in 2024 and the remainder by 2025.

14. Income Taxes

Income tax benefit from continuing operations consisted of the following for the periods indicated:

<i>(in thousands)</i>	Years ended December 31,	
	2022	2021
<u>Current:</u>		
Federal	\$ 1,701	\$ 28
State	470	(40)
Foreign	—	118
Current	\$ 2,171	\$ 106
<u>Deferred:</u>		
Federal	(1,985)	(1,692)
State	(355)	(390)
Foreign	(51)	(4)
Deferred	\$ (2,391)	\$ (2,086)
Income tax benefit	\$ (220)	\$ (1,980)

Deferred tax assets and liabilities consist of the following components:

<i>(in thousands)</i>	Years ended December 31,	
	2022	2021
Deferred income tax assets:		
Bad debt and inventory reserve	\$ 303	\$ 405
UNICAP	598	130
Deferred revenue	210	156
ASC842 lease accounting (DTA)	1,243	1,236
Net operating loss carryforwards	8,225	6,984
Accrued liabilities	779	559
Stock-based compensation	1,247	899
R&D credit carryforward	—	500
Section 174 capitalization	2,081	—
Other, net	—	360
Total deferred income tax assets before valuation allowance	14,686	11,229
Less: Valuation allowance	(3,593)	(3,806)
Total deferred income tax assets	11,093	7,423
Deferred income tax liabilities:		
ASC842 lease accounting (DTL)	(1,152)	(1,090)
Depreciation and amortization	(3,762)	(3,012)
Deferred gain	(548)	—
Investment in partnership	(67)	—
Other, net	(917)	—
Total deferred income tax liabilities	\$ (6,446)	\$ (4,102)
Net deferred tax assets	\$ 4,647	\$ 3,321

The benefit from income taxes from continuing operations differs from the amount computed by applying the federal statutory income tax rate to our (loss)/income from continuing operations before income taxes as follows for the periods indicated:

	Years ended December 31,	
	2022	2021
Income tax expense at federal statutory rate	21.00 %	21.00 %
Effect of foreign operations	3.06	28.79
State taxes, net of federal tax effects	(0.64)	9.48
Change in valuation allowance	(23.55)	(24.66)
Provision to return adjustments	(0.88)	(0.04)
Meals and entertainment	(0.60)	(0.11)
Other permanent differences	(3.92)	(14.71)
Equity compensation	3.08	34.43
Current year R&D credit	14.86	8.80
Prior year R&D credit	(2.18)	1.52
Foreign derived intangible income benefit	8.82	3.31
Reserve for uncertain tax positions	(1.90)	(2.73)
Other	(8.41)	(0.56)
Income tax benefit	8.74 %	64.52 %

The realization of our deferred income tax assets is dependent upon sufficient taxable income in future periods. In assessing whether deferred tax assets may be realized, we consider whether it is more likely than not that some portion, or all, of the deferred tax asset will be realized. We consider scheduled reversals of deferred tax liabilities, projected future taxable income and tax planning strategies that we can implement in making our assessment. We continue to be in a three year cumulative net income position, and based on all available positive and negative evidence, we believe the net deferred tax asset will be fully realizable.

In March 2022, we acquired the stock of Lios, which included a German entity and a US entity, both of which had deferred tax assets that were recorded as of the acquisition date. Based on all available evidence, including cumulative history of losses, we have realized deferred tax assets only to the extent they are supported by the reversal of existing temporary differences. Due to taxable temporary differences exceeding the NOLs in existence at the acquisition date, no valuation allowance was recorded at the acquisition date for the German entity. Subsequent to the acquisition, a valuation allowance was recorded in the amount of \$0.2 million to income tax benefit for the year ended December 31, 2022. A valuation allowance of \$0.5 million was recorded on the opening balance sheet for the US entity.

In December 2020, Luna acquired the stock of OptaSense Holdings Limited and its wholly owned subsidiaries ("OptaSense"), which included a UK entity and US entity. Both of these entities had deferred tax assets that were recorded as of the acquisition date. Based on all available evidence, including cumulative history of losses, we have realized deferred tax assets only to the extent they are supported by the reversal of existing temporary differences. This results in a valuation allowance of \$2.5 million and \$3.8 million as of December 31, 2022 and 2021 respectively.

As of December 31, 2022, we have net operating loss ("NOL") carryforwards of approximately \$31.9 million, of which approximately \$21.0 million is in foreign jurisdictions. These NOLs were primarily from past acquisitions. A portion of these NOLs begin to expire in 2025. The domestic NOLs are subject to limitation under IRC Section 382.

The following table summarizes the activity related to our gross unrecognized tax benefits:

<i>(in thousands)</i>	Years ended December 31,			
	2022		2021	
Unrecognized tax benefits, beginning of period	\$	295	\$	211
Increases related to current period tax positions		56		75
Increases related to prior period tax positions		—		9
Decreases related to prior period tax positions		(8)		—
Unrecognized tax benefits, end of period	\$	343	\$	295

As of December 31, 2022 we had \$0.3 million of unrecognized tax benefits. If these amounts are recognized in future periods, it would impact the effective tax rate on income from continuing operations for the years in which they are recognized. Interest and penalties released related to uncertain tax positions was immaterial for the year ended December 31, 2022. To the extent interest and penalties are not assessed with respect to uncertain tax positions, amounts accrued will be reduced and reflected as a reduction of the overall income tax provision in the period for which the event occurs requiring the adjustment. The accrued interest and penalties as of December 31, 2022, is recorded in other long-term liabilities on the consolidated balance sheets. Our policy is to recognize interest and/or penalties related to income tax matters in income tax expense.

We file numerous consolidated and separate income tax returns in the U.S. federal jurisdiction and in many state and foreign jurisdictions. The U.S. federal statute of limitations remains open for the year 2018 and onward. U.S. state jurisdictions have statutes of limitation generally ranging from three to seven years. Our Optasense companies have open years for audit including UK - 2018 and forward; US - 2018 and forward; and Canada 2017 and forward. Given that certain subsidiaries have federal or state net operating loss carryforwards, the statute for examination by the taxing authorities will typically remain open for a period following the use of such net operating loss carryforwards, extending the period for examination beyond the years indicated above. We currently have no income tax returns under examination, we do not believe that there are any positions for which it is reasonably possible that the total amount of unrecognized tax benefits will significantly increase or decrease within the next 12 months.

We consider undistributed earnings of certain foreign subsidiaries to be indefinitely reinvested outside of the U.S. No taxes have been recorded with respect to our indefinitely reinvested earnings in accordance with the relevant accounting guidance for income taxes. Should the earnings be remitted as dividends, we may be subject to additional foreign withholding.

and state income taxes. As of December 31, 2022, the cumulative amount of U.S. GAAP foreign unremitted earnings upon which additional income taxes have not been provided is not material to the financial statements. It is not practicable to estimate the amount of any additional taxes which may be payable on the undistributed earnings.

On March 27, 2020, the United States enacted the Coronavirus Aid, Relief and Economic Securities Act (the "CARES Act"). The CARES Act includes significant business tax provisions that, among other things, include the removal of certain limitations on utilization of net operating losses, increase the loss carryback period for certain losses to five years, and increase the ability to deduct interest expense, as well as amending certain provisions of the previous of the previously enacted Tax Cuts and Jobs Act. We do not expect the CARES Act to have a significant impact on our tax obligations. In December 2020, the Consolidated Appropriations Act, 2021 ("CAA") was signed into law. The CAA included additional funding through tax credits as part of its economic package for 2021. As of December 31, 2022, and December 31, 2021, we evaluated these items in our tax computation and determined that the items did not have a material impact on our financial statements.

15. Commitments and Contingencies

Litigation and other contingencies

From time to time, we may become involved in litigation in relation to claims arising from our operations in the normal course of business. While management currently believes it is not reasonably possible the amount of ultimate liability, if any, with respect to these actions will have a material adverse effect on our financial position, results of operations or liquidity, the ultimate outcome of any litigation is uncertain.

We have made, and will continue to make, efforts to comply with current and future environmental laws. We anticipate that we could incur additional capital and operating costs in the future to comply with existing environmental laws and new requirements arising from new or amended statutes and regulations. In addition, because the applicable regulatory agencies have not yet promulgated final standards for some existing environmental programs, we cannot at this time reasonably estimate the cost for compliance with these additional requirements. The amount of any such compliance costs could be material. We cannot predict the impact that future regulations will impose upon our business.

Obligation under Operating Leases

See Note 11 - Leases for discussion of our lease obligations.

Purchase Commitments

We executed multiple non-cancelable purchase orders totaling \$4.8 million in the second quarter of 2022 and a non-cancelable purchase order totaling \$4.6 million in the fourth quarter of 2022 for multiple shipments of tunable lasers and components to be delivered over an 9-15-month period. At December 31, 2022, approximately \$6.6 million of these commitments remained and are expected to be delivered by December 30, 2024.

Guarantees

As of December 31, 2022, we had a total of \$0.3 million in performance bond guarantees outstanding in favor of certain third parties to ensure performance of its obligations under certain customer contracts and lease arrangements. These guarantees expire at various dates through September 2027. To date, we have not incurred any charges associated with non-performance covered by such guarantees and have not accrued any liabilities as of December 31, 2022.

16. Employee Profit Sharing Plan

We maintain a salary reduction/profit-sharing plan under provisions of Section 401(k) of the Internal Revenue Code. The plan is offered to all permanent employees. We contribute 30% of the salary deferral elected by each employee up to a maximum deferral of 10% of annual salary.

We contributed approximately \$0.6 million and \$0.7 million to the plan for the years ended December 31, 2022 and December 31, 2021, respectively.

17. Relationship with Major Customers

During the years ended December 31, 2022 and 2021, approximately 8% and 11%, respectively, of our consolidated revenues were attributable to contracts with the U.S. government.

At December 31, 2022 and 2021, receivables with respect to contracts with the U.S. government represented 4% and 6% of total trade receivables, respectively.

ITEM 9. CHANGES IN AND DISAGREEMENTS WITH ACCOUNTANTS ON ACCOUNTING AND FINANCIAL DISCLOSURE

None.

ITEM 9A. CONTROLS AND PROCEDURES

Evaluation of Disclosure Controls and Procedures

We maintain “disclosure controls and procedures,” as defined in Rules 13a-15(e) and 15d-15(e) under the Securities Exchange Act of 1934, as amended (the “Exchange Act”), which are controls and other procedures that are designed to provide reasonable assurance that information required to be disclosed by a company in the reports that it files or submits under the Exchange Act is recorded, processed, summarized and reported within the time periods specified in the SEC’s rules and forms. Disclosure controls and procedures also include, without limitation, controls and procedures designed to provide reasonable assurance that information required to be disclosed by a company in the reports that it files or submits under the Exchange Act is accumulated and communicated to the company’s management, including its principal executive and principal financial officers, as appropriate to allow timely decisions regarding required disclosure.

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. In addition, the design of any system of controls also is based in part upon certain assumptions about the likelihood of future events, and there can be no assurance that any design will succeed in achieving its stated goals under all potential future conditions; over time, controls may become inadequate because of changes in conditions, or the degree of compliance with policies or procedures may deteriorate. Because of the inherent limitations in a control system, misstatements due to error or fraud may occur and not be detected.

Under the supervision and with the participation of our management, including our President and Chief Executive Officer and our Chief Financial Officer, we evaluated the effectiveness of the design and operation of our disclosure controls and procedures as of the end of the period covered by this report. Based on this evaluation, our President and Chief Executive Officer and our Chief Financial Officer have concluded that, as of December 31, 2022, our disclosure controls and procedures were effective.

Changes in Internal Control over Financial Reporting

There were no changes in our internal control over financial reporting (as defined in Rules 13a-15(f) and Rule 15d-15(f) under the Exchange Act) that occurred during the quarter ended December 31, 2022 that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

Management’s Report on Internal Control over Financial Reporting

Our management is responsible for establishing and maintaining adequate internal control over financial reporting as defined in Rules 13a-15(f) and 15d-15(f) under the Exchange Act. Our internal control over financial reporting is designed, under the supervision of our principal executive and principal financial officers, and effected by our board of directors, management and other personnel to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with accounting principles generally accepted in the United States of America (“GAAP”). Our internal control over financial reporting includes those policies and procedures that: (i) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of our assets; (ii) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with GAAP, and that our receipts and expenditures are being made only in accordance with

authorizations of our management and directors; and (iii) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use or disposition of our assets that could have a material effect on our financial statements.

There are inherent limitations in the effectiveness of any internal control over financial reporting, including the possibility of human error and the circumvention or overriding of controls. Accordingly, even effective internal control over financial reporting can provide only reasonable assurance with respect to financial statement preparation and may not prevent or detect all misstatements. Further, because of changes in conditions, effectiveness of internal control over financial reporting may vary over time. Our internal control system was designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with GAAP.

Under the supervision and with the participation of our management, including our President and Chief Executive Officer, and our Chief Financial Officer, we conducted an evaluation of the effectiveness of our internal control over financial reporting as of December 31, 2022. This evaluation was based on the criteria established in the 2013 *Internal Control—Integrated Framework* issued by the Committee of Sponsoring Organizations of the Treadway Commission.

Based on our evaluation under the framework established in the 2013 *Internal Control—Integrated Framework*, our President and Chief Executive officer, and our Chief Financial Officer concluded that our internal control over financial reporting was effective as of December 31, 2022 to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with GAAP.

ITEM 9B. OTHER INFORMATION

On March 14, 2023, our board of directors approved updated indemnification agreements with each of our directors and executive officers. With certain exceptions, these agreements provide that we will indemnify each of our directors and executive officers against any and all expenses incurred because of his or her status as one of our directors or executive officers to the fullest extent permitted by Delaware law, our certificate of incorporation and bylaws. In addition, the indemnification agreements provide that, to the fullest extent permitted by Delaware law, we will advance all expenses incurred by our directors and executive officers in connection with a legal proceeding involving his or her status as a director or executive officer.

ITEM 9C. DISCLOSURE REGARDING FOREIGN JURISDICTIONS THAT PREVENT INSPECTIONS

None

PART III

ITEM 10. DIRECTORS, EXECUTIVE OFFICERS AND CORPORATE GOVERNANCE

The information required by Item 10 of Form 10-K will be included in the proxy statement related to our 2023 Annual Meeting of Stockholders, (the "2023 Proxy Statement"), anticipated to be filed with the SEC within 120 days after December 31, 2022, and is incorporated into this report by reference.

ITEM 11. EXECUTIVE COMPENSATION

The information required by Item 11 of Form 10-K is incorporated into this report by reference to the information to be provided in our 2023 Proxy Statement.

ITEM 12. SECURITY OWNERSHIP OF CERTAIN BENEFICIAL OWNERS AND MANAGEMENT AND RELATED STOCKHOLDER MATTERS

The information required by Item 12 of Form 10-K is incorporated into this report by reference to the information to be provided in our 2023 Proxy Statement.

ITEM 13. CERTAIN RELATIONSHIPS AND RELATED TRANSACTIONS, AND DIRECTOR INDEPENDENCE

The information required by Item 13 of Form 10-K is incorporated into this report by reference to the information to be provided in our 2023 Proxy Statement.

ITEM 14. PRINCIPAL ACCOUNTING FEES AND SERVICES

The information required by Item 14 of Form 10-K is incorporated into this report by reference to the information to be provided in our 2023 Proxy Statement.

PART IV

ITEM 15. EXHIBITS, FINANCIAL STATEMENT SCHEDULE

- (a) The following documents are filed as part of this Annual Report on Form 10-K:
- (i) Financial Statements. See Index to Consolidated Financial Statements at Item 8 of this Report on Form 10-K.
 - (ii) Schedules.

Schedule II

Column A	Luna Innovations Incorporated Valuation and Qualifying Accounts			
	Column B Balance at beginning of period	Column C Additions	Column D Deductions	Column E Balance at end of period
<i>(in thousands)</i>				
Year Ended December 31, 2021				
Reserves deducted from assets to which they apply:				
Deferred tax valuation allowance	\$ 2,850	\$ 2,815	\$ (1,859)	\$ 3,806
Allowances for doubtful accounts	\$ 886	\$ 880	\$ (841)	\$ 925
	\$ 3,736	\$ 3,695	\$ (2,700)	\$ 4,731
Year Ended December 31, 2022				
Reserves deducted from assets to which they apply:				
Deferred tax valuation allowance	\$ 3,806	\$ 554	\$ (767)	\$ 3,593
Allowances for doubtful accounts	\$ 925	\$ 564	\$ (709)	\$ 780
	\$ 4,731	\$ 1,118	\$ (1,476)	\$ 4,373

All other schedules are omitted as the required information is inapplicable or the information is presented in the Consolidated Financial Statements and notes thereto in Item 8 of Part II of this Annual Report on Form 10-K.

- Exhibits. The exhibits filed as part of this report are listed under "Exhibits" at subsection (b) of this Item 15.
- (b) Exhibits

EXHIBIT INDEX

<u>Exhibit No.</u>	<u>Exhibit Document</u>
2.1#	Share Purchase Agreement, by and between the Company and QinetiQ Holdings Limited, dated as of December 2, 2020 (incorporated by reference to Exhibit 2.1 to the Registrant's Current Report on Form 8-K (File No. 000-52008) filed on December 3, 2020).
2.2#	Form of Equity Purchase Agreement, by and among the Company and the Management Investors, dated as of March 7, 2022 (incorporated by reference Exhibit 2.6 to the Registrant's Annual Report on Form 10-K (File No. 000-52008) filed on March 14, 2022).
2.3#	Equity Purchase Agreement, by and among the Company, Luna Labs and the Investors, dated as of March 8, 2022 (incorporated by reference Exhibit 2.7 to the Registrant's Annual Report on Form 10-K (File No. 000-52008) filed on March 14, 2022).
3.1	Amended and Restated Certificate of Incorporation of the Registrant (incorporated by reference to Exhibit 3.2 to the Registrant's Current Report on Form 8-K (File No. 000-52008) filed on June 8, 2006).
3.2	Certificate of Designations of the Series A Convertible Preferred Stock (incorporated by reference to Exhibit 3.1 to the Registrant's Current Report on Form 8-K (File No. 000-52008) filed on January 15, 2010).
3.3	Amended and Restated Bylaws of the Registrant (incorporated by reference to Exhibit 3.1 to the Registrant's Registration Statement on Form S-1 Current Report on Form 8-K (File No. 000-52008333-131764) filed on March 6, 2023).
4.1	Specimen Common Stock certificate of the Registrant (incorporated by reference to the Exhibit 4.1 to Amendment No. 5 of the Registrant's Registration Statement on Form S-1 (File No. 333-131764) filed on May 19, 2006).
4.2	2006 Equity Incentive Plan (incorporated by reference to Exhibit 10.9 to Amendment No. 3 of the Registrant's Registration Statement on Form S-1 (File No. 333-131764) filed on April 28, 2006).
4.3	Form of Stock Option Agreement under 2006 Equity Incentive Plan (incorporated by reference to Exhibit 4.7 to the Registrant's Registration Statement on Form S-1 (File No. 333-131764) filed on February 10, 2006).
4.4	2016 Equity Incentive Plan (incorporated by reference to Exhibit 4.7 to the Registrant's Registration Statement on Form S-8 (File No. 333-211802) filed on June 3, 2016).
4.5	Form of Stock Option Grant Notice and Stock Option Agreement under 2016 Equity Incentive Plan (incorporated by reference to Exhibit 4.8 of the Registrant's Registration Statement on Form S-8 (File No. 333-211802) filed on June 3, 2016).
4.6	Form of Restricted Stock Unit Grant Notice and Restricted Stock Unit Award Agreement under 2016 Equity Incentive Plan (incorporated by reference to Exhibit 4.1 to the Registrant's Current Report on Form 8-K (File No. 000-52008) filed on January 16, 2019).
4.7	Form of Restricted Stock Award Grant Notice and Restricted Stock Award Agreement under 2016 Equity Incentive Plan (incorporated by reference to Exhibit 10.1 to the Registrant's Quarterly Report on Form 10-O (File No. 000-52008) filed on August 10, 2016).
4.8*	Description of the Registrant's Securities Registered Pursuant to Section 12 of the Securities Exchange Act of 1934.
10.1*	Form of Indemnification Agreement for directors and executive officers.
10.2**	Development and Supply Agreement, dated December 12, 2006, by and between Luna Innovations Incorporated and Intuitive Surgical, Inc. dated June 11, 2007 (incorporated by reference to Exhibit 10.1 to the Registrant's Current Report on Form 8-K (File No. 000-52008) filed on June 14, 2007).
10.3	Non-Employee Directors' Deferred Compensation Plan (incorporated by reference to Exhibit 10.13 to the Registrant's Annual Report on Form 10-K (File No. 000-52008) filed on March 21, 2018).
10.4**	License Agreement, effective January 12, 2010, by and among Luna Innovations Incorporated, Luna Technologies, Inc. and Intuitive Surgical, Inc. (incorporated by reference to Exhibit 10.8 to Registrant's Quarterly Report on Form 10-O (File No. 000-52008) file on May 17, 2010).
10.5	Amended and Restated Employment Agreement dated April 1, 2022, by and between Scott A. Graeff and Luna Innovations Incorporated (incorporated by reference to Exhibit 10.1 to the Registrant's Current Report on Form 8-K (File No. 000-52008) filed on April 7, 2022).
10.6**	Cross-License Agreement by and among Luna Innovations Incorporated and Luna Technologies, Inc. and Intuitive Surgical Operations, Inc. and Intuitive Surgical International, Ltd., dated as of January 17, 2014 (incorporated by reference to Exhibit 10.2 to the Registrant's Quarterly Report on Form 10-O (File No. 000-52008) filed on May 13, 2014).

10.7	Lease Agreement by and between SBA Tenant, LLC and Luna Innovations Incorporated dated November 2014 (incorporated by reference to Exhibit 10.49 to the Registrant's Annual Report on Form 10-K (File No. 000-52008) filed March 16, 2015).
10.8	Amended and Restated Non-Employee Director Compensation Policy, as amended as of February 26, 2019 (incorporated by reference to Exhibit 10.1 to the Registrant's Quarterly Report on Form 10-Q (File No. 000-52008) filed on May 13, 2019).
10.9	Amended and Restated Employment Agreement, dated April 1, 2022, by and between the Registrant and Eugene J. Nestro (incorporated by reference to Exhibit 10.2 to the Registrant's Current Report on Form 8-K (File No. 000-52008) filed on April 7, 2022).
10.10	First Amendment to Commercial Lease, dated as of February 21, 2020, by and between SBA Tenant, LLC and the Registrant (incorporated by reference to Exhibit 10.30 to the Registrant's Annual Report on Form 10-K (File No. 000-52008) filed on March 13, 2020).
10.11	Luna Innovation Incorporated 2020 Employee Stock Purchase Plan (incorporated by reference to Exhibit 10.1 to the Registrant's Quarterly Report on Form 10-Q (File No. 000-52008) filed on August 6, 2020).
10.12	Tax Deed, by and between the Company and OinetiO Holdings Limited, dated as of December 2, 2020 (incorporated by reference to Exhibit 10.1 to the Registrant's Current Report on Form 8-K (File No. 000-52008) filed on December 3, 2020).
10.13	Loan Agreement, dated December 1, 2020, by and between the Company and PNC Bank, National Association (incorporated by reference Exhibit 10.1 to the Registrant's Annual Report on Form 10-K (File No. 000-52008) filed on March 12, 2021).
10.14	Term Note, dated December 1, 2020, by and between the Company and PNC Bank, National Association, Incorporated by reference Exhibit 10.2 to the Registrant's Annual Report on Form 10-K (File No. 000-52008) filed on March 12, 2021).
10.15	Amended and Restated Employment Agreement, dated April 21, 2022, by and between the Registrant and Brian J. Soller (incorporated by reference Exhibit 10.3 to the Registrant's Quarterly Report on Form 10-Q (File No. 000-52008) filed on April 7, 2022).
10.16	Second Amendment to Lease Agreement by and between SBA Tenant, LLC and Luna Innovations Incorporated dated August 27, 2021 (incorporated by reference Exhibit 10.22 to the Registrant's Annual Report on Form 10-K (File No. 000-52008) filed on March 14, 2022).
10.17	First Amendment to Loan Agreement, dated as of March 10, 2022, by and between the Company and PNC Bank, National Association (incorporated by reference to Exhibit 10.4 to the Registrant's Current Report on Form 8-K (File No. 000-52008) filed on August 12, 2022).
10.18	Second Amendment to Loan Agreement, dated as of June 21, 2022, by and between the Company and PNC Bank, National Association (incorporated by reference to Exhibit 10.5 to the Registrant's Current Report on Form 8-K (File No. 000-52008) filed on August 12, 2022).
10.19	Amended and Restated Revolving Line of Credit Note, dated June 21, 2022, by and between the Company and PNC Bank, National Association (incorporated by reference to Exhibit 10.6 to the Registrant's Current Report on Form 8-K (File No. 000-52008) filed on August 12, 2022).
10.20	Amended and Restated Term Loan Agreement, dated as of June 21, 2022, by and between the Company and PNC Bank, National Association (incorporated by reference to Exhibit 10.7 to the Registrant's Current Report on Form 8-K (File No. 000-52008) filed on August 12, 2022).
10.21*	Third Amendment to Loan Agreement, dated January 31, 2023, by and between the Company and PNC Bank, National Association.
21.1*	List of Subsidiaries
23.1*	Consent of Ernst & Young LLP, Independent Registered Public Accounting Firm
23.2*	Consent of Grant Thornton LLP, Predecessor Independent Registered Public Accounting Firm
24.1	Power of Attorney (see signature page)
31.1*	Certification of the Principal Executive Officer pursuant to Rule 13a-14(a) and Rule 15d-14(a) of the Securities Exchange Act of 1934, as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
31.2*	Certification of the Principal Financial Officer pursuant to Rule 13a-14(a) and Rule 15d-14(a) of the Securities Exchange Act of 1934, as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
32.1***	Certification of Principal Executive Officer pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.

32.2***
101 [Certification of Principal Financial Officer pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.](#)
The following materials from the Registrant's Annual Report on Form 10-K for the year ended December 31, 2022, are formatted in XBRL (eXtensible Business Reporting Language): (i) Consolidated Balance Sheets at December 31, 2022 and 2021, (ii) Consolidated Statements of Operations for the years ended December 31, 2022 and 2021, (iii) Consolidated Statements of Changes in Stockholder's Equity for the years ended December 31, 2022 and 2021 (iv) Consolidated Statements of Cash Flows for the years ended December 31, 2022 and 2021, and (v) Notes to Audited Consolidated Financial Statements.

* Filed herewith

Pursuant to Item 601(b)(2) of Regulation S-K, the schedules and exhibits to this agreement are omitted, but will be furnished to the Securities and Exchange Commission upon request.

** Confidential treatment has been granted with respect to portions of this exhibit, indicated by asterisks, which has been filed separately with the Securities and Exchange Commission.

*** These certifications are being furnished solely to accompany this annual report pursuant to 18 U.S.C. Section 1350, and are not being filed for purposes of Section 18 of the Securities Exchange Act of 1934 and are not to be incorporated by reference into any filing of the registrant, whether made before or after the date hereof, regardless of any general incorporation language in such filing.

ITEM 16. FORM 10-K SUMMARY

Not applicable.

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) 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.

LUNA INNOVATIONS INCORPORATED

By: _____ /s/ Eugene J. Nestro
Eugene J. Nestro
Chief Financial Officer
(Principal Financial and Accounting Officer)

March 16, 2023

KNOW ALL PERSONS BY THESE PRESENTS, that each person whose signature appears below hereby constitutes and appoints Scott A. Graeff and Eugene J. Nestro, and each of them acting individually, as his true and lawful attorneys-in-fact and agents, with full power of each to act alone, with full powers of substitution and resubstitution, for him and in his name, place and stead, in any and all capacities, to sign any and all amendments to this Annual Report on Form 10-K with all exhibits thereto and all documents in connection therewith, with the Securities and Exchange Commission, granting unto said attorneys-in-fact and agents, with full power of each to act alone, full power and authority to do and perform each and every act and thing requisite and necessary to be done in connection therewith, as fully for all intents and purposes as he might or could do in person, hereby ratifying and confirming all that said attorneys-in-fact and agents, or his or their substitutes, may lawfully do or cause to be done by virtue hereof.

Pursuant to the requirements of the Securities Exchange Act of 1934, this report has been signed below by the following persons on behalf of the registrant and in the capacities and on the dates indicated.

<u>Signature</u>	<u>Title</u>	<u>Date</u>
_____ /s/ Scott A. Graeff Scott A. Graeff	President, Chief Executive Officer and Director (Principal Executive Officer)	March 16, 2023
_____ /s/ Eugene J. Nestro Eugene J. Nestro	Chief Financial Officer (Principal Financial and Accounting Officer)	March 16, 2023
_____ /s/ N. Leigh Anderson N. Leigh Anderson	Director	March 16, 2023
_____ /s/ Warren B. Phelps, III Warren B. Phelps, III	Director	March 16, 2023
_____ /s/ Pamela Coe Pamela Coe	Director	March 16, 2023
_____ /s/ Gary Spiegel Gary Spiegel	Director	March 16, 2023
_____ /s/ Mary Beth Vitale Mary Beth Vitale	Director	March 16, 2023
_____ /s/ Richard W. Roedel Richard W. Roedel	Chairman of the Board of Directors	March 16, 2023

Description of Capital Stock of Luna Innovations Incorporated

The following description of the common stock of Luna Innovations Incorporated (the “Company”) is a summary and does not purport to be complete. This summary is qualified in its entirety by reference to the provisions of the Delaware General Corporation Law (the “DGCL”) and the complete text of the Company’s amended and restated certificate of incorporation (the “restated certificate”), the Amended and Restated Certificate of Designations of the Series A Convertible Preferred Stock (the “certificate of designations”), and the amended and restated bylaws (the “bylaws”), each as currently in effect, which are incorporated by reference as Exhibits 3.1, 3.2 and 3.3, respectively, of the Company’s Annual Report on Form 10-K, to which this description is also an exhibit. The Company encourages you to read that law and those documents carefully.

Authorized Capital Stock

The restated certificate authorizes the issuance of up to 100,000,000 shares of common stock, \$0.001 par value per share, and 5,000,000 shares of preferred stock with a \$0.001 par value per share. The Company’s board of directors may establish the rights and preferences of the preferred stock from time to time.

Common Stock

Voting Rights

Holders of common stock are entitled to one vote for each share held of record on all matters submitted to a vote of the stockholders. Holders of common stock do not have cumulative voting rights in the election of directors. Accordingly, holders of a majority of the shares voting are able to elect all directors being elected at such time.

Dividends

Holders of common stock are entitled to receive ratably those dividends, if any, as may be declared from time to time by the board of directors out of legally available funds.

Liquidation

In the event of the Company’s liquidation, dissolution or winding up, holders of common stock will be entitled to share ratably in the net assets legally available for distribution to stockholders.

Rights and Preferences

Holders of common stock have no preemptive, conversion or subscription rights and there are no redemption or sinking fund provisions applicable to the common stock. The rights, preferences and privileges of the holders of common stock are subject to, and may be adversely affected by, the rights of the holders of shares of any series of preferred stock that the Company may designate in the future.

Preferred Stock

The board of directors has the authority under our restated certificate, without further action by stockholders, to issue up to 5,000,000 shares of preferred stock in one or more series, to establish from time to time the number of shares to be included in each such series, to fix the rights, preferences and privileges of the shares of each wholly unissued series and any qualifications, limitations or restrictions thereon, and to increase or decrease the number of shares of any such series, but not below the number of shares of such series then outstanding.

The board of directors previously designated 1,321,514 shares of preferred stock as Series A Convertible Preferred Stock (“Series A Preferred Stock”). All shares of Series A Preferred Stock have been converted to common stock and, accordingly, there are no shares of Series A Preferred Stock outstanding.

The board of directors may authorize the issuance of preferred stock with voting or conversion rights that could adversely affect the voting power or other rights of the holders of common stock. The purpose of authorizing the board of directors to issue preferred stock and determine its rights and preferences is to eliminate delays

associated with a stockholder vote on specific issuances. The issuance of preferred stock, while providing flexibility in connection with possible acquisitions and other corporate purposes, could, among other things, have the effect of delaying, deferring or preventing a change in control of the Company and may adversely affect the market price of the common stock and the voting and other rights of the holders of common stock. It is not possible to state the actual effect of the issuance of any shares of preferred stock on the rights of holders of common stock until the board of directors determines the specific rights attached to that preferred stock.

Anti-Takeover Effects of Provisions of the Amended and Restated Certificate of Incorporation and Bylaws

The restated certificate provides for the Company's board of directors to be divided into three classes, with staggered three-year terms. Only one class of directors will be elected at each annual meeting of stockholders, with the other classes continuing for the remainder of their respective three-year terms. Because common stockholders do not have cumulative voting rights, common stockholders representing a majority of the shares of common stock outstanding will be able to elect all of the Company's directors. The restated certificate and bylaws provide that only the Company's board of directors, chairman of the board, chief executive officer or president (in the absence of a chief executive officer) may call a special meeting of stockholders. The restated certificate requires a 66 2/3% stockholder vote for the amendment, repeal or modification of certain provisions of the restated certificate and bylaws relating to the absence of cumulative voting, the classification of the Company's board of directors, and the designated parties entitled to call a special meeting of the stockholders.

The combination of a classified board, the lack of cumulative voting and the 66 2/3% stockholder voting requirements will make it more difficult for existing stockholders to replace the Company's board of directors as well as for another party to obtain control of the Company by replacing the Company's board of directors. Since the Company's board of directors has the power to retain and discharge the Company's officers, these provisions could also make it more difficult for existing stockholders or another party to effect a change in management. In addition, the authorization of undesignated preferred stock makes it possible for the Company's board of directors to issue preferred stock with voting or other rights or preferences that could impede the success of any attempt to change the Company's control.

These provisions may have the effect of deterring hostile takeovers or delaying changes in the Company's control or management. These provisions are intended to enhance the likelihood of continued stability in the composition of the Company's board of directors and in the policies they implement, and to discourage certain types of transactions that may involve an actual or threatened change of the Company's control. These provisions are designed to reduce the Company's vulnerability to an unsolicited acquisition proposal. The provisions also are intended to discourage certain tactics that may be used in proxy fights. However, such provisions could have the effect of discouraging others from making tender offers for the Company's shares and, as a consequence, they also may inhibit fluctuations in the market price of the Company's shares that could result from actual or rumored takeover attempts. Such provisions may also have the effect of preventing changes in the Company's management.

Section 203 of the General Corporation Law of the State of Delaware

The Company is subject to Section 203 of the DGCL, which regulates acquisitions of some Delaware corporations. Section 203 generally prohibits a publicly held Delaware corporation from engaging in a "business combination" with an "interested stockholder" for a period of three years following the date of the transaction in which the person became an interested stockholder, unless:

- the board of directors of the corporation approved the business combination or the other transaction in which the person became an interested stockholder prior to the date of the business combination or other transaction;
- upon consummation of the transaction that resulted in the person becoming an interested stockholder, the person owned at least 85% of the voting stock of the corporation outstanding at the time the transaction commenced, excluding shares owned by persons who are directors and also officers of the corporation and shares issued under employee stock plans under which employee participants do not have the right to determine confidentially whether shares held subject to the plan will be tendered in a tender or exchange offer; or
- on or subsequent to the date the person became an interested stockholder, the board of directors of the corporation approved the business combination and the stockholders of the corporation authorized the

business combination at an annual or special meeting of stockholders by the affirmative vote of at least 66-2/3% of the outstanding stock of the corporation not owned by the interested stockholder.

Section 203 of the DGCL defines a "business combination" to include any of the following:

- any merger or consolidation involving the corporation and the interested stockholder;
 - any sale, transfer, pledge or other disposition of 10% or more of the corporation's assets or outstanding stock involving the interested stockholder;
 - subject to exceptions, any transaction that results in the issuance or transfer by the corporation of any of its stock to the interested stockholder;
 - any transaction involving the corporation that has the effect of increasing the proportionate share of its stock owned by the interested stockholder; or
 - the receipt by the interested stockholder of the benefit of any loans, advances, guarantees, pledges or other financial benefits provided by or through the corporation.
- In general, Section 203 defines an "interested stockholder" as any person who, together with the person's affiliates and associates, owns, or within three years prior to the determination of interested stockholder status did own, 15% or more of a corporation's voting stock.

Section 203 of the DGCL could depress the Company's stock price and delay, discourage or prohibit transactions not approved in advance by the board of directors, such as takeover attempts that might otherwise involve the payment to the Company's stockholders of a premium over the market price of the common stock.

Nasdaq Capital Market Listing

The common stock is listed on the Nasdaq Capital Market under the symbol "LUNA."

Transfer Agent and Registrar

The transfer agent and registrar for the Company's common stock is American Stock Transfer & Trust Company. The transfer agent's address is 6201 15th Avenue, Brooklyn New York 11219.

INDEMNIFICATION AGREEMENT

THIS INDEMNIFICATION AGREEMENT (the “**Agreement**”) is made and entered into as of _____ between **Luna Innovations Incorporated**, a Delaware corporation (the “**Company**”), and [Indemnitee Name] (“**Indemnitee**”).

WITNESSETH THAT:

WHEREAS, highly competent persons have become more reluctant to serve corporations as directors and/or officers or in other capacities unless they are provided with adequate protection through insurance or adequate indemnification against inordinate risks of claims and actions against them arising out of their service to and activities on behalf of the corporation;

WHEREAS, the Board of Directors of the Company (the “**Board**”) has determined that, in order to attract and retain qualified individuals, the Company will attempt to maintain on an ongoing basis, at its sole expense, liability insurance to protect persons serving the Company and its subsidiaries from certain liabilities. Although the furnishing of such insurance has been a customary and widespread practice among United States-based corporations and other business enterprises, the Company believes that, given current market conditions and trends, such insurance may be available to it in the future only at higher premiums and with more exclusions. At the same time, directors, officers, and other persons in service to corporations or business enterprises are being increasingly subjected to expensive and time-consuming litigation relating to, among other things, matters that traditionally would have been brought only against the Company or business enterprise itself. The Amended and Restated Certificate of Incorporation of the Company (the “**Certificate of Incorporation**”) and the Amended and Restated Bylaws of the Company (as amended, the “**Bylaws**”) each require indemnification of the executive officers and directors of the Company. Indemnitee may also be entitled to indemnification pursuant to the General Corporation Law of the State of Delaware (“**DGCL**”). The Bylaws, Certificate of Incorporation, and the DGCL expressly provide that the indemnification provisions set forth therein are not exclusive, and thereby contemplate that contracts may be entered into between the Company and members of the Board, officers and other persons with respect to indemnification;

WHEREAS, the uncertainties relating to such insurance and to indemnification have increased the difficulty of attracting and retaining such persons;

WHEREAS, the Board has determined that the increased difficulty in attracting and retaining such persons is detrimental to the best interests of the Company’s stockholders and that the Company should act to assure such persons that there will be increased certainty of such protection in the future;

WHEREAS, it is reasonable, prudent and necessary for the Company contractually to obligate itself to indemnify, and to advance expenses on behalf of, such persons to the fullest extent permitted by applicable law so that they will serve or continue to serve the Company free from undue concern that they will not be so indemnified;

WHEREAS, this Agreement is a supplement to and in furtherance of the Bylaws and Certificate of Incorporation of the Company and any resolutions adopted pursuant thereto, and shall not be deemed a substitute therefor, nor to diminish or abrogate any rights of Indemnitee thereunder; and

WHEREAS, Indemnitee does not regard the protection available under the Company’s Bylaws and Certificate of Incorporation and insurance as adequate in the present circumstances, and may not be willing to serve as an officer or director without adequate protection, and the Company desires Indemnitee to serve in such capacity. Indemnitee is willing to serve, continue to serve and to take on additional service for or on behalf of the Company on the condition that Indemnitee be so indemnified.

NOW, THEREFORE, in consideration of Indemnitee’s agreement to serve as an officer and/or director from and after the date hereof, the parties hereto agree as follows:

1. Indemnity of Indemnitee. The Company hereby agrees to hold harmless and indemnify Indemnitee to the fullest extent permitted by law, as such may be amended from time to time. In furtherance of the foregoing indemnification, and without limiting the generality thereof:

(a) Proceedings Other Than Proceedings by or in the Right of the Company. Indemnitee shall be entitled to the rights of indemnification provided in this Section 1(a) if, by reason of Indemnitee's Corporate Status (as hereinafter defined), the Indemnitee is, or is threatened to be made, a party to or participant in any Proceeding (as hereinafter defined) other than a Proceeding by or in the right of the Company. Pursuant to this Section 1(a), Indemnitee shall be indemnified against all Expenses (as hereinafter defined), judgments, penalties, fines and amounts paid in settlement actually and reasonably incurred by Indemnitee, or on Indemnitee's behalf, in connection with such Proceeding or any claim, issue or matter therein, if the Indemnitee acted in good faith and in a manner the Indemnitee reasonably believed to be in or not opposed to the best interests of the Company, and with respect to any criminal Proceeding, had no reasonable cause to believe the Indemnitee's conduct was unlawful.

(b) Proceedings by or in the Right of the Company. Indemnitee shall be entitled to the rights of indemnification provided in this Section 1(b) if, by reason of Indemnitee's Corporate Status, the Indemnitee is, or is threatened to be made, a party to or participant in any Proceeding brought by or in the right of the Company. Pursuant to this Section 1(b), Indemnitee shall be indemnified against all Expenses actually and reasonably incurred by the Indemnitee, or on the Indemnitee's behalf, in connection with such Proceeding if the Indemnitee acted in good faith and in a manner the Indemnitee reasonably believed to be in or not opposed to the best interests of the Company; provided, however, if applicable law so provides, no indemnification against such Expenses shall be made in respect of any claim, issue or matter in such Proceeding as to which Indemnitee shall have been adjudged to be liable to the Company unless and to the extent that the Court of Chancery of the State of Delaware shall determine that such indemnification may be made.

(c) Indemnification for Expenses of a Party Who is Wholly or Partly Successful. Notwithstanding any other provision of this Agreement, to the extent that Indemnitee is, by reason of Indemnitee's Corporate Status, a party to (or participant in) and is successful, on the merits or otherwise, in any Proceeding, Indemnitee shall be indemnified to the maximum extent permitted by law, as such may be amended from time to time, against all Expenses actually and reasonably incurred by Indemnitee, or on Indemnitee's behalf, in connection therewith. If Indemnitee is not wholly successful in such Proceeding but is successful, on the merits or otherwise, as to one or more but less than all claims, issues or matters in such Proceeding, the Company shall indemnify Indemnitee against all Expenses actually and reasonably incurred by Indemnitee, or on Indemnitee's behalf, in connection with each successfully resolved claim, issue or matter. For purposes of this Section and without limitation, the termination of any claim, issue or matter in such a Proceeding by dismissal, with or without prejudice, shall be deemed to be a successful result as to such claim, issue or matter.

(d) Partial Indemnification. If Indemnitee is entitled under any provision of this Agreement to indemnification by the Company for some or a portion of Expenses, but not, however, for the total amount thereof, the Company shall nevertheless indemnify Indemnitee for the portion thereof to which Indemnitee is entitled.

2. Additional Indemnity. In addition to, and without regard to any limitations on, the indemnification provided for in Section 1 of this Agreement, the Company shall and hereby does indemnify and hold harmless Indemnitee against all Expenses, judgments, penalties, fines and amounts paid in settlement actually and reasonably incurred by Indemnitee, or on Indemnitee's behalf, if, by reason of Indemnitee's Corporate Status, Indemnitee is, or is threatened to be made, a party to or participant in any Proceeding (including a Proceeding by or in the right of the Company), including, without limitation, all liability arising out of the negligence or active or passive wrongdoing of Indemnitee. The only limitation that shall exist upon the Company's obligations pursuant to this Agreement shall be that the Company shall not be obligated to make any payment to Indemnitee that is finally determined (under the procedures, and subject to the presumptions, set forth in Sections 6 and 7 hereof) to be unlawful.

3. Contribution.

(a) Whether or not the indemnification provided in Sections 1 and 2 hereof is available, in respect of any threatened, pending or completed action, suit or proceeding in which the Company is jointly liable with Indemnitee (or would be if joined in such action, suit or proceeding), the Company shall pay, in the first instance, the entire amount of any judgment or settlement of such action, suit or proceeding without requiring Indemnitee to contribute to such payment and the Company hereby waives and relinquishes any right of contribution it may have against Indemnitee. The Company shall not enter into any settlement of any action, suit or proceeding in which the Company is jointly liable with Indemnitee (or would be if joined in such action, suit or proceeding) unless such settlement provides for a full and final release of all claims asserted against Indemnitee.

(b) Without diminishing or impairing the obligations of the Company set forth in the preceding subparagraph, if, for any reason, Indemnitee shall elect or be required to pay all or any portion of any judgment or settlement in any threatened, pending or completed action, suit or proceeding in which the Company is jointly liable with Indemnitee (or would be if joined in such action, suit or proceeding), the Company shall contribute to the amount of Expenses, judgments, fines and amounts paid in settlement actually and reasonably incurred and paid or payable by Indemnitee in proportion to the relative benefits received by the Company and all officers, directors or employees of the Company, other than Indemnitee, who are jointly liable with Indemnitee (or would be if joined in such action, suit or proceeding), on the one hand, and Indemnitee, on the other hand, from the transaction or events from which such action, suit or proceeding arose; provided, however, that the proportion determined on the basis of relative benefit may, to the extent necessary to conform to law, be further adjusted by reference to the relative fault of the Company and all officers, directors or employees of the Company other than Indemnitee who are jointly liable with Indemnitee (or would be if joined in such action, suit or proceeding), on the one hand, and Indemnitee, on the other hand, in connection with the transaction or events that resulted in such expenses, judgments, fines or settlement amounts, as well as any other equitable considerations which applicable law may require to be considered. The relative fault of the Company and all officers, directors or employees of the Company, other than Indemnitee, who are jointly liable with Indemnitee (or would be if joined in such action, suit or proceeding), on the one hand, and Indemnitee, on the other hand, shall be determined by reference to, among other things, the degree to which their actions were motivated by intent to gain personal profit or advantage, the degree to which their liability is primary or secondary and the degree to which their conduct is active or passive.

(c) The Company hereby agrees to fully indemnify and hold Indemnitee harmless from any claims of contribution which may be brought by officers, directors, or employees of the Company, other than Indemnitee, who may be jointly liable with Indemnitee.

(d) To the fullest extent permissible under applicable law, if the indemnification provided for in this Agreement is unavailable to Indemnitee for any reason whatsoever, the Company, in lieu of indemnifying Indemnitee, shall contribute to the amount incurred by Indemnitee, whether for judgments, fines, penalties, excise taxes, amounts paid or to be paid in settlement and/or for Expenses, in connection with any claim relating to an indemnifiable event under this Agreement, in such proportion as is deemed fair and reasonable in light of all of the circumstances of such Proceeding in order to reflect (i) the relative benefits received by the Company and Indemnitee as a result of the event(s) and/or transaction(s) giving cause to such Proceeding and/or (ii) the relative fault of the Company (and its directors, officers, employees and agents) and Indemnitee in connection with such event(s) and/or transaction(s).

4. Indemnification for Expenses of a Witness. Notwithstanding any other provision of this Agreement, to the extent that Indemnitee is, by reason of Indemnitee's Corporate Status, a witness, or is made (or asked) to respond to discovery requests, in any Proceeding to which Indemnitee is not a party, Indemnitee shall be indemnified against all Expenses actually and reasonably incurred by Indemnitee, or on Indemnitee's behalf, in connection therewith.

5. Advancement of Expenses. Notwithstanding any other provision of this Agreement, the Company shall advance all Expenses incurred by or on behalf of Indemnitee in connection with any Proceeding by reason of Indemnitee's Corporate Status within thirty (30) days after the receipt by the Company of a statement or statements from Indemnitee requesting such advance or advances from time to time, whether prior to or after final disposition of such Proceeding. Such statement or statements shall reasonably evidence the Expenses incurred by Indemnitee and shall include or be preceded or accompanied by a written undertaking by or on behalf of Indemnitee to repay any Expenses advanced if it shall ultimately be determined that Indemnitee is not entitled to be indemnified against such Expenses. Any advances and undertakings to repay pursuant to this Section 5 shall be unsecured and interest free. This Section 5 shall not apply to any claim made by Indemnitee for which indemnity is excluded pursuant to Section 9.

6. Procedures and Presumptions for Determination of Entitlement to Indemnification. It is the intent of this Agreement to secure for Indemnitee rights of indemnity that are as favorable as may be permitted under the DGCL and public policy of the State of Delaware. Accordingly, the parties agree that the following procedures and presumptions shall apply in the event of any question as to whether Indemnitee is entitled to indemnification under this Agreement:

(a) To obtain indemnification under this Agreement, Indemnitee shall submit to the Company a written request, including therein or therewith such documentation and information as is reasonably available to Indemnitee and is reasonably necessary to determine whether and to what extent Indemnitee is entitled to indemnification. The Secretary of the Company shall, promptly upon receipt of such a request for indemnification, advise the Board in writing that Indemnitee has requested indemnification. Notwithstanding the foregoing, any failure of Indemnitee to provide such a request to the Company, or to provide such a request in a timely fashion, shall not relieve the Company of any liability that it may have to Indemnitee unless, and to the extent that, such failure actually and materially prejudices the interests of the Company. The Company will be entitled to participate in the Proceeding at its own Expense.

(b) Upon written request by Indemnitee for indemnification pursuant to the first sentence of Section 6(a) hereof, a determination with respect to Indemnitee's entitlement thereto shall be made in the specific case by one of the following four methods, which shall be at the election of the Board: (i) by a majority vote of the disinterested directors, even though less than a quorum, (ii) by a committee of disinterested directors designated by a majority vote of the disinterested directors, even though less than a quorum, (iii) if there are no disinterested directors or if the disinterested directors so direct, by independent legal counsel in a written opinion to the Board, a copy of which shall be delivered to the Indemnitee, or (iv) if so directed by the Board, by the stockholders of the Company. For purposes hereof, disinterested directors are those members of the Board who are not parties to the action, suit or proceeding in respect of which indemnification is sought by Indemnitee.

(c) If the determination of entitlement to indemnification is to be made by Independent Counsel pursuant to Section 6(b) hereof, the Independent Counsel shall be selected as provided in this Section 6(c). The Independent Counsel shall be selected by the Board. Indemnitee may, within ten (10) days after such written notice of selection shall have been given, deliver to the Company a written objection to such selection; provided, however, that such objection may be asserted only on the ground that the Independent Counsel so selected does not meet the requirements of "Independent Counsel" as defined in Section 13 of this Agreement, and the objection shall set forth with particularity the factual basis of such assertion. Absent a proper and timely objection, the person so selected shall act as Independent Counsel. If a written objection is made and substantiated, the Independent Counsel selected may not serve as Independent Counsel unless and until such objection is withdrawn or a court has determined that such objection is without merit. If, within twenty (20) days after submission by Indemnitee of a written request for indemnification pursuant to Section 6(a) hereof, no Independent Counsel shall have been selected and not objected to, either the Company or Indemnitee may petition the Court of Chancery of the State of Delaware or other court of competent jurisdiction for resolution of any objection which shall have been made by the Indemnitee to the Company's selection of Independent Counsel and/or for the appointment as Independent Counsel of a person selected by the court or by such

other person as the court shall designate, and the person with respect to whom all objections are so resolved or the person so appointed shall act as Independent Counsel under Section 6(b) hereof. The Company shall pay any and all reasonable fees and expenses of Independent Counsel incurred by such Independent Counsel in connection with acting pursuant to Section 6(b) hereof, and the Company shall pay all reasonable fees and expenses incurred by the Company and the Indemnitee incident to the procedures of this Section 6(c), regardless of the manner in which such Independent Counsel was selected or appointed.

(d) In making a determination with respect to entitlement to indemnification hereunder, the person or persons or entity making such determination shall presume that Indemnitee is entitled to indemnification under this Agreement. Anyone seeking to overcome this presumption shall have the burden of proof and the burden of persuasion by clear and convincing evidence. Neither the failure of the Company (including by its directors or independent legal counsel) to have made a determination prior to the commencement of any action pursuant to this Agreement that indemnification is proper in the circumstances because Indemnitee has met the applicable standard of conduct, nor an actual determination by the Company (including by its directors or independent legal counsel) that Indemnitee has not met such applicable standard of conduct, shall be a defense to the action or create a presumption that Indemnitee has not met the applicable standard of conduct.

(e) Indemnitee shall be deemed to have acted in good faith if Indemnitee's action is based on the records or books of account of the Enterprise (as hereinafter defined), including financial statements, or on information supplied to Indemnitee by the officers of the Enterprise in the course of their duties, or on the advice of legal counsel for the Enterprise or on information or records given or reports made to the Enterprise by an independent certified public accountant or by an appraiser or other expert selected with reasonable care by the Enterprise. The provisions of this Section 6(e) shall not be deemed to be exclusive or to limit in any way the other circumstances in which the Indemnitee may be deemed to have met the applicable standard of conduct set forth in this Agreement. In addition, the knowledge and/or actions, or failure to act, of any director, officer, agent or employee of the Enterprise shall not be imputed to Indemnitee for purposes of determining the right to indemnification under this Agreement. Whether or not the foregoing provisions of this Section 6(e) are satisfied, it shall in any event be presumed that Indemnitee has at all times acted in good faith and in a manner Indemnitee reasonably believed to be in or not opposed to the best interests of the Company. Anyone seeking to overcome this presumption shall have the burden of proof and the burden of persuasion by clear and convincing evidence.

(f) If the person, persons or entity empowered or selected under Section 6 to determine whether Indemnitee is entitled to indemnification shall not have made a determination within sixty (60) days after receipt by the Company of the request therefor, the requisite determination of entitlement to indemnification shall be deemed to have been made and Indemnitee shall be entitled to such indemnification absent (i) a misstatement by Indemnitee of a material fact, or an omission of a material fact necessary to make Indemnitee's statement not materially misleading, in connection with the request for indemnification, or (ii) a prohibition of such indemnification under applicable law; provided, however, that such sixty (60) day period may be extended for a reasonable time, not to exceed an additional thirty (30) days, if the person, persons or entity making such determination with respect to entitlement to indemnification in good faith requires such additional time to obtain or evaluate documentation and/or information relating thereto; and provided further, that the foregoing provisions of this Section 6(f) shall not apply if the determination of entitlement to indemnification is to be made by the stockholders pursuant to Section 6(b) of this Agreement and if (A) within fifteen (15) days after receipt by the Company of the request for such determination, the Board or the Disinterested Directors, if appropriate, resolve to submit such determination to the stockholders for their consideration at an annual meeting thereof to be held within seventy five (75) days after such receipt and such determination is made thereat, or (B) a special meeting of stockholders is called within fifteen (15) days after such receipt for the purpose of making such determination, such meeting is held for such purpose within sixty (60) days after having been so called and such determination is made thereat.

(g) Indemnitee shall cooperate with the person, persons or entity making such determination with respect to Indemnitee's entitlement to indemnification, including providing to such person, persons or entity upon reasonable advance request any documentation or information which is not privileged or otherwise protected from disclosure and which is reasonably available to Indemnitee and reasonably necessary to such determination. Any Independent Counsel, member of the Board or stockholder of the Company shall act reasonably and in good faith in making a determination regarding the Indemnitee's entitlement to indemnification under this Agreement. Any costs or expenses (including attorneys' fees and disbursements) incurred by Indemnitee in so cooperating with the person, persons or entity making such determination shall be borne by the Company (irrespective of the determination as to Indemnitee's entitlement to indemnification) and the Company hereby indemnifies and agrees to hold Indemnitee harmless therefrom.

(h) In the event that any action, suit or proceeding to which Indemnitee is a party is resolved in any manner other than by adverse judgment against Indemnitee (including, without limitation, settlement of such action, suit or proceeding with or without payment of money or other consideration) it shall be presumed that Indemnitee has been successful on the merits or otherwise in such action, suit or proceeding. Anyone seeking to overcome this presumption shall have the burden of proof and the burden of persuasion by clear and convincing evidence.

(i) The termination of any Proceeding or of any claim, issue or matter therein, by judgment, order, settlement or conviction, or upon a plea of nolo contendere or its equivalent, shall not (except as otherwise expressly provided in this Agreement) of itself adversely affect the right of Indemnitee to indemnification or create a presumption that Indemnitee did not act in good faith and in a manner which Indemnitee reasonably believed to be in or not opposed to the best interests of the Company or, with respect to any criminal Proceeding, that Indemnitee had reasonable cause to believe that Indemnitee's conduct was unlawful.

7. Remedies of Indemnitee.

(a) In the event that (i) a determination is made pursuant to Section 6 of this Agreement that Indemnitee is not entitled to indemnification under this Agreement, (ii) advancement of Expenses is not timely made pursuant to Section 5 of this Agreement, (iii) no determination of entitlement to indemnification is made pursuant to Section 6(b) of this Agreement within ninety (90) days after receipt by the Company of the request for indemnification, (iv) payment of indemnification is not made pursuant to Sections 1(c), 1(d), 4 or the last sentence of Section 6(g) of this Agreement within ten (10) days after receipt by the Company of a written request therefor, or (v) payment of indemnification is not made pursuant to Sections 1(a), 1(b) and 2 of this Agreement within ten (10) days after a determination has been made that Indemnitee is entitled to indemnification or such determination is deemed to have been made pursuant to Section 6 of this Agreement, Indemnitee shall be entitled to an adjudication in an appropriate court of the State of Delaware, or in any other court of competent jurisdiction, of Indemnitee's entitlement to such indemnification. Indemnitee shall commence such proceeding seeking an adjudication within one hundred eighty (180) days following the date on which Indemnitee first has the right to commence such proceeding pursuant to this Section 7(a). The Company shall not oppose Indemnitee's right to seek any such adjudication.

(b) In the event that a determination shall have been made pursuant to Section 6(b) of this Agreement that Indemnitee is not entitled to indemnification, any judicial proceeding commenced pursuant to this Section 7 shall be conducted in all respects as a de novo trial on the merits, and Indemnitee shall not be prejudiced by reason of the adverse determination under Section 6(b).

(c) If a determination shall have been made pursuant to Section 6(b) of this Agreement that Indemnitee is entitled to indemnification, the Company shall be bound by such determination in any judicial proceeding commenced pursuant to this Section 7, absent (i) a misstatement by Indemnitee of a material fact, or an omission of a material fact necessary to make Indemnitee's misstatement not materially misleading in connection with the application for indemnification, or (ii) a prohibition of such indemnification under applicable law.

(d) In the event that Indemnitee, pursuant to this Section 7, seeks a judicial adjudication of Indemnitee's rights under, or to recover damages for breach of, this Agreement, or to recover under any directors' and officers' liability insurance policies maintained by the Company, the Company shall pay on Indemnitee's behalf, in advance, any and all expenses (of the types described in the definition of Expenses in Section 13 of this Agreement) actually and reasonably incurred by Indemnitee in such judicial adjudication, regardless of whether Indemnitee ultimately is determined to be entitled to such indemnification, advancement of expenses or insurance recovery.

(e) The Company shall be precluded from asserting in any judicial proceeding commenced pursuant to this Section 7 that the procedures and presumptions of this Agreement are not valid, binding and enforceable and shall stipulate in any such court that the Company is bound by all the provisions of this Agreement. It is the intent of the Company that, to the fullest extent permitted by law, the Indemnitee not be required to incur legal fees or other Expenses associated with the interpretation, enforcement or defense of Indemnitee's rights under this Agreement by litigation or otherwise because the cost and expense thereof would substantially detract from the benefits intended to be extended to the Indemnitee hereunder. The Company shall indemnify Indemnitee against any and all Expenses and, if requested by Indemnitee, shall (within ten (10) days after receipt by the Company of a written request therefore) advance, to the extent not prohibited by law, such expenses to Indemnitee, which are incurred by Indemnitee in connection with any action brought by Indemnitee for indemnification or advance of Expenses from the Company under this Agreement or under any directors' and officers' liability insurance policies maintained by the Company, if, in the case of indemnification, Indemnitee is wholly successful on the underlying claims; if Indemnitee is not wholly successful on the underlying claims, then such indemnification shall be only to the extent Indemnitee is successful on such underlying claims or otherwise as permitted by law, whichever is greater.

(f) Notwithstanding anything in this Agreement to the contrary, no determination as to entitlement to indemnification under this Agreement shall be required to be made prior to the final disposition of the Proceeding.

8. Non-Exclusivity; Survival of Rights; Insurance; Primacy of Indemnification; Subrogation.

(a) The rights of indemnification as provided by this Agreement shall not be deemed exclusive of any other rights to which Indemnitee may at any time be entitled under applicable law, the Certificate of Incorporation, the Bylaws, any agreement, a vote of stockholders, a resolution of directors of the Company, or otherwise. No amendment, alteration or repeal of this Agreement or of any provision hereof shall limit or restrict any right of Indemnitee under this Agreement in respect of any action taken or omitted by such Indemnitee in Indemnitee's Corporate Status prior to such amendment, alteration or repeal. To the extent that a change in the DGCL, whether by statute or judicial decision, permits greater indemnification than would be afforded currently under the Certificate of Incorporation, Bylaws and this Agreement, it is the intent of the parties hereto that Indemnitee shall enjoy by this Agreement the greater benefits so afforded by such change. No right or remedy herein conferred is intended to be exclusive of any other right or remedy, and every other right and remedy shall be cumulative and in addition to every other right and remedy given hereunder or now or hereafter existing at law or in equity or otherwise. The assertion or employment of any right or remedy hereunder, or otherwise, shall not prevent the concurrent assertion or employment of any other right or remedy.

(b) To the extent that the Company maintains an insurance policy or policies providing liability insurance for directors, officers, employees, or agents or fiduciaries of the Company or of any other corporation, partnership, joint venture, trust, employee benefit plan or other enterprise that such person serves at the request of the Company, Indemnitee shall be covered by such policy or policies in accordance with its or their terms to the maximum extent of the coverage available for any director, officer, employee, agent or fiduciary under such policy or policies. If, at the time of the receipt of a notice of a claim pursuant to the terms hereof, the Company has directors' and officers' liability insurance in effect, the Company shall give prompt notice of the commencement of such proceeding to the insurers in accordance with the procedures set forth in the respective policies. The Company shall thereafter take

all necessary or desirable action to cause such insurers to pay, on behalf of the Indemnitee, all amounts payable as a result of such proceeding in accordance with the terms of such policies.

(c) In the event of any payment under this Agreement, the Company shall be subrogated to the extent of such payment to all of the rights of recovery of Indemnitee, who shall execute all papers required and take all action necessary to secure such rights, including execution of such documents as are necessary to enable the Company to bring suit to enforce such rights.

(d) The Company shall not be liable under this Agreement to make any payment of amounts otherwise indemnifiable hereunder if and to the extent that Indemnitee has otherwise actually received such payment under any insurance policy, contract, agreement or otherwise.

(e) The Company's obligation to indemnify or advance Expenses hereunder to Indemnitee who is or was serving at the request of the Company as a director, officer, employee or agent of any other corporation, partnership, joint venture, trust, employee benefit plan or other enterprise shall be reduced by any amount Indemnitee has actually received as indemnification or advancement of expenses from such other corporation, partnership, joint venture, trust, employee benefit plan or other enterprise.

9. Exception to Right of Indemnification. Notwithstanding any provision in this Agreement, the Company shall not be obligated under this Agreement to make any indemnity in connection with any claim made against Indemnitee:

(a) for which payment has actually been made to or on behalf of Indemnitee under any insurance policy or other indemnity provision, except with respect to any excess beyond the amount paid under any insurance policy or other indemnity provision; or

(b) for (i) an accounting of profits made from the purchase and sale (or sale and purchase) by Indemnitee of securities of the Company within the meaning of Section 16(b) of the Securities Exchange Act of 1934, as amended, or similar provisions of state statutory law or common law, (ii) any reimbursement of the Company by the Indemnitee of any bonus or other incentive-based or equity-based compensation or of any profits realized by the Indemnitee from the sale of securities of the Company, as required in each case under the Exchange Act (including any such reimbursements that arise from an accounting restatement of the Company pursuant to Section 304 of the Sarbanes-Oxley Act of 2002 (the "**Sarbanes-Oxley Act**"), or the payment to the Company of profits arising from the purchase and sale by Indemnitee of securities in violation of Section 306 of the Sarbanes-Oxley Act) or (iii) any reimbursement of the Company by Indemnitee of any compensation pursuant to any compensation recoupment or clawback policy adopted by the Board or the compensation committee of the Board, including but not limited to any such policy adopted to comply with stock exchange listing requirements implementing Section 10D of the Exchange Act; or

(c) except as provided in Section 7(e) of this Agreement, in connection with any Proceeding (or any part of any Proceeding) initiated by Indemnitee, including any Proceeding (or any part of any Proceeding) initiated by Indemnitee against the Company or its directors, officers, employees or other indemnitees, unless (i) the Board authorized the Proceeding (or any part of any Proceeding) prior to its initiation, (ii) such payment arises in connection with any mandatory counterclaim or cross claim brought or raised by Indemnitee in any Proceeding (or any part of any Proceeding) or (iii) the Company provides the indemnification, in its sole discretion, pursuant to the powers vested in the Company under applicable law.

10. Duration of Agreement. All agreements and obligations of the Company contained herein shall continue for five years following the date that Indemnitee ceases to be an officer or director of the Company (or, if applicable, ceases to serve at the request of the Company as a director, officer, employee or agent of another corporation, partnership, joint venture, trust or other enterprise), and shall continue thereafter so long as Indemnitee shall be subject to any Proceeding (or any proceeding commenced under Section 7 hereof) by reason of Indemnitee's Corporate Status. This Agreement shall

be binding upon and inure to the benefit of and be enforceable by the parties hereto and their respective successors (including any direct or indirect successor by purchase, merger, consolidation or otherwise to all or substantially all of the business or assets of the Company), assigns, spouses, heirs, executors and personal and legal representatives.

11. **Security.** To the extent requested by Indemnitee and approved by the Board, the Company may at any time and from time to time provide security to Indemnitee for the Company's obligations hereunder through an irrevocable bank line of credit, funded trust or other collateral. Any such security, once provided to Indemnitee, may not be revoked or released without the prior written consent of the Indemnitee.

12. **Enforcement.**

(a) The Company expressly confirms and agrees that it has entered into this Agreement and assumes the obligations imposed on it hereby in order to induce Indemnitee to serve as an officer or director of the Company, and the Company acknowledges that Indemnitee is relying upon this Agreement in serving as an officer or director of the Company.

(b) This Agreement constitutes the entire agreement between the parties hereto with respect to the subject matter hereof and supersedes all prior agreements and understandings, oral, written and implied, between the parties hereto with respect to the subject matter hereof.

(c) The Company shall not seek from a court, or agree to, a "bar order" which would have the effect of prohibiting or limiting the Indemnitee's rights to receive advancement of expenses under this Agreement.

13. **Definitions.** For purposes of this Agreement:

(a) "**Corporate Status**" describes the status of a person who is or was a director, officer, employee, agent or fiduciary of the Company or of any other corporation, partnership, joint venture, trust, employee benefit plan or other enterprise that such person is or was serving at the request of the Company.

(b) "**Disinterested Director**" means a director of the Company who is not and was not a party to the Proceeding in respect of which indemnification is sought by Indemnitee.

(c) "**Enterprise**" shall mean the Company and any other corporation, partnership, joint venture, trust, employee benefit plan or other enterprise that Indemnitee is or was serving at the request of the Company as a director, officer, employee, agent or fiduciary.

(d) "**Expenses**" shall include all reasonable attorneys' fees, retainers, court costs, transcript costs, fees of experts, witness fees, travel expenses, duplicating costs, printing and binding costs, telephone charges, postage, delivery service fees, ERISA excise taxes and penalties, and all other disbursements or expenses of the types customarily incurred in connection with prosecuting, defending, preparing to prosecute or defend, investigating, participating, or being or preparing to be a witness in a Proceeding, or responding to, or objecting to, a request to provide discovery in any Proceeding. Expenses also shall include (i) Expenses incurred in connection with any appeal resulting from any Proceeding, including, without limitation, the premium, security for, and other costs relating to any cost bond, supersedeas bond, or other appeal bond or its equivalent, (ii) Expenses incurred in connection with recovery under any directors' and officers' liability insurance policies maintained by the Company, regardless of whether Indemnitee is ultimately determined to be entitled to such indemnification, advancement or Expenses or insurance recovery, as the case may be, and (iii) for purposes of [Section 7\(c\)](#) only, Expenses incurred by Indemnitee in connection with the interpretation, enforcement or defense of Indemnitee's rights under this Agreement, the Certificate of Incorporation, the Bylaws or under any directors' and officers' liability insurance policies maintained by the Company, by litigation or otherwise.

Expenses, however, shall not include amounts paid in settlement by Indemnitee or the amount of judgments or fines against Indemnitee.

(e) **“Independent Counsel”** means a law firm, or a member of a law firm, that is experienced in matters of corporation law and neither at present is, nor in the past five years has been, retained to represent (i) the Company or Indemnitee in any matter material to either such party (other than with respect to matters concerning Indemnitee under this Agreement, or of other indemnitees under similar indemnification agreements), or (ii) any other party to the Proceeding giving rise to a claim for indemnification hereunder. Notwithstanding the foregoing, the term “Independent Counsel” shall not include any person who, under the applicable standards of professional conduct then prevailing, would have a conflict of interest in representing either the Company or Indemnitee in an action to determine Indemnitee’s rights under this Agreement. The Company agrees to pay the reasonable fees of the Independent Counsel referred to above and to fully indemnify such counsel against any and all Expenses, claims, liabilities and damages arising out of or relating to this Agreement or its engagement pursuant hereto.

(f) **“Proceeding”** includes any threatened, pending or completed action, suit, claim, counterclaim, cross claim, arbitration, mediation, alternate dispute resolution mechanism, investigation, inquiry, administrative hearing or any other actual, threatened or completed proceeding, whether brought by or in the right of the Company or otherwise and whether civil, criminal, administrative or investigative, including any appeal therefrom, in which Indemnitee was, is or will be involved as a party or otherwise, by reason of Indemnitee’s Corporate Status, by reason of any action taken by Indemnitee, or of any inaction on Indemnitee’s part, while acting in Indemnitee’s Corporate Status; in each case whether or not Indemnitee is acting or serving in any such capacity at the time any liability or expense is incurred for which indemnification, reimbursement or advancement of expenses can be provided under this Agreement; including one pending on or before the date of this Agreement, but excluding one initiated by an Indemnitee pursuant to Section 7 of this Agreement to enforce Indemnitee’s rights under this Agreement.

14. **Severability.** The invalidity or unenforceability of any provision hereof shall in no way affect the validity or enforceability of any other provision. Without limiting the generality of the foregoing, this Agreement is intended to confer upon Indemnitee indemnification rights to the fullest extent permitted by applicable laws. In the event any provision hereof conflicts with any applicable law, such provision shall be deemed modified, consistent with the aforementioned intent, to the extent necessary to resolve such conflict.

15. **Modification and Waiver.** No supplement, modification, termination or amendment of this Agreement shall be binding unless executed in writing by both of the parties hereto. No waiver of any of the provisions of this Agreement shall be deemed or shall constitute a waiver of any other provisions hereof (whether or not similar) nor shall such waiver constitute a continuing waiver.

16. **Notice By Indemnitee.** Indemnitee agrees promptly to notify the Company in writing upon being served with or otherwise receiving any summons, citation, subpoena, complaint, indictment, information or other document relating to any Proceeding or matter which may be subject to indemnification covered hereunder. The failure to so notify the Company shall not relieve the Company of any obligation which it may have to Indemnitee under this Agreement or otherwise unless and only to the extent that such failure or delay materially prejudices the Company.

17. **Notices.** All notices and other communications given or made pursuant to this Agreement shall be in writing and shall be deemed effectively given (a) upon personal delivery to the party to be notified, (b) when sent by confirmed electronic mail if sent during normal business hours of the recipient, and if not so confirmed, then on the next business day, (c) five (5) days after having been sent by registered or certified mail, return receipt requested, postage prepaid, or (d) one (1) day after deposit with a nationally recognized overnight courier, specifying next day delivery, with written verification of receipt. All communications shall be sent.

(a) To Indemnitee at the address set forth below Indemnitee signature hereto.

(b) To the Company at:

301 First Street SW, Suite 200
Roanoke, Virginia 24011

Attention: Chief Executive Officer

or to such other address as may have been furnished to Indemnitee by the Company or to the Company by Indemnitee, as the case may be.

18. Counterparts. This Agreement may be executed in two (2) or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same the same instrument. Counterparts may be delivered via electronic mail (including pdf or any electronic signature complying with the U.S. federal ESIGN Act of 2000, e.g., www.docusign.com) or other transmission method and any counterpart so delivered shall be deemed to have been duly and validly delivered and be valid and effective for all purposes.

19. Headings. The headings of the paragraphs of this Agreement are inserted for convenience only and shall not be deemed to constitute part of this Agreement or to affect the construction thereof.

20. Governing Law and Consent to Jurisdiction. This Agreement and the legal relations among the parties shall be governed by, and construed and enforced in accordance with, the laws of the State of Delaware, without regard to its conflict of laws rules. The Company and Indemnitee hereby irrevocably and unconditionally (i) agree that any action or proceeding arising out of or in connection with this Agreement shall be brought only in the Chancery Court of the State of Delaware (the "**Delaware Court**"), and not in any other state or federal court in the United States of America or any court in any other country, (ii) consent to submit to the exclusive jurisdiction of the Delaware Court for purposes of any action or proceeding arising out of or in connection with this Agreement, (iii) waive any objection to the laying of venue of any such action or proceeding in the Delaware Court, and (iv) waive, and agree not to plead or to make, any claim that any such action or proceeding brought in the Delaware Court has been brought in an improper or inconvenient forum.

SIGNATURE PAGE TO FOLLOW

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

COMPANY:

Luna Innovations Incorporated

By: _____

Name: Scott Graeff
Title: Chief Executive Officer

Email: _____

Address: 301 First Street SW, Suite 200
Roanoke, Virginia 24011

INDEMNITEE:

[Indemnitee Name]

(Signature)

Address: _____

Email: _____

Third Amendment to Loan Documents

THIS THIRD AMENDMENT TO LOAN DOCUMENTS (this "Amendment") is made as of January 31, 2023, by and between LUNA INNOVATIONS INCORPORATED, a Delaware corporation (the "Borrower"), and PNC BANK, NATIONAL ASSOCIATION (the "Bank").

BACKGROUND

A. The Borrower or another obligor has executed and delivered to the Bank (or a predecessor which is now known by the Bank's name as set forth above), one or more promissory notes, letter agreements, loan agreements, security agreements, mortgages, pledge agreements, collateral assignments, and other agreements, instruments, certificates and documents, some or all of which are more fully described on attached Exhibit A, which is made a part of this Amendment (collectively as amended from time to time, the "Loan Documents") which evidence or secure some or all of the indebtedness and other obligations of the Borrower to the Bank for one or more loans or other extensions of credit (as used herein, collectively, together with the Obligations, if and as defined in the Loan Documents, the "Obligations"). Any initially capitalized terms used in this Amendment without definition shall have the meanings assigned to those terms in the Loan Documents.

B. The Borrower and the Bank desire to amend the Loan Documents as provided for in this Amendment.

NOW, THEREFORE, in consideration of the mutual covenants herein contained and intending to be legally bound hereby, the parties hereto agree as follows:

1. Certain of the Loan Documents are amended as set forth in Exhibit A. Any and all references to any Loan Document in any other Loan Document shall be deemed to refer to such Loan Document as amended by this Amendment. This Amendment is deemed incorporated into each of the Loan Documents. To the extent that any term or provision of this Amendment is or may be inconsistent with any term or provision in any Loan Document, the terms and provisions of this Amendment shall control.

2. The Borrower hereby certifies that: (a) all of its representations and warranties in the Loan Documents, as amended by this Amendment, are, except as may otherwise be stated in this Amendment: (i) true and correct in all material respects as of the date of this Amendment, (ii) ratified and confirmed without condition as if made anew, and (iii) incorporated into this Amendment by reference (it being understood that (x) any representation or warranty which by its terms is made as of a specified date shall be true and correct in all material respects only as of such specified date and (y) any other representation or warranty is true and correct in all material respects), (b) no Event of Default or event which, with the passage of time or the giving of notice or both, would constitute an Event of Default, exists under any Loan Document which will not be cured by the execution and effectiveness of this Amendment, (c) as of the date hereof, it has no defenses, set offs, counterclaims, discounts or charges of any kind against the Bank, its officers, directors, employees, agents or attorneys with respect to the Loan or Loan Documents, (d) no consent, approval, order or authorization of, or registration or filing with, any third party is required in connection with the execution, delivery and carrying out of this Amendment or, if required, has been obtained, and (e) this Amendment has been duly authorized, executed and delivered so that it constitutes the legal, valid and binding obligation of the Borrower, enforceable in accordance with its terms. The Borrower confirms that the Obligations remain outstanding without defense, set off, counterclaim, discount or charge of any kind as of the date of this Amendment.

3. The Borrower hereby confirms that any collateral for the Obligations, including liens, security interests, mortgages, and pledges granted by the Borrower or third parties (if applicable), shall continue unimpaired and in full force and effect, and shall cover and secure all of the Borrower's existing and future Obligations to the Bank, as modified by this Amendment.

4. As a condition precedent to the effectiveness of this Amendment, the Borrower shall comply with the terms and conditions (if any) specified in Exhibit A.

5. This Amendment may be signed in any number of counterpart copies and by the parties to this Amendment on separate counterparts, but all such copies shall constitute one and the same instrument. Delivery of an executed counterpart of a signature page to this Amendment by facsimile transmission shall be effective as delivery of a manually executed counterpart. Upon written request by the other party (which may be made by

electronic mail), any party so executing this Amendment by facsimile transmission shall promptly deliver a manually executed counterpart, provided that any failure to do so shall not affect the validity of the counterpart executed by facsimile transmission.

6. Notwithstanding any other provision herein or in the other Loan Documents, the Borrower agrees that this Amendment, the Loan Documents, any other amendments thereto and any other information, notice, signature card, agreement or authorization related thereto (each, a "**Communication**") may, at the Bank's option, be in the form of an electronic record. Any Communication may, at the Bank's option, be signed or executed using electronic signatures. For the avoidance of doubt, the authorization under this paragraph may include, without limitation, use or acceptance by the Bank of a manually signed paper Communication which has been converted into electronic form (such as scanned into PDF format) for transmission, delivery and/or retention. The Borrower and the Bank acknowledge and agree that the methods for delivering Communications, including notices, under the Loan Documents include electronic transmittal to any electronic address provided by either party to the other party from time to time.

7. The Bank may modify this Amendment for the purposes of completing missing content or correcting erroneous content, without the need for a written amendment, provided that the Bank shall send a copy of any such modification to the Borrower (which notice may be given by electronic mail).

8. This Amendment will be binding upon and inure to the benefit of the Borrower and the Bank and their respective heirs, executors, administrators, successors and assigns.

9. This Amendment will be interpreted and the rights and liabilities of the parties hereto determined in accordance with the laws of the State of New York, excluding its conflict of laws rules, including without limitation the Electronic Transactions Act (or equivalent) in such state (or, to the extent controlling, the laws of the United States of America, including without limitation the Electronic Signatures in Global and National Commerce Act). This Amendment has been delivered to and accepted by the Bank and will be deemed to be made in the State.

10. Except as amended hereby, the terms and provisions of the Loan Documents remain unchanged, are and shall remain in full force and effect unless and until modified or amended in writing in accordance with their terms, and are hereby ratified and confirmed. Except as expressly provided herein, this Amendment shall not constitute an amendment, waiver, consent or release with respect to any provision of any Loan Document, a waiver of any default or Event of Default under any Loan Document, or a waiver or release of any of the Bank's rights and remedies (all of which are hereby reserved). The Borrower expressly ratifies and confirms the dispute resolution, waiver of jury trial or arbitration provisions, as applicable, contained in the Loan Documents, all of which are incorporated herein by reference.

REMAINDER OF PAGE INTENTIONALLY LEFT BLANK

Third Amendment to Loan Documents

[SIGNATURE PAGE]

WITNESS the due execution of this Amendment as a document under seal as of the date first written above.

BORROWER:

LUNA INNOVATIONS INCORPORATED,
a Delaware corporation

By: /s/ Scott A. Graeff
Scott A. Graeff,
Chief Executive Officer

SIGNATURES CONTINUE ON FOLLOWING PAGE

Third Amendment to Loan Documents

[SIGNATURE PAGE]

WITNESS the due execution of this Amendment as a document under seal as of the date first written above.

BANK:

PNC BANK, NATIONAL ASSOCIATION

By: /s/ David Notaro
Name: David Notaro
Title: Senior Vice President

SIGNATURES CONTINUE ON FOLLOWING PAGE

EXHIBIT A

Third Amendment to Loan Documents

DATED AS OF JANUARY 31, 2023

A. **Loan Documents.** The Loan Documents that are the subject of this Amendment include the following (as each of such documents has been amended, modified or otherwise supplemented previously):

1. Amended and Restated Term Note dated as of June 17, 2022 made by Borrower payable to the order of Bank in the original principal amount of \$20,000,000.00;
2. Amended and Restated Revolving Line of Credit Note dated as of June 17, 2022 made by Borrower payable to the order of Bank in the original principal amount of \$15,000,000.00; and
3. Loan Agreement dated as of December 1, 2020 among Borrower, Guarantors and Bank, as amended by (i) that certain Amendment to Loan Documents as of March 10, 2022, and (ii) that certain Second Amendment to Loan Documents as of June 21, 2022.

B. **Amendments.** The Loan Documents are amended as follows:

1. Section 6.9(a) of the Loan Agreement is hereby deleted and replaced with the following text:

(a) Maintain at all times: (i) for the fiscal quarter ending March 31, 2023 and tested as of each fiscal quarter end, a Net Leverage Ratio which is less than 2.75 to 1.00; and (ii) commencing with the fiscal quarter ending June 30, 2023 and tested as of each fiscal quarter end thereafter, a Net Leverage Ratio which is less than 2.50 to 1.00; and

2. In each of the Amended and Restated Term Note and the Amended and Restated Revolving Line of Credit Note, the chart in Exhibit A entitled "Fiscal Quarter End Net Leverage Ratio/Applicable Margin" is hereby deleted and replaced with the following chart:

<i>Fiscal Quarter End Net Leverage Ratio</i>	<i>Applicable Margin</i>
<i>Net Leverage Ratio less than or equal to 0.50 to 1.00</i>	<i>1.75%</i>
<i>Net Leverage Ratio greater than 0.50 to 1.00 and less than 1.25 to 1.00</i>	<i>2.00%</i>
<i>Net Leverage Ratio greater than 1.25 to 1.00 and less than 1.75 to 1.00</i>	<i>2.25%</i>
<i>Net Leverage Ratio greater than 1.75 to 1.00 and less than 2.25 to 1.00</i>	<i>2.50%</i>
<i>Net Leverage Ratio greater than or equal to 2.25 to 1.00</i>	<i>2.75%</i>

C. **Conditions to Effectiveness of Amendment.** The Bank's willingness to agree to the amendments set forth in this Amendment is subject to the prior satisfaction of the following conditions:

1. Execution by all parties and delivery to the Bank of this Amendment, including the attached Consent of Guarantors; and
2. Payment by the Borrower to the Bank of all fees and expenses required by the Bank in connection with this Amendment.

**CONSENT OF GUARANTORS TO
AMENDMENT TO LOAN DOCUMENTS**

Each of the undersigned guarantors (each, jointly and severally, a “**Guarantor**”) consents to the provisions of the foregoing Amendment and all prior amendments, if any, and confirms and agrees that: (a) each Guarantor’s obligations under the Guaranty and Suretyship Agreement dated as of December 1, 2020 (the “**Guaranty**”), relating to the Obligations mentioned in the Amendment, shall be unimpaired by the Amendment; (b) each Guarantor has no defenses, set offs, counterclaims, discounts or charges of any kind against the Bank, its officers, directors, employees, agents or attorneys with respect to the Guaranty; and (c) all of the terms, conditions and covenants in the Guaranty remain unaltered (except as expressly modified by the Amendment) and in full force and effect, are hereby ratified and confirmed, and continue to apply to the Obligations, as modified by the Amendment. Each Guarantor certifies that all representations and warranties made in the Guaranty are true and correct.

Each Guarantor hereby confirms that any collateral for the Obligations, including liens, security interests, mortgages, and pledges granted by such Guarantor or third parties (if applicable), shall continue unimpaired and in full force and effect, shall cover and secure all of such Guarantor’s existing and future Obligations to the Bank, as modified by this Amendment. Each Guarantor ratifies and confirms the indemnification, waiver of jury trial or arbitration provisions contained in the Guaranty, all of which are incorporated herein by reference.

By signing below, each Guarantor agrees that this Consent, the Guaranty, the other Loan Documents, any amendments thereto and any other information, notice, signature card, agreement or authorization related thereto (each, a “**Communication**”) may, at the Bank’s option, be in the form of an electronic record. Any Communication may, at the Bank’s option, be signed or executed using electronic signatures. For the avoidance of doubt, the authorization under this paragraph may include, without limitation, use or acceptance by the Bank of a manually signed paper Communication which has been converted into electronic form (such as scanned into PDF format) for transmission, delivery and/or retention. Each Guarantor acknowledges and agrees that the methods for delivering Communications, including notices, under the Guaranty and the other Loan Documents include electronic transmittal to any electronic address provided by any party to the other party from time to time.

REMAINDER OF PAGE INTENTIONALLY LEFT BLANK

**CONSENT OF GUARANTORS TO
AMENDMENT TO LOAN DOCUMENTS**

WITNESS the due execution of this Consent as a document under seal as of the date of this Amendment, intending to be legally bound hereby.

GUARANTORS:

LUNA TECHNOLOGIES, INC.,
a Delaware corporation, successor by merger to
Former Luna Subsidiary, Inc., a Delaware corporation, and
Terametrix LLC, a Delaware limited liability company

By: /s/ Scott Graeff
Scott A. Graeff,
Chief Executive Officer

GENERAL PHOTONICS CORP.,
a California corporation

By: /s/ Scott Graeff
Scott A. Graeff,
President

SUBSIDIARIES

Luna Technologies, Inc.
General Photonics Corporation
OptaSense Holdings Limited
OptaSense Limited
OptaSense Inc.
OptaSense Canada Ltd.
Luna Innovations Germany GmbH (formerly NKT Photonics GmbH)
LIOS Technology Inc.

Consent of Independent Registered Public Accounting Firm

We consent to the incorporation by reference in the following Registration Statements:

- Registration Statements (Form S-3 No. 333-191809, Form S-4 No. 333-201956 and Forms S-8 No. 333-211802, 333-204435, 333-138745 and 333-239362) of Luna Innovations Incorporated;

of our report dated March 16, 2023, with respect to the consolidated financial statements of Luna Innovations Incorporated, included in this Annual Report (Form 10-K) of Luna Innovations Incorporated for the year ended December 31, 2022.

/s/ Ernst & Young LLP

Richmond, Virginia
March 16, 2023

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We have issued our report dated March 14, 2022, with respect to the consolidated financial statements in the Annual Report of Luna Innovations Incorporated on Form 10-K for the year ended December 31, 2021. We consent to the incorporation by reference of said report in the Registration Statements of Luna Innovations Incorporated on Form S-3 (File No. 333-191809), on Form S-4 (File No. 333-201956) and on Forms S-8 (File No. 333-211802, File No 333-204435, File No 333-138745, and File No. 333-239362).

/s/ GRANT THORNTON LLP

Philadelphia, Pennsylvania
March 16, 2023

**CERTIFICATION OF PRINCIPAL EXECUTIVE OFFICER PURSUANT TO
SECTION 302 OF THE SARBANES-OXLEY ACT OF 2002**

I, Scott A. Graeff, certify that:

1. I have reviewed this annual report on Form 10-K of Luna Innovations Incorporated;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) 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 and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):
 - a. all significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and
 - b. any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: March 16, 2023

/s/ Scott A. Graeff

Scott A. Graeff
President and Chief Executive Officer
(principal executive officer)

**CERTIFICATION OF PRINCIPAL FINANCIAL OFFICER PURSUANT TO
SECTION 302 OF THE SARBANES-OXLEY ACT OF 2002**

I, Eugene J. Nestro, certify that:

1. I have reviewed this annual report on Form 10-K of Luna Innovations Incorporated;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) 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 and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):
 - a. all significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and
 - b. any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: March 16, 2023

/s/ Eugene J. Nestro

Eugene J. Nestro
Chief Financial Officer
(principal financial officer)

**CERTIFICATION OF PRINCIPAL EXECUTIVE OFFICER PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002**

In connection with the annual report of Luna Innovations Incorporated (the "Company") on Form 10-K for the year ended December 31, 2022 as filed with the Securities and Exchange Commission on the date hereof (the "Report"), I, Scott A. Graeff, President and Chief Executive Officer of the Company, certify, pursuant to 18 U.S.C. § 1350, as adopted pursuant to § 906 of the Sarbanes-Oxley Act of 2002, that to my knowledge:

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

This certification accompanies this Report to which it relates, shall not be deemed "filed" with the Securities and Exchange Commission and is not to be incorporated by reference into any filing of the Company under the Securities Act of 1933, as amended, or the Securities Exchange Act of 1934, as amended (whether made before or after the date of the Report), irrespective of any general incorporation language contained in such filing.

/s/ Scott A. Graeff

Scott A. Graeff
President and Chief Executive Officer
(principal executive officer)

March 16, 2023

**CERTIFICATION OF PRINCIPAL FINANCIAL OFFICER PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002**

In connection with the annual report of Luna Innovations Incorporated (the "Company") on Form 10-K for the year ended December 31, 2022 as filed with the Securities and Exchange Commission on the date hereof (the "Report"), I, Eugene J. Nestro, Chief Financial Officer of the Company, certify, pursuant to 18 U.S.C. § 1350, as adopted pursuant to § 906 of the Sarbanes-Oxley Act of 2002, that to my knowledge:

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

This certification accompanies this Report to which it relates, shall not be deemed "filed" with the Securities and Exchange Commission and is not to be incorporated by reference into any filing of the Company under the Securities Act of 1933, as amended, or the Securities Exchange Act of 1934, as amended (whether made before or after the date of the Report), irrespective of any general incorporation language contained in such filing.

/s/ Eugene J. Nestro

Eugene J. Nestro
Chief Financial Officer
(principal financial officer)

March 16, 2023