UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, DC 20549

FORM 10-Q

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

For the quarterly period ended September 30, 2019

OR

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

For the transition period from __________ to __________

COMMISSION FILE NUMBER 000-52008

LUNA INNOVATIONS INCORPORATED
(Exact name of registrant as specified in its charter)

Delaware	**54-1560050**
(State or Other Jurisdiction of Incorporation or Organization)	**(I.R.S. Employer Identification Number)**

301 First Street 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

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 o No

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit such files). ☒ Yes o 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	o	Accelerated filer	o
Non-accelerated filer	☒	Smaller reporting company	☒
Emerging growth company	o		

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. o

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

Indicate the number of shares outstanding of each of the issuer's classes of common stock, as of the latest practicable date: As of November 4, 2019, there were 30,165,771 shares of the registrant's common stock outstanding.

LUNA INNOVATIONS INCORPORATED
QUARTERLY REPORT ON FORM 10-Q
FOR THE QUARTER ENDED SEPTEMBER 30, 2019

TABLE OF CONTENTS

Table of Contents

PART I. FINANCIAL INFORMATION

ITEM 1. *FINANCIAL STATEMENTS*

Luna Innovations Incorporated
Consolidated Balance Sheets

	September 30, 2019	December 31, 2018
	(unaudited)	
Assets		
Current assets:		
Cash and cash equivalents	$ 21,414,272	$ 42,460,267
Accounts receivable, net	16,796,252	13,037,068
Receivable from sale of HSOR business	2,500,941	2,500,000
Contract assets	3,441,771	2,422,495
Inventory	9,644,864	6,873,742
Prepaid expenses and other current assets	1,119,622	935,185
Total current assets	54,917,722	68,228,757
Long-term contract assets	423,830	336,820
Property and equipment, net	3,626,833	3,627,886
Intangible assets, net	10,570,347	3,302,270
Goodwill	10,345,250	101,008
Other assets, net	3,003,813	1,995
Total assets	$ 82,887,795	$ 75,598,736
Liabilities and stockholders' equity		
Liabilities:		
Current liabilities:		
Current portion of long-term debt obligations	$ —	$ 619,315
Current portion of capital lease obligations	—	40,586
Accounts payable	2,636,783	2,395,984
Accrued liabilities	9,694,722	6,597,458
Contract liabilities	3,389,417	2,486,111
Total current liabilities	15,720,922	12,139,454
Long-term deferred rent	—	1,035,974
Other long-term liabilities	2,257,958	—
Long-term capital lease obligations	—	68,978
Total liabilities	17,978,880	13,244,406
Commitments and contingencies		
Stockholders' equity:		
Preferred stock, par value $0.001, 1,321,514 shares authorized, 0 and 1,321,514 issued and outstanding at September 30, 2019 and December 31, 2018, respectively	—	1,322
Common stock, par value $0.001, 100,000,000 shares authorized, 31,798,062 and 29,209,506 shares issued, 30,158,271 and 27,956,401 shares outstanding at September 30, 2019 and December 31, 2018, respectively	31,998	30,120
Treasury stock at cost, 1,639,791 and 1,253,105 shares at September 30, 2019 and December 31, 2018, respectively	(4,337,107)	(2,116,640)
Additional paid-in capital	87,608,274	85,744,750
Accumulated deficit	(18,394,250)	(21,305,222)
Total stockholders' equity	64,908,915	62,354,330
Total liabilities and stockholders' equity	$ 82,887,795	$ 75,598,736

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

Luna Innovations Incorporated
Consolidated Statements of Operations

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2019	2018	2019	2018
	(unaudited)		(unaudited)	
Revenues:				
Products and licensing	$ 11,926,178	$ 5,371,165	$ 31,459,323	$ 13,960,003
Technology development	6,494,832	5,315,861	19,576,574	15,418,919
Total revenues	18,421,010	10,687,026	51,035,897	29,378,922
Cost of revenues:				
Products and licensing	4,561,801	2,079,749	12,357,961	5,381,333
Technology development	4,574,035	3,918,666	13,874,156	11,131,965
Total cost of revenues	9,135,836	5,998,415	26,232,117	16,513,298
Gross profit	9,285,174	4,688,611	24,803,780	12,865,624
Operating expense:				
Selling, general and administrative	5,753,649	3,233,485	17,964,524	9,898,064
Research, development and engineering	2,047,524	873,629	5,240,759	2,513,497
Total operating expense	7,801,173	4,107,114	23,205,283	12,411,561
Operating income	1,484,001	581,497	1,598,497	454,063
Other income/(expense):				
Investment income	72,728	171,896	324,139	350,976
Other income/(expense)	278	8,319	(4,459)	(16,001)
Interest expense	(2,032)	(28,029)	(14,806)	(103,208)
Total other income	70,974	152,186	304,874	231,767
Income from continuing operations before income taxes	1,554,975	733,683	1,903,371	685,830
Income tax expense/(benefit)	324,723	(559,093)	(1,293,051)	(674,329)
Net income from continuing operations	1,230,252	1,292,776	3,196,422	1,360,159
(Loss)/income from discontinued operations, net of income tax of $216,813 and $235,312 for the three and nine months ended September 30, 2018, respectively	—	(56,418)	—	1,132,436
Gain on sale, net of income taxes of $1,866,232 and $1,508,373 for the three and nine months ended September 30, 2018, respectively	—	7,612,044	—	7,571,810
Net income from discontinued operations	—	7,555,626	—	8,704,246
Net income	1,230,252	8,848,402	3,196,422	10,064,405
Preferred stock dividend	112,846	63,235	285,450	190,895
Net income attributable to common stockholders	$ 1,117,406	$ 8,785,167	$ 2,910,972	$ 9,873,510
Net income per share from continuing operations:				
Basic	$ 0.04	$ 0.05	$ 0.11	$ 0.05
Diluted	$ 0.04	$ 0.04	$ 0.10	$ 0.04
Net income per share from discontinued operations:				
Basic	$ —	$ 0.27	$ —	$ 0.32
Diluted	$ —	$ 0.23	$ —	$ 0.27
Net income per share attributable to common stockholders:				
Basic	$ 0.04	$ 0.31	$ 0.10	$ 0.36
Diluted	$ 0.03	$ 0.27	$ 0.09	$ 0.30
Weighted average common shares and common equivalent shares outstanding:				
Basic	28,291,297	27,901,631	28,193,330	27,547,955
Diluted	32,115,847	33,055,881	31,768,575	32,721,860

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

Luna Innovations Incorporated
Consolidated Statements of Cash Flows

	Nine Months Ended September 30,	
	2019	2018
	(unaudited)	
Cash flows provided by/(used in) operating activities		
Net income	$ 3,196,422	$ 10,064,405
Adjustments to reconcile net income to net cash provided by/(used in) operating activities		
Depreciation and amortization	1,834,594	898,215
Share-based compensation	1,140,202	345,582
Bad debt expense	—	6,000
Gain on disposal of fixed assets	—	(1,000)
Gain on sale of discontinued operations	—	(7,571,810)
Tax benefit from release of valuation allowance	(1,889,266)	—
Change in assets and liabilities		
Accounts receivable	(2,238,234)	(4,056,716)
Contract assets	(1,106,286)	(957,012)
Inventory	(73,122)	(992,075)
Other current assets	(74,321)	482,155
Other long term assets	(338,347)	—
Accounts payable and accrued expenses	(113,414)	243,965
Contract liabilities	746,732	(1,906,117)
Net cash provided by/(used in) operating activities	1,084,960	(3,444,408)
Cash flows (used in)/provided by investing activities		
Acquisition of property and equipment	(500,562)	(272,039)
Intangible property costs	(192,203)	(277,068)
Proceeds from sale of property and equipment	—	1,000
Proceeds from sales of discontinued operations	—	14,775,541
Acquisition of General Photonics Corporation	(19,004,250)	—
Net cash (used in)/provided by investing activities	(19,697,015)	14,227,434
Cash flows used in financing activities		
Payments on finance lease obligations	(26,901)	(33,064)
Payments of debt obligations	(625,000)	(1,375,000)
Repurchase of common stock	(2,220,467)	(466,894)
Proceeds from the exercise of options and warrants	438,428	1,255,118
Net cash used in financing activities	(2,433,940)	(619,840)
Net (decrease)/increase in cash and cash equivalents	(21,045,995)	10,163,186
Cash and cash equivalents—beginning of period	42,460,267	36,981,533
Cash and cash equivalents—end of period	$ 21,414,272	$ 47,144,719
Supplemental disclosure of cash flow information		
Cash paid for interest	$ 16,928	$ 97,867
Cash paid for income taxes	$ 735,000	$ 7,686
Non-cash investing and financing activities		
Contingent liability for business combination	$ 940,000	$ —
Dividend on preferred stock, 59,469 shares of common stock issuable for each of the nine months ended September 30, 2019 and 2018	$ 285,450	$ 190,895

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

Luna Innovations Incorporated
Notes to Unaudited Consolidated Financial Statements

1. Basis of Presentation and Significant Accounting Policies

Nature of Operations

Luna Innovations Incorporated (“we,” “Luna Innovations” 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 products for the telecommunications industry and distributed fiber optic sensing products for industries utilizing composite and other advanced materials, such as the automotive, aerospace, energy and infrastructure industries. Our distributed fiber optic sensing products help designers and manufacturers more efficiently develop new and innovative products by providing valuable information such as highly detailed stress, strain, and temperature measurements of a new design or manufacturing process. In addition, our distributed fiber optic sensing products are used to monitor the structural integrity or operational health of critical assets, including large civil structures such as bridges. Our communications test products accelerate the development of advanced fiber optic components and networks by providing fast and highly accurate characterization of components and networks. We also provide applied research services, typically under research programs funded by the U.S. government, in areas of advanced materials, sensing, and healthcare applications. Our business model is designed to accelerate the process of bringing new and innovative products to market. We use our in-house technical expertise across a range of technologies to perform applied research services for companies and for government funded projects. We continue to invest in product development and commercialization, which we anticipate will lead to increased product sales growth.

Unaudited Interim Financial Information

The accompanying unaudited consolidated interim financial statements have been prepared in accordance with accounting principles generally accepted in the United Stated of America (“U.S. GAAP”) for interim financial statements and Article 10 of Regulation S-X of the Securities Exchange Act of 1934, as amended. Accordingly, they do not include all of the information and footnotes required by U.S. GAAP for annual financial statements. The unaudited consolidated interim financial statements have been prepared on the same basis as the annual financial statements and in the opinion of management reflect all adjustments, consisting of only normal recurring accruals considered necessary to present fairly our financial position at September 30, 2019, results of operations and changes in stockholders' equity for the three and nine months ended September 30, 2019 and 2018, and cash flows for the nine months ended September 30, 2019 and 2018. The results of operations for the three and nine months ended September 30, 2019, are not necessarily indicative of the results that may be expected for the year ending December 31, 2019. The consolidated balance sheet as of December 31, 2018 was derived from our audited consolidated financial statements.

The consolidated interim financial statements, including our significant accounting policies, should be read in conjunction with the audited Consolidated Financial Statements and the notes thereto for the year ended December 31, 2018, included in our Annual Report on Form 10-K as filed with the Securities and Exchange Commission (“SEC”) on March 15, 2019.

Business Combinations

We apply the provisions of Accounting Standards Codification ("ASC") 805, *Business Combinations*, in the accounting for acquisitions. ASC 805 requires us to recognize separately from goodwill the assets acquired and the liabilities assumed at their acquisition date fair values. Goodwill as of the acquisition date is measured as the excess of consideration transferred over the net of the acquisition date fair values of the assets acquired and the liabilities assumed. While we use our best estimates and assumptions to accurately value assets acquired and liabilities assumed at the acquisition date as well as contingent consideration, where applicable, these estimates are inherently uncertain and subject to refinement. As a result, during the measurement period, which may be up to one year from the acquisition date, we record adjustments to the assets acquired and liabilities assumed with the corresponding offset to goodwill. Upon the conclusion of the measurement period or final determination of the values of the assets acquired or liabilities assumed, whichever comes first, any subsequent adjustments are recorded in our consolidated statements of operations. Accounting for business combinations requires management to make significant estimates and assumptions, especially at the acquisition date, including estimates for intangible assets, contractual obligations assumed, restructuring liabilities, pre-acquisition contingencies and contingent consideration, where applicable. Although we believe the assumptions and estimates we have made have been reasonable and appropriate, they are based in part on historical experience and information obtained from management of the acquired companies and are inherently uncertain. Critical estimates in valuing certain of the intangible assets we have acquired include: future expected cash flows from product sales; customer contracts and acquired technologies; expected costs to develop in-process research and development into commercially viable products and estimated cash flows from the projects when completed; and discount rates. Unanticipated events and circumstances may occur that may affect the accuracy or validity of such assumptions, estimates, or actual results.

Goodwill and Intangible Assets

Goodwill and intangible assets with indefinite lives are not amortized but are tested for impairment on an annual basis, as of October 1 of each year, or whenever events or changes in circumstances indicate that the carrying amount of these assets may not be recoverable. Purchased intangible assets with finite useful lives are amortized using the straight-line method over their estimated useful lives and reviewed for impairment as described above.

Fair Value Measurements

Fair value is defined as the price that would be received to sell an asset or paid to transfer a liability in the principal or most advantageous market in an orderly transaction between marketplace participants. Various valuation approaches can be used to determine fair value, each requiring different valuation inputs. The following hierarchy classifies the inputs used to determine fair value into three levels:

- 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 all significant inputs and significant value drivers are observable in active markets
- Level 3—Valuations derived from valuation techniques in which one or more significant inputs or significant value drivers are unobservable

The carrying values of cash and cash equivalents, accounts receivable and accounts payable approximate fair value because of the short-term nature of these instruments. The carrying value of our debt as of December 31, 2018 approximates fair value, as we consider the floating interest rate on our credit facilities with Silicon Valley Bank ("SVB") to be at market for similar instruments. Certain non-financial assets and liabilities are measured at fair value on a nonrecurring basis in accordance with U.S. GAAP. This includes items such as non-financial assets and liabilities initially measured at fair value in a business combination and non-financial long-lived asset groups measured at fair value for an impairment assessment. In general, non-financial assets including intangible assets and property and equipment are measured at fair value when there is an indication of impairment and are recorded at fair value only when any impairment is recognized.

Net Income Per Share

Basic per share data is computed by dividing our net income by the weighted average number of shares outstanding during the period. Diluted per share data is computed by dividing net income 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 shares of common stock 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.

The effects of 3.8 million and 5.2 million common stock equivalents (which include outstanding warrants, preferred stock and stock options) are included for the diluted per share data for three months ended September 30, 2019 and 2018, respectively. The effects of 3.6 million and 5.2 million common stock equivalents are included for the diluted per share data for the nine months ended September 30, 2019 and 2018, respectively.

Recently Issued Accounting Pronouncements

In February 2016, the Financial Accounting Standards Board ("FASB") issued a new standard related to Leases, Accounting Standards Update ("ASU") No. 2016-02, *Leases (Topic 842)* and subsequent amendments, which replaced existing U.S. GAAP and requires lessees to recognize right-of-use ("ROU") assets and lease liabilities on the balance sheet for those leases classified as operating leases for greater transparency. We, using a modified retrospective adoption approach, are required to recognize and measure leases existing at the beginning of the adoption period, with certain practical expedients available.

We adopted the standard effective January 1, 2019. The standard allows a number of optional practical expedients to use for transition. We chose the certain practical expedients allowed under the transition guidance which permitted us to not to reassess any existing or expired contracts to determine if they contain embedded leases, to not reassess our lease classification on existing leases, to account for lease and non-lease components as a single lease component for equipment leases, and whether initial direct costs previously capitalized would qualify for capitalization under FASB ASC 842. The new standard also provides practical expedients and recognition exemptions for an entity's ongoing accounting policy elections. We have elected the short-term lease recognition for all leases that qualify, which means that we do not recognize a ROU asset and lease liability for any lease with a term of twelve months or less.

The most significant impact of adopting the standard was the recognition of ROU assets and lease liabilities for operating leases on our consolidated balance sheet but it did not have an impact on our consolidated statements of operations or consolidated statements of cash flows. The cumulative effect of the changes made to our January 1, 2019 unaudited consolidated balance sheet as a result of the adoption of ASC 842 are as follows:

	Balance at December 31, 2018	Adjustment for ASC 842	Adjusted balance at January 1, 2019
Assets:			
Property and equipment, net	3,627,886	(90,494)	3,537,392
Other assets, net	1,995	3,536,133	3,538,128
Liabilities:			
Accrued liabilities	6,597,458	1,242,669	7,840,127
Current portion of capital lease obligations	40,586	(40,586)	—
Long-term deferred rent	1,035,974	(1,035,974)	—
Long-term operating lease liability	—	3,271,705	3,271,705
Long-term capital lease obligations	68,978	(68,978)	—
Long-term finance lease liability	—	76,803	76,803

Effective January 1, 2018, we adopted ASU No. 2016-15, *Statement of Cash Flows (Topic 230)*, which addresses eight specific cash flow issues with the objective of reducing the existing diversity in practice in how cash receipts and cash payments are presented in the statement of cash flows. The adoption of ASU No. 2016-15 did not have a significant impact on our consolidated financial statements.

In June 2016, the FASB issued ASU 2016-13: *Financial Instruments - Credit Losses (Topic 326) - Measurement of Credit Losses on Financial Instruments*. The ASU requires companies to measure credit losses by using a methodology that reflects the expected credit losses based on historical information current economic conditions, and reasonable and supportable information. The new standard is effective for fiscal years beginning after December 15, 2019 and early adoption is permitted. We do not expect the adoption of ASU 2016-13 will have a significant impact on our consolidated financial statements.

In February 2018, the FASB issued ASU 2018-02: *Income Statement – Reporting Comprehensive Income (Topic 220)*. Under current accounting guidance, the income tax effects for changes in income tax rates and certain other transactions are recognized in income from continuing operations resulting in income tax effects recognized in accumulated other comprehensive income that do not reflect the current tax rate of the entity (“stranded tax effects”). The new guidance allows us the option to reclassify these stranded tax effects to accumulated deficit that relate to the change in the federal tax rate resulting from the passage of the Tax Cuts and Jobs Act. We adopted ASU 2018-02, effective January 1, 2019. ASU 2018-02 did not have a significant impact on our consolidated financial statements.

In August 2018, the FASB issued ASU No. 2018-13, *Fair Value Measurement (Topic 820): Changes to the Disclosure Requirements for Fair Value Measurement.* which amends the disclosure requirements in ASC 820 by adding, changing, or removing certain disclosures. The ASU applies to all entities that are required under this guidance to provide disclosures about recurring or nonrecurring fair value measurements. These amendments are effective for all entities for fiscal years beginning after December 15, 2019 including interim periods within those fiscal years. We do not expect ASU 2018-13 will have a material impact on our consolidated financial statements.

2. Business Combinations

On October 15, 2018, we acquired substantially all of the assets, other than cash, of the United States operations of Micron Optics, Inc. ("MOI") for cash consideration of $5.5 million.

For the three months ended September 30, 2019, we recognized revenue of $2.7 million and operating income of $0.4 million associated with the acquired operations of MOI, and for the nine months ended September 30, 2019, we recognized revenue of $8.1 million and operating income of $1.8 million associated with the acquired operations of MOI.

On March 1, 2019, we acquired the outstanding stock of General Photonics Corporation ("GP") for cash consideration of $19.0 million. Of the purchase price, $17.1 million was paid at closing and $1.9 million was placed into escrow for possible working capital adjustments to the purchase price and potential satisfaction of certain post-closing indemnification obligations. Additionally, we may become obligated to pay additional cash consideration of up to $1.0 million if certain revenue targets for the GP historical business are met for the twelve month period following the closing. We currently estimate the fair value of the contingent obligation to be $0.9 million, which is shown in accrued liabilities on the consolidated balance sheet. The fair value of the contingent obligation was determined using the present value of estimated likely future payments.

For the three months ended September 30, 2019, we recognized revenue of $3.2 million and operating income of $0.3 million associated with the acquired operations of GP, and we recognized revenue of $7.1 million and operating income of $0.5 million associated with the acquired operations of GP for the period from the closing of the acquisition through September 30, 2019. Operating income for the three months ended September 30, 2019 included $0.6 million in amortization expense for the acquired intangibles and step-up in value of acquired inventory associated with the acquisition of GP, and operating income included $1.4 million in such amortization expense for the period from the closing of the acquisition through September 30, 2019. Operating income for the nine months ended September 30, 2019 also included $0.9 million of costs associated with the acquisition of GP. There were no costs associated with the acquisition of GP included in operating income for the three months ended September 30, 2019. The amortization expense for the acquired intangibles as well as the costs associated with the acquisition of GP are included in the cost of goods sold and selling, general and administrative expenses in our consolidated statements of operations.

These acquisitions have been accounted for under the acquisition method of accounting in accordance with ASC 805. Under the acquisition method of accounting, 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 the acquisition consideration over the identifiable assets acquired and liabilities assumed is recognized as goodwill. We have completed our allocation of the purchase consideration for MOI. We have completed a preliminary allocation of the purchase consideration for GP with the assistance of a third-party valuation expert. The following table summarizes the allocation of the purchase consideration of each acquisition. The allocation of the purchase consideration for GP is subject to revision as the work of the valuation expert is finalized or additional information becomes known in the future.

	MOI	GP
Accounts receivable	$ 1,742,693	$ 1,520,950
Inventory	1,435,606	2,698,000
Other current assets	69,951	763,873
Property and equipment	996,460	286,000
Identifiable intangible assets	1,650,000	8,200,000
Goodwill	29,760	10,315,490
Accounts payable and accrued expenses	(379,737)	(3,840,063)
Total purchase consideration	$ 5,544,733	$ 19,944,250

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

	Estimated	Estimated Fair Value	
	Useful Life	MOI	GP
Developed technology	5 - 8 years	$ 1,200,000	$ 7,200,000
In process research and development	7 years	200,000	—
Trade names and trademarks	3 years	150,000	400,000
Customer base	7 - 15 years	100,000	600,000
		$ 1,650,000	$ 8,200,000

Developed technologies acquired primarily consist of MOI's technologies related to fiber optic sensing instruments, modules, and components and GP's technologies relating to the measurement and control of the polarization of light. The developed technologies were valued using the "multi-period excess earnings" method, under the income approach. The multi-period excess earnings method reflects the present value of the projected cash flows that are expected by the developed technologies less charges representing the contribution of other assets to those cash flows. Discount rates of 24.5% and 17% were used to discount the cash flows of MOI and GP, respectively, to present value.

In process research and development represents the fair value of an incomplete MOI research and development project that had not reached technological feasibility as of the closing date of the acquisition. In the fourth quarter of 2019, the fair value of this project at the closing date of the acquisition will begin being amortized following the project's completion. The fair value of in process research and development was determined using the multi-period excess earnings method. A discount rate of 29.5% was used to discount the cash flows to the present value.

Customer base represents the fair value of projected cash flows that will be derived from the sale of products to existing customers of MOI and GP as of the respective closing dates of their acquisitions. Customer relationships were valued using the "distributor" method, under the income approach. Under this premise, the margin of a distributor within the industry is deemed to be the margin attributable to customer relationships. This isolates the cash flows attributable to the customer relationships for which a market participant would be willing to pay. Discount rates of 24.5% and 16% were used to discount cash flows of MOI and GP, respectively, to present value.

Trade names and trademarks are considered a type of guarantee of a certain level of quality or performance represented by the MOI and GP brands. Trade names and trademarks were valued using the "relief from royalty" method of the income approach. This method is based on the assumption that in lieu of ownership, a market participant would be willing to pay a royalty in order to exploit the related benefits of this asset. Discount rates of 17% and 16% were used to discount the cash flows of MOI and GP, respectively, 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 acquisitions was primarily attributable to expected synergies from future growth.

Pro forma consolidated results of operations

The following unaudited pro forma financial information presents combined results of operations for each of the periods presented as if the acquisitions of MOI and GP had been completed on January 1, 2018. The pro forma information includes adjustments to depreciation expense for property and equipment acquired, to amortize expense for the intangible assets acquired, and to eliminate the acquisition transaction expenses recognized in each period. Transaction-related expenses associated with the acquisition and excluded from pro forma income from continuing operations were $0.9 million for the nine months ended September 30, 2019. There were no transaction-related expenses associated with the acquisition for the nine months ended September 30, 2018. The pro forma data are for informational purposes only and are not necessarily indicative of the consolidated results of operations or the combined business had the acquisitions of MOI and GP actually occurred on January 1, 2018, or the results of future operations of the combined business. For instance, planned or expected operational synergies following the acquisition are not reflected in the pro forma information. Consequently, actual results will differ from the unaudited pro forma information presented below.

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2019	2018	2019	2018
Revenue	$ 18,421,010	$ 16,102,426	$ 53,097,083	$ 43,553,934
Income from continuing operations	$ 1,540,863	$ 1,702,156	$ 5,029,586	$ 1,567,552

3. Discontinued Operations

On July 31, 2018, we sold the assets and operations related to our optoelectronic components and subassemblies ("Opto") business, which was part of our Products and Licensing segment, to an unaffiliated third party for an initial purchase price up to $18.5 million, of which $17.5 million was received at closing and has been properly recorded in the financial statements with the remaining purchase price adjustment up to $1.0 million which is contingent upon the attainment of specified revenue targets during the eighteen months following the closing of the sale. The Opto business was a component of the operations of Advanced Photonix, Inc., which we acquired in May 2015, and represented all of our operations in our Camarillo, California and Montreal, Quebec facilities.

We have reported the results of operations of the Opto business as discontinued operations in our consolidated interim financial statements. We allocated a portion of the consolidated tax expense to discontinued operations based on the ratio of the discontinued business's loss before allocations.

The key components of net income from discontinued operations were as follows:

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2019	2018	2019	2018
	(unaudited)		(unaudited)	
Net revenues	$ —	$ 1,089,681	$ —	$ 8,363,606
Cost of revenues	—	648,652	—	5,294,268
Operating expenses	—	271,262	—	1,714,920
Other income	—	(9,372)	—	13,330
Income before income taxes	—	160,395	—	1,367,748
Allocated tax expense	—	216,813	—	235,312
Operating (loss)/income from discontinued operations	—	(56,418)	—	1,132,436
Gain on sale, net of related income taxes	—	7,612,044	—	7,571,810
Net income from discontinued operations	$ —	$ 7,555,626	$ —	$ 8,704,246

4. Intangible assets

Intangible assets, net at September 30, 2019 and December 31, 2018 consisted of the following:

	September 30, 2019	December 31, 2018
	(unaudited)	
Patent costs	$ 3,955,374	$ 4,991,460
Developed technology	9,800,000	2,600,000
In-process research & development	1,580,000	200,000
Customer base	700,000	100,000
Trade names and trademarks	550,000	150,000
	16,585,374	8,041,460
Accumulated amortization	(6,015,027)	(4,739,190)
	$ 10,570,347	$ 3,302,270

Amortization for the three and nine months ended September 30, 2019 was $0.4 million and $1.1 million, respectively. Estimated aggregate amortization, based on the net value of intangible assets at September 30, 2019, for each of the next five years and beyond is as follows:

Year Ending December 31,		
Remainder of 2019	$	406,749
2020		1,626,995
2021		1,618,649
2022		1,465,880
2023		1,390,621
2024 & beyond		4,061,453
Total	$	10,570,347

5. Goodwill

The changes in the carrying value of goodwill during the nine months ended September 30, 2019 were as follows:

Balance as of December 31, 2018	$	101,008
Goodwill resulting from business combination - GP		10,315,490
Measurement Period Adjustment - MOI		(71,248)
Balance as of September 30, 2019	$	10,345,250

6. 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. We write down inventory for estimated obsolescence or unmarketable inventory in an amount equal to the difference between the cost of the inventory and the estimated market value based upon assumptions about future demand and market conditions.

Components of inventory were as follows:

		September 30, 2019		December 31, 2018
		(unaudited)		
Finished goods	$	1,376,797	$	1,339,832
Work-in-process		1,002,702		643,420
Raw materials		7,265,365		4,890,490
Total inventory	$	9,644,864	$	6,873,742

7. Accrued Liabilities

Accrued liabilities at September 30, 2019 and December 31, 2018 consisted of the following:

	September 30, 2019	December 31, 2018
	(unaudited)	
Accrued compensation	$ 5,520,291	$ 4,467,587
Income tax payable	1,072,216	236,636
Accrued professional fees	116,656	198,062
Deferred Rent	—	146,542
Current operating lease liability	1,394,761	—
Current finance lease liability	51,637	—
Royalties	265,770	302,428
Accrued liabilities - other	333,391	404,752
Customer deposits	—	298,468
Contingent liability - GP	940,000	—
Working capital adjustment - MOI	—	542,983
Total accrued liabilities	$ 9,694,722	$ 6,597,458

8. Debt

Silicon Valley Bank Facility

We maintain a Loan and Security Agreement with SVB (the "Credit Facility") under which we had a term loan with an original borrowing amount of $6.0 million (the “Original Term Loan”). The Original Term Loan carried a floating annual interest rate equal to SVB’s prime rate then in effect plus 2%. The Original Term Loan matured and was repaid in May 2019. We amended and restated the Credit Facility on October 10, 2019, as described in Note 15 - Subsequent Event.

The following table presents a summary of debt outstanding as of September 30, 2019 and December 31, 2018:

	September 30, 2019	December 31, 2018
	(unaudited)	
Silicon Valley Bank Term Loan	$ —	$ 625,000
Less: unamortized debt issuance costs	—	5,685
Less: current portion	—	619,315
Total long-term debt	$ —	$ —

9. Leases

We have operating leases for our facilities, which have remaining terms ranging from 1 to 5 years. Most of 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.

As of September 30, 2019, our lease components included in the consolidated balance sheet were as follows:

Lease component	Classification		September 30, 2019
Assets			
ROU assets - operating lease	Other assets	$	2,545,616
ROU assets - finance lease	Other assets		83,813
Total ROU assets		$	2,629,429
Liabilities			
Current operating lease liability	Accrued liabilities	$	1,394,761
Current finance lease liability	Accrued liabilities		51,637
Long-term operating lease liability	Other liabilities		2,223,623
Long-term finance lease liability	Other liabilities		34,335
Total lease liabilities		$	3,704,356

Rent expense is recognized on a straight-line basis over the life of the lease. Rent expense consists of the following:

	Three Months Ended September 30, 2019		Nine Months Ended September 30, 2019	
Operating lease costs	$	407,365	$	1,214,484
Variable rent costs		(36,794)		(109,748)
Total rent expense	$	370,571	$	1,104,736

Future minimum lease payments under non-cancelable leases were as follows as of September 30, 2019:

	September 30, 2019	
2019 - remaining 3 months	$	407,992
2020		1,467,701
2021		640,800
2022		544,704
2023		544,704
2024 and beyond		544,704
Total future minimum lease payments		4,150,605
Less: Interest		532,221
Total operating lease liabilities	$	3,618,384
Current operating lease liability	$	1,394,761
Long-term operating lease liability		2,223,623
Total operating lease liabilities	$	3,618,384

Other information related to leases is as follows:

	Three Months Ended September 30, 2019	Nine Months Ended September 30, 2019
Finance lease cost:		
Amortization of right-of-use assets	$ 10,902	$ 32,867
Interest on lease liabilities	1,649	3,880
Total finance lease cost	$ 12,551	$ 36,747
Other information:		
Cash paid for amounts included in the measurement of lease liabilities:		
Operating cash flows from operating leases	$ 407,365	$ 1,214,484
Finance cash flows from finance leases	$ 13,249	$ 28,803
Right-of-use assets obtained in exchange for new finance lease liabilities	$ —	$ 14,541
Weighted-average remaining lease term (years) - operating leases	3.8	3.8
Weighted-average remaining lease term (years) - finance leases	2.2	2.2
Weighted-average discount rate - operating leases	7%	7%
Weighted-average discount rate - finance leases	7%	7%

At September 30, 2019, we had no operating or finance leases that have not yet commenced.

10. Capital Stock and Share-Based Compensation

We recognize share-based compensation expense based upon the fair value of the underlying equity award on the date of the grant. For restricted stock awards and restricted stock units, we recognize expense based upon the price of our underlying stock at the date of the grant. We have elected to use the Black-Scholes-Merton option pricing model to value any option or warrant awards granted. We recognize share-based compensation for such awards on a straight-line basis over the requisite service period of the awards. 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. The expected life is based upon historical experience of homogeneous groups within our company. We also assume an expected dividend yield of zero for all periods, as we have never paid a dividend on our common stock and do not have any plans to do so in the future.

Stock Options

A summary of the stock option activity for the nine months ended September 30, 2019 is presented below:

	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)
Balance, January 1, 2019	3,108,868	$0.61 - $6.55	$ 2.26	$ 3,669,794	1,986,740	$ 1.81	$ 3,314,494
Granted	565,070	$3.21 - $3.37					
Exercised	(551,334)	$0.61 - $1.81					
Canceled	(13,507)	$1.47 - $3.37					
Balance, September 30, 2019	3,109,097	$1.18 - $4.75	$ 2.62	$ 9,847,522	1,734,345	$ 2.22	$ 6,186,154

(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 aggregate intrinsic value is based on the closing price of our common stock on the Nasdaq Capital Market, as applicable, on the respective dates.

At September 30, 2019, the outstanding stock options to purchase an aggregate of 3.1 million shares had a weighted-average remaining contractual term of 6.4 years, and the exercisable stock options to purchase an aggregate of 1.7 million shares had a weighted-average remaining contractual term of 4.3 years. The fair value of shares underlying vested options was $10.0 million at September 30, 2019. The fair value of shares underlying options exercised during the nine months ended September 30, 2019 was $2.3 million.

For the nine months ended September 30, 2019 and 2018 we recognized $1.1 million and $0.3 million in share-based compensation expense, respectively, which is included in our selling, general and administrative expense in the accompanying consolidated interim financial statements. We expect to recognize $2.8 million in share-based compensation expense over the weighted-average remaining service period of 3.0 years for stock options outstanding as of September 30, 2019.

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 nine months ended September 30, 2019, we granted an aggregate of 230,000 RSUs to certain employees. Of the RSUs granted during the nine months ended September 30, 2019, 167,000 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 63,000 RSUs are performance-based awards that will vest based on our achievement of long-term performance goals, in particular, based on our levels of 2021 revenue and operating income. The 63,000 shares issuable upon vesting of the performance-based RSUs represent the maximum payout under our performance-based awards, based upon 150% of our target performance for 2021 revenue and operating income (the payout of such awards based on target performance for 2021 revenue and operating income would be 42,000 shares). 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. During the nine months ended September 30, 2019, 177,665 shares of restricted stock vested.

In addition, in conjunction with our 2018 and 2019 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. For the nine months ended September 30, 2019, we granted 11,600 RSUs to certain non-employee members of our Board of Directors in respect of the annual equity grants pursuant to our non-employee director compensation policy. During the nine months ended September 30, 2019, 16,286 RSUs vested.

The following table summarizes the value of our unvested restricted stock awards and RSUs:

	Number of Unvested Shares	Weighted Average Grant Date Fair Value	Aggregate Grant Date Fair Value of Unvested Shares
Balance, January 1, 2019	458,620	$ 2.56	$ 1,172,456
Granted	241,600	3.04	733,429
Vested	(193,951)	2.32	(450,935)
Forfeitures	—	—	—
Balance, September 30, 2019	506,269	$ 2.87	$ 1,454,950

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 of the 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.

In December 2017, we amended and restated our Deferred Compensation Plan to also permit participating non-employee directors to elect, beginning in 2018, 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 the nine months ended September 30, 2019:

	Number of Stock Units	Weighted Average Grant Date Fair Value per Share	Intrinsic Value Outstanding
Balance, January 1, 2019	507,290	$1.53	$ 1,699,422
Granted	112,503	4.30	
Forfeitures	—	—	
Converted	—	—	
Balance, September 30, 2019	619,793	$2.03	$ 3,588,601

As of September 30, 2019, 37,546 of the outstanding stock units had not yet vested.

The following tables detail our equity transactions during the nine months ended September 30, 2019 and 2018:

	Preferred Stock		Common Stock		Treasury Stock		Additional Paid-in Capital	Accumulated Deficit	Total
	Shares	$	Shares	$	Shares	$	$		
Balance at January 1, 2019, as previously reported	1,321,514	1,322	27,956,401	30,120	1,253,105	(2,116,640)	85,744,750	(21,305,222)	62,354,330
Exercise of stock options	—	—	189,312	189	—	—	184,769	—	184,958
Share-based compensation	—	—	—	—	—	—	342,765	—	342,765
Stock dividends to Carilion Clinic[1]	—	—	—	20	—	—	83,038	(83,058)	—
Net income	—	—	—	—	—	—	—	1,125,879	1,125,879
Balance, March 31 2019	1,321,514	1,322	28,145,713	30,329	1,253,105	(2,116,640)	86,355,322	(20,262,401)	64,007,932
Exercise of stock options	—	—	207,786	208	—	—	182,317	—	182,525
Share-based compensation	—	—	—	—	—	—	377,884	—	377,884
Stock dividends to Carilion Clinic[1]	—	—	—	20	—	—	89,383	(89,403)	—
Net income	—	—	—	—	—	—	—	840,292	840,292
Purchase of treasury stock	—	—	(52,733)	—	52,733	(220,470)	—	—	(220,470)
Balance, June 30 2019	1,321,514	1,322	28,300,766	30,557	1,305,838	(2,337,110)	87,004,906	(19,511,512)	65,188,163
Exercise of stock options	—	—	83,204	83	—	—	70,863	—	70,946
Share-based compensation	—	—	16,286	16	—	—	419,535	—	419,551
Stock dividends to Carilion Clinic[1]	—	—	770,454	20	—	—	112,970	(112,990)	—
Preferred stock to common stock conversion	(1,321,514)	(1,322)	1,321,514	1,322	—	—	—	—	—
Net income	—	—	—	—	—	—	—	1,230,252	1,230,252
Purchase of treasury stock	—	—	(333,953)	—	333,953	(1,999,997)	—	—	(1,999,997)
Balance, September 30 2019	—	—	30,158,271	31,998	1,639,791	(4,337,107)	87,608,274	(18,394,250)	64,908,915

	Preferred Stock		Common Stock		Treasury Stock		Additional Paid-in Capital	Accumulated Deficit	Total
	Shares	$	Shares	$	Shares	$	$		
Balance at January 1, 2018, as previously reported	1,321,514	1,322	27,283,918	29,186	1,070,904	(1,649,746)	83,563,208	(32,406,189)	49,537,781
Impact of change in accounting policy	—	—	—	—	—	—	—	354,028	354,028
As adjusted balance at January 1, 2018	1,321,514	1,322	27,283,918	29,186	1,070,904	(1,649,746)	83,563,208	(32,052,161)	49,891,809
Exercise of stock options	—	—	10,727	11	—	—	22,277	—	22,288
Share-based compensation	—	—	—	—	—	—	94,606	—	94,606
Stock dividends to Carilion Clinic(1)	—	—	—	20	—	—	64,405	(64,425)	—
Net income	—	—	—	—	—	—	—	148,676	148,676
Purchase of treasury stock	—	—	(132,450)	—	132,450	(306,041)	—	—	(306,041)
Balance, March 31 2018	1,321,514	1,322	27,162,195	29,217	1,203,354	(1,955,787)	83,744,496	(31,967,910)	49,851,338
Exercise of stock options	—	—	250,115	250	—	—	617,259	—	617,509
Share-based compensation	—	—	280,000	280	—	—	117,543	—	117,823
Non-cash compensation	—	—	129,865	130	—	—	199,871	—	200,001
Stock dividends to Carilion Clinic(1)	—	—	—	20	—	—	63,216	(63,236)	—
Net income	—	—	—	—	—	—	—	1,067,327	1,067,327
Purchase of treasury stock	—	—	(49,751)	—	49,751	(160,853)	—	—	(160,853)
Balance, June 30 2018	1,321,514	1,322	27,772,424	29,897	1,253,105	(2,116,640)	84,742,385	(30,963,819)	51,693,145
Exercise of stock options	—	—	181,583	181	—	—	414,876	—	415,057
Share-based compensation	—	—	(17,606)	(18)	—	—	133,433	—	133,415
Non-cash compensation	—	—	—	1	—	—	1	—	2
Stock dividends to Carilion Clinic(1)	—	—	—	20	—	—	63,214	(63,234)	—
Net income	—	—	—	—	—	—	—	8,848,402	8,848,402
Balance, September 30 2018	1,321,514	1,322	27,936,401	30,081	1,253,105	(2,116,640)	85,353,909	(22,178,651)	61,090,021

(1) For the period from January 12, 2010, the original issue date of the Series A Preferred Stock, through September 30, 2019, the Series A Preferred Stock issued to Carilion accrued $1,703,084 in dividends. In September 2019, Carilion elected to convert the preferred stock into an equal number of shares of our common stock. In addition, we issued

770,454 shares of our common stock in satisfaction of the accrued dividends earned on the preferred stock prior to its conversion.

Stock Repurchase Program

In September 2017, our board of directors authorized us to repurchase up to $2.0 million of our common stock through September 19, 2018 (the "prior stock repurchase program"). Our prior stock repurchase program did not obligate us to acquire any specific number of shares. Under the prior stock repurchase program, shares could be repurchased in privately negotiated or open market transactions, including under plans complying with Rule 10b5-1 under the Securities Exchange Act of 1934, as amended. As of September 19, 2018, we had repurchased a total of 565,629 shares for an aggregate purchase price of $1.1 million under the prior stock repurchase program, after which the prior stock repurchase program expired. We currently maintain all repurchased shares under the prior stock repurchase program as treasury stock.

In August 2019, our board of directors authorized a new stock repurchase program which allowed us to repurchase up to $2.0 million of our common stock through August 2020. As of September 30, 2019, we had repurchased a total of 333,953 shares for an aggregate purchase price of $2.0 million under this new stock repurchase program, and accordingly the program expired. We currently maintain all repurchased shares under this new stock repurchase program as treasury stock.

11. Revenue Recognition

Our operations are divided into two operating segments—“Products and Licensing” and “Technology Development”.

The Products and Licensing segment derives its revenues from product sales, funded product development and technology licenses.

The Technology Development segment provides applied research to customers in our areas of focus. Our engineers and scientists collaborate with our network of government, academic and industry experts to identify technologies and ideas with promising market potential. We then compete to win fee-for-service contracts from government agencies and industrial customers who seek innovative solutions to practical problems that require new technology. The Technology Development segment derives its revenues primarily from services.

Disaggregation of Revenue

We disaggregate our revenue from contracts with customers by geographic locations, customer-type, contract type, timing of recognition, and major categories for each of our segments, as we believe it best depicts how the nature, amount, timing and uncertainty of our revenue and cash flows are affected by economic factors.

The details are listed in the table below for the three and nine months ended September 30, 2019 and 2018:

	Three Months Ended September 30, 2019 (unaudited)			Three Months Ended September 30, 2018 (unaudited)		
	Technology Development	Products and Licensing	Total	Technology Development	Products and Licensing	Total
Total Revenue by Geographic Location						
United States	$ 6,494,832	$ 5,924,077	$ 12,418,909	$ 5,315,861	$ 3,251,602	$ 8,567,463
Asia	—	3,728,671	3,728,671	—	1,143,767	1,143,767
Europe	—	1,912,652	1,912,652	—	899,683	899,683
Canada, Central and South America	—	218,846	218,846	—	1,330	1,330
All Others	—	141,932	141,932	—	74,783	74,783
Total	$ 6,494,832	$ 11,926,178	$ 18,421,010	$ 5,315,861	$ 5,371,165	$ 10,687,026
Total Revenue by Major Customer Type						
Sales to the U.S. government	$ 6,411,899	$ 1,260,475	$ 7,672,374	$ 5,216,389	$ 977,076	$ 6,193,465
U.S. direct commercial sales and other	82,933	4,663,602	4,746,535	99,472	2,250,656	2,350,128
Foreign commercial sales & other	—	6,002,101	6,002,101	—	2,143,433	2,143,433
Total	$ 6,494,832	$ 11,926,178	$ 18,421,010	$ 5,315,861	$ 5,371,165	$ 10,687,026
Total Revenue by Contract Type						
Fixed-price contracts	$ 3,487,522	$ 11,926,178	$ 15,413,700	$ 2,004,166	$ 5,371,165	$ 7,375,331
Cost-type contracts	3,007,310	—	3,007,310	3,311,695	—	3,311,695
Total	$ 6,494,832	$ 11,926,178	$ 18,421,010	$ 5,315,861	$ 5,371,165	$ 10,687,026
Total Revenue by Timing of Recognition						
Goods transferred at a point in time	$ —	$ 11,669,034	$ 11,669,034	$ —	$ 5,190,830	$ 5,190,830
Goods/services transferred over time	6,494,832	257,144	6,751,976	5,315,861	180,335	5,496,196
Total	$ 6,494,832	$ 11,926,178	$ 18,421,010	$ 5,315,861	$ 5,371,165	$ 10,687,026
Total Revenue by Major Products/Services						
Technology development	$ 6,494,832	$ —	$ 6,494,832	$ 5,315,861	$ —	$ 5,315,861
Optical test and measurement systems	—	11,266,322	11,266,322	—	4,469,677	4,469,677
Other	—	659,856	659,856	—	901,488	901,488
Total	$ 6,494,832	$ 11,926,178	$ 18,421,010	$ 5,315,861	$ 5,371,165	$ 10,687,026

	Nine Months Ended September 30, 2019 (unaudited)			Nine Months Ended September 30, 2018 (unaudited)		
	Technology Development	Products and Licensing	Total	Technology Development	Products and Licensing	Total
Total Revenue by Geographic Location						
United States	$ 19,576,574	$ 15,450,256	$ 35,026,830	$ 15,418,919	$ 7,961,048	$ 23,379,967
Asia	—	9,450,775	9,450,775	—	3,280,348	3,280,348
Europe	—	5,343,251	5,343,251	—	2,542,017	2,542,017
Canada, Central and South America	—	936,426	936,426	—	99,807	99,807
All Others	—	278,615	278,615	—	76,783	76,783
Total	$ 19,576,574	$ 31,459,323	$ 51,035,897	$ 15,418,919	$ 13,960,003	$ 29,378,922
Total Revenue by Major Customer Type						
Sales to the U.S. government	$ 19,180,408	$ 2,457,677	$ 21,638,085	$ 15,284,661	$ 1,364,755	$ 16,649,416
U.S. direct commercial sales and other	396,166	12,992,580	13,388,746	134,258	6,583,006	6,717,264
Foreign commercial sales & other	—	16,009,066	16,009,066	—	6,012,242	6,012,242
Total	$ 19,576,574	$ 31,459,323	$ 51,035,897	$ 15,418,919	$ 13,960,003	$ 29,378,922
Total Revenue by Contract Type						
Fixed-price contracts	$ 10,654,247	$ 31,459,323	$ 42,113,570	$ 6,611,758	$ 13,960,003	$ 20,571,761
Cost-type contracts	8,922,327	—	8,922,327	8,807,161	—	8,807,161
Total	$ 19,576,574	$ 31,459,323	$ 51,035,897	$ 15,418,919	$ 13,960,003	$ 29,378,922
Total Revenue by Timing of Recognition						
Goods transferred at a point in time	$ —	$ 30,302,926	$ 30,302,926	$ —	$ 13,505,897	$ 13,505,897
Goods/services transferred over time	19,576,574	1,156,397	20,732,971	15,418,919	454,106	15,873,025
Total	$ 19,576,574	$ 31,459,323	$ 51,035,897	$ 15,418,919	$ 13,960,003	$ 29,378,922
Total Revenue by Major Products/Services						
Technology development	$ 19,576,574	$ —	$ 19,576,574	$ 15,418,919	$ —	$ 15,418,919
Optical test and measurement systems	—	29,323,169	29,323,169	—	12,129,197	12,129,197
Other	—	2,136,154	2,136,154	—	1,830,806	1,830,806
Total	$ 19,576,574	$ 31,459,323	$ 51,035,897	$ 15,418,919	$ 13,960,003	$ 29,378,922

Contract Balances

Our contract assets consist of unbilled amounts for technology development contracts as well as custom product contracts. Also included in contract assets are royalty revenue and carrying amounts of right of returned inventory. Long-term contract assets include the fee withholding on cost reimbursable contracts that will not be billed within a year. Contract liabilities include excess billings, subcontractor accruals, warranty expense, extended warranty revenue, right of return refund, and customer deposits. The net contract assets (liabilities) increased $0.2 million, due primarily to increased contract assets in addition to a slight decrease in contract liabilities. The increase in contract assets is a result of the increased number of government research programs in addition to an increase in the number of our Fixed-Price contracts that have not reached milestones as designated in their respective contracts.

The following table shows the components of our contract balances as of September 30, 2019 and December 31, 2018:

	September 30, 2019	December 31, 2018
Contract assets	$ 3,865,601	$ 2,759,315
Contract liabilities	(3,389,417)	(2,486,111)
Net contract assets	$ 476,184	$ 273,204

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 Products and Licensing segment's unfulfilled performance obligations was $14.6 million at September 30, 2019. We expect to satisfy 27% of the performance obligations in 2019, 31% in 2020 and the remainder by 2023. The approximate value of our Technology Development segment's unfulfilled performance obligations was $34.8 million at September 30, 2019. We expect to satisfy 22% of the performance obligations in 2019, 55% in 2020 and the remainder by 2022.

12. Income Taxes

We and our subsidiaries file U.S. Federal income tax returns and income tax returns in various state, local and foreign jurisdictions.

Our quarterly tax provision, and our quarterly estimate of our annual effective tax rate, is subject to significant variation due to several factors, including the variability in accurately predicting our pre-tax and taxable income and the mix of jurisdictions to which they relate, changes in how we do business, changes in our stock price, tax law developments (including changes in statues, regulations, case law, and administrative practices), and relative changes of expenses or losses for which tax benefits are not recognized. Additionally, our effective tax rate can be more or less volatile based on the amount of pre-tax income or loss. For example, the impact of discrete items and non-deductible expenses on our effective tax rate is greater when our pre-tax income is lower.

For the nine months ended September 30, 2019, our effective income tax rate was (67.93)%. We expect our effective tax rate for 2019 to continue to differ from the Federal statutory rate of 21%, partly because of the partial release of the valuation allowance due to the acquisition of GP in the first quarter of 2019, and partly because of the net operating loss carryforwards expected to be used to offset taxable income.

We consider both positive and negative evidence when evaluating the recoverability of our deferred tax assets ("DTAs"). The assessment is required to determine whether based on all available evidence, it is more likely than not (i.e. greater than a 50% probability) that all or some portion of the DTAs will be realized in the future. As of September 30, 2019, our valuation allowance was $0.9 million.

13. Reportable Segments

Through September 30, 2019, our Chief Executive Officer and his direct reports collectively represented our chief operating decision makers, and they evaluated segment performance based primarily on revenues and operating income or loss. The accounting policies of our segments are the same as those described in the summary of significant accounting policies (see Note 1 to our Financial Statements, “Organization and Summary of Significant Accounting Policies,” presented in our Annual Report on Form 10-K as filed with the SEC on March 15, 2019).

The table below presents revenues and operating income/(loss) for reportable segments:

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2019	2018	2019	2018
	(unaudited)		(unaudited)	
Revenues:				
Products and licensing	$ 11,926,178	$ 5,371,165	$ 31,459,323	$ 13,960,003
Technology development	6,494,832	5,315,861	19,576,574	15,418,919
Total revenues	$ 18,421,010	$ 10,687,026	$ 51,035,897	$ 29,378,922
Products and licensing operating income/(loss)	$ 706,185	$ 240,645	$ 233,177	$ (410,477)
Technology development operating income	777,816	340,852	1,365,320	864,540
Total operating income	$ 1,484,001	$ 581,497	$ 1,598,497	$ 454,063
Depreciation, products and licensing	$ 133,142	$ 42,559	$ 417,633	$ 192,058
Depreciation, technology development	$ 98,393	$ 95,673	$ 287,901	$ 283,550
Amortization, products and licensing	$ 422,391	$ 56,062	$ 1,054,234	$ 300,837
Amortization, technology development	$ 15,060	$ 43,708	$ 74,826	$ 121,770

The table below presents assets for reportable segments:

	September 30, 2019	December 31, 2018
	(unaudited)	
Total segment assets:		
Products and licensing	$ 45,702,864	$ 40,775,211
Technology development	37,184,931	34,823,525
Total assets	$ 82,887,795	$ 75,598,736
Property plant and equipment, and intangible assets, products and licensing	$ 22,380,346	$ 4,927,453
Property plant and equipment, and intangible assets, technology development	$ 2,162,084	$ 2,103,711

The U.S. government accounted for 42% and 58% of total consolidated revenues for the three months ended September 30, 2019 and 2018, respectively and for 42% and 57% of total consolidated revenues for the nine months ended September 30, 2019 and 2018, respectively.

International revenues (customers outside the United States) accounted for 33% and 20% of total consolidated revenues for the three months ended September 30, 2019 and 2018, respectively, and 31% and 20% of the total consolidated revenues for the nine months ended September 30, 2019 and 2018, respectively. Customers in China represented 11% of total revenues in the three and nine months ended September 30, 2019, while no other single country, outside of the United States, represented more than 10% of total revenues in the three and nine months ended September 30, 2019 and 2018.

14. Contingencies and Guarantees

We are from time to time involved in certain legal proceedings in the ordinary course of conducting our business. While the ultimate liability pursuant to these actions cannot currently be determined, we believe it is not reasonably possible that these legal proceedings will have a material adverse effect on our financial position or results of operations.

In March 2018, we received a notice of claim (the "Claim") from Macom Technology Solutions, Inc. ("Macom"), who acquired our HSOR business in August 2017 pursuant to an asset purchase agreement. Under the asset purchase agreement, we agreed to indemnify Macom for certain matters, including, among other things, the collection of accounts receivable from certain major customers, and placed $4.0 million of the purchase price into an escrow account for the potential settlement of any valid indemnity claims. The notice of claim received from Macom totaled $2.0 million under various indemnity provisions. We have disputed Macom's assertion of right to payment for the matters described in the Claim. It is uncertain what amount, if any, will be owed in settlement of the Claim. As of September 30, 2019, $1.5 million of the escrow balance had been received with the remaining $2.5 million in the escrow account pending resolution of the dispute.

On July 31, 2018, we sold the assets associated with our Opto components business to an unaffiliated third party. The asset purchase agreement provides for additional consideration of up to $1.0 million contingent upon the achievement of a specified revenue level by the sold business during the 18 months following the sale. In addition, the asset purchase agreement provides for a potential adjustment to the consideration paid, either positive or negative, to the extent that working capital transferred to the buyer is greater or less than a specified target amount. There have been no amounts recorded in reference to the above matter in the financial statements as of September 30, 2019. It is uncertain what amount, if any, will be received or paid with respect to each of these potential adjustments.

On March 1, 2019, we acquired the outstanding stock of GP for cash consideration of $19.0 million. Additionally, we can become obligated to pay additional cash consideration of up to $1.0 million if certain revenue targets for the GP historical business are met for the twelve month period following the closing. At September 30, 2019, a liability of $0.9 million has been recorded in the financial statements in reference to the above matter.

We executed a non-cancelable purchase order totaling $1.1 million in the first quarter of 2018 and a non-cancelable purchase order totaling $1.9 million in the third quarter of 2019 for multiple shipments of tunable lasers to be delivered over an 18-month period. At September 30, 2019, approximately $1.9 million of these commitments remained and is expected to be delivered by December 31, 2020

We have entered into indemnification agreements with our officers and directors, to the extent permitted by law, pursuant to which we have agreed to reimburse the officers and directors for legal expenses in the event of litigation and regulatory matters. The terms of these indemnification agreements provide for no limitation to the maximum potential future payments. We have a directors and officers insurance policy that may, in certain instances, mitigate the potential liability and payments.

15. Subsequent Event

On October 10, 2019, we entered into an Amended and Restated Loan and Security Agreement (the “Loan Agreement”) with SVB, which amended and restated in its entirety our previous Loan and Security Agreement dated as of February 18, 2010, as amended (See Note 8). Under the Loan Agreement, SVB agreed to make advances available up to $10.0 million (the “Revolving Line”). If we borrow from the Revolving Line, such borrowing would carry a floating annual interest rate equal to the greater of (i) the Prime Rate (as defined in the Loan Agreement) then in effect plus 1% or (ii) 6%. Amounts borrowed under the Revolving Line may be repaid and, prior to the Revolving Line Maturity Date (defined below), reborrowed. The Revolving Line terminates on October 10, 2020 (the “Revolving Line Maturity Date”), unless earlier terminated by us. No amounts have been borrowed under this Loan Agreement.

Amounts due under the Loan Agreement are secured by our assets, including all personal property and bank accounts; however, intellectual property is not secured under the Loan Agreement. The Loan Agreement requires us to observe a number of financial and operational covenants, including maintenance of a specified Liquidity Coverage Ratio (as defined in the Loan Agreement), protection and registration of intellectual property rights and customary negative covenants.

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

CAUTIONARY NOTE REGARDING FORWARD LOOKING STATEMENTS

This Quarterly Report on Form 10-Q, including the sections entitled “Management’s Discussion and Analysis of Financial Condition and Results of Operations” and “Quantitative and Qualitative Disclosures About Market Risk” under Items 2 and 3, respectively, of Part I of this report, and the section entitled “Risk Factors” under Item 1A of Part II of this *report, may 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 fact are "forward-looking statements" for purposes of these statutes, 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 and plans for growth and future operations, 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 Quarterly Report on Form 10-Q and elsewhere within this report.

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.

Overview of Our Business

We are a leader in advanced optical technology, providing high performance fiber optic test products for the telecommunications industry and distributed fiber optic sensing products for industries utilizing composite and other advanced materials, such as the automotive, aerospace, energy and infrastructure industries. Our distributed fiber optic sensing products help designers and manufacturers more efficiently develop new and innovative products by providing valuable information such as highly detailed stress, strain, and temperature measurements of a new design or manufacturing process. In addition, our distributed fiber optic sensing products are used to monitor the structural integrity or operational health of critical assets, including large civil structures such as bridges. Our communications test products accelerate the development of advanced fiber optic components and networks by providing fast and highly accurate characterization of components and networks. We also provide applied research services, typically under research programs funded by the U.S. government, in areas of advanced materials, sensing, and healthcare applications. Our business model is designed to accelerate the process of bringing new and innovative products to market. We use our in-house technical expertise across a range of technologies to perform applied research services for companies and for government funded projects. We continue to invest in product development and commercialization, which we anticipate will lead to increased product sales growth.

We are organized into two main business segments, the Products and Licensing segment and the Technology Development segment. Our Products and Licensing segment develops, manufactures and markets distributed fiber optic sensing products, as well as communications test products. We are continuing to develop and commercialize our fiber optic technology for sensing applications for aerospace, automotive, energy, and infrastructure as well as for test and measurement applications in the telecommunications and data communications industries. Our Products and Licensing segment revenues represented 65% and 50% of our total revenues for the three months ended September 30, 2019 and 2018, respectively, and 62% and 48% of our total revenues for the nine months ended September 30, 2019 and 2018, respectively. The Products and Licensing segment revenues were $11.9 million and $5.4 million for the three months ended September 30, 2019 and 2018, respectively, and $31.5 million and $14.0 million for the nine months ended September 30, 2019 and 2018, respectively.

Revenues from product sales are mostly derived from the sales of our sensing and test and measurement products that make use of light-transmitting optical fibers, or fiber optics. We continue to invest in product development and commercialization, which we anticipate will lead to increased product sales growth. Although we have been successful in licensing certain technology in past years, we do not expect license revenues to represent a significant portion of future revenues. Over time, however, we do intend to gradually increase such revenues. In the long term, we expect that revenues from product sales will represent a larger portion of our total revenues and that as we develop and commercialize new products, these revenues will reflect a broader and more diversified mix of products.

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 and for which a purchase order has been received by a commercial customer, and unfunded backlog, representing firm orders for which funding has not yet been appropriated. Indefinite delivery and quantity contracts and unexercised options are not reported in total backlog. The approximate value of our Products and Licensing segment backlog was $14.6 million at September 30, 2019 and $5.8 million at December 31, 2018. The backlog at September 30, 2019 is expected to be recognized as revenue in the future as follows:

	2019	2020	2021	2022	2023 and beyond	Total
Products and Licensing	$ 3,915,638	$ 4,509,102	$ 1,992,612	$ 2,754,717	$ 1,413,842	$ 14,585,911

The Technology Development segment performs applied research principally in the areas of sensing and instrumentation, advanced materials and health sciences. This segment comprised 35% and 50% of our total revenues for the three months ended September 30, 2019 and 2018, respectively, and 38% and 52% of our total revenues for the nine months ended September 30, 2019 and 2018. Most of the government funding for our Technology Development segment is derived from the Small Business Innovation Research ("SBIR") program coordinated by the U.S. Small Business Administration ("SBA"). The Technology Development segment revenues were $6.5 million and $5.3 million for the three months ended September 30, 2019 and 2018, respectively, and $19.6 million and $15.4 million for the nine months ended September 30, 2019 and 2018, respectively.

Within the Technology Development segment, we have historically had a backlog of contracts for which work has been scheduled, but for which a specified portion of work has not yet been completed. The approximate value of our Technology Development segment backlog was $34.8 million at September 30, 2019 and $26.0 million at December 31, 2018. The backlog at September 30, 2019 is expected to be recognized as revenue in the future as follows:

Technology Development	2019	2020	2021	2022	Total
Funded	$ 7,613,700	$ 18,178,690	$ 5,532,353	$ 1,566,062	$ 32,890,805
Unfunded	$ 197,597	$ 790,387	$ 727,888	$ 153,750	$ 1,869,622

On October 15, 2018, we acquired substantially all of the assets, other than cash, as well as specified liabilities of Micron Optics, Inc. ("MOI"), a leading provider of innovative optical components and laser-based measurement technology, whose sensing and measurement solutions are deployed in multiple industries, for total cash consideration of $5.0 million, including $4.0 million paid at closing and $1.0 million placed in escrow until the later of October 1, 2019 or the date that specified matters are resolved as agreed by us and MOI. Following closing of the transaction, the purchase price was increased by $0.5 million based upon the final determination of working capital of MOI as of the closing date compared to a target working capital amount specified in the asset purchase agreement.

On March 1, 2019, we acquired all of the outstanding stock of General Photonics Corporation ("GP"), a leading provider of innovative components, modules and test equipment focused on the generation, measurement and control of polarized light critical in fiber optic-based applications for aggregate consideration of $19.0 million. Of the purchase price, $17.1 million was paid at closing and $1.9 million was placed into escrow for possible working capital adjustments to the purchase price and potential satisfaction of certain post-closing indemnification obligations. Additionally, we can become obligated to pay additional cash consideration of up to $1.0 million if certain revenue targets for the GP historical business are met for the twelve months following the closing.

We may also 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 other acquisition-related expenses.

Description of Revenues, Costs and Expenses

Revenues

The Products and Licensing 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, and represented 65% and 50% of our total revenues for the three months ended September 30, 2019 and 2018, respectively, and 62% and 48% of our total revenues for the nine months ended September 30, 2019 and 2018, respectively.

We generate revenues from technology development, product sales and commercial product development and licensing activities. We derive Technology Development segment revenues 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 complete 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. The Technology Development segment revenues represented 35% and 50% of total revenues for the three months ended September 30, 2019 and 2018, respectively and 38% and 52% of our total revenues for the nine months ended September 30, 2019 and 2018, respectively.

Cost of Revenues

Cost of revenues associated with our Products and Licensing 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 our Technology Development segment revenues consists of costs associated with performing the related research activities including direct labor, amounts paid to subcontractors and overhead allocated to Technology Development segment activities.

Operating Expense

Operating expense consists of selling, general and administrative expenses, as well as expenses related to research, development and engineering, depreciation of fixed assets and amortization of intangible assets. These expenses also include compensation for employees in executive and operational functions including certain non-cash charges related to expenses from option grants, facilities costs, professional fees, salaries, commissions, travel expense and related benefits of personnel engaged in sales, product management and marketing 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 Technology Development segment, product development activities not provided under contracts with third parties, and overhead costs related to these activities.

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 loans as well as interest accrued on our finance lease obligations.

Critical Accounting Policies and Estimates

Our discussion and analysis of our financial condition and results of operations are based on our consolidated financial statements, which have been prepared in accordance with accounting principles generally accepted in the United States of America. The preparation of these financial statements requires us to make estimates, assumptions and judgments that affect the amounts reported in our financial statements and the accompanying notes. We base our estimates on historical experience and on various other assumptions that we believe to be reasonable under the circumstances. Actual results may differ from these estimates under different assumptions or judgments.

Our critical accounting policies are described in the Management’s Discussion and Analysis section and the notes to our audited consolidated financial statements previously included in our Annual Report on Form 10-K for the year ended December 31, 2018, as filed with the Securities and Exchange Commission ("SEC") on March 15, 2019.

In February 2016, the Financial Accounting Standards Board ("FASB") issued a new standard related to Leases, Accounting Standards Update ("ASU") No. 2016-02, *Leases (Topic 842)* and subsequent amendments, which replaced existing GAAP and requires lessees to recognize right-of-use ("ROU") assets and corresponding lease liabilities that depict the rights and obligations arising from a lease agreement. We implemented ASU 2016-02 on January 1, 2019 and elected certain practical expedients available under the ASU. As a result of the adoption, we recognized ROU assets totaling $3.5 million and lease liabilities totaling $4.7 million as of the adoption date. For additional information, see Note 1 to our Unaudited Consolidated Financial Statements - "Basis of Presentation and Significant Accounting Policies-Recently Issued Accounting Pronouncements" elsewhere in this Quarterly Report.

Results of Operations

Three Months Ended September 30, 2019 Compared to Three Months Ended September 30, 2018

Revenues

	Three Months Ended September 30,			
	2019	2018	$ Difference	% Difference
Revenues:				
Products and licensing	$ 11,926,178	$ 5,371,165	$ 6,555,013	122%
Technology development	6,494,832	5,315,861	1,178,971	22%
Total revenues	$ 18,421,010	$ 10,687,026	$ 7,733,984	72%

Our Products and Licensing segment included revenues from sales of test and measurement systems, primarily representing sales of our Optical Backscatter Reflectometer, ODiSI, and Optical Vector Analyzer platforms, optical components and sub-assemblies and sales of our Hyperion and Terahertz sensing platforms. Products and Licensing segment revenues for the three months ended September 30, 2019 increased $6.6 million, or 122%, to $11.9 million compared to $5.4 million for the three months ended September 30, 2018. The increase for the three months ended September 30, 2019, compared to the three months ended September 30, 2018, resulted primarily from $2.7 million of revenues realized from the legacy business of MOI and $3.2 million of revenues realized from the legacy business of GP during the period. Continued growth in sales of our communications test instruments also contributed to this increase.

Revenues from our Technology Development segment for the three months ended September 30, 2019 increased $1.2 million, or 22%, to $6.5 million compared to $5.3 million for the three months ended September 30, 2018. The increase in Technology Development segment revenues continues a growth trend experienced over the past two years largely driven by successes in Phase 2 SBIR awards. The increase for the three months ended September 30, 2019, compared to the three months ended September 30, 2018, was realized primarily in our terahertz, advanced materials, and systems groups. As Phase 2 contracts generally have a performance period of a year or more, we currently expect revenues to remain at a similar level for the near term.

Cost of Revenues and Gross Profit

	Three Months Ended September 30,			
	2019	2018	$ Difference	% Difference
Cost of revenues:				
Products and licensing	$ 4,561,801	$ 2,079,749	$ 2,482,052	119%
Technology development	4,574,035	3,918,666	655,369	17%
Total cost of revenues	9,135,836	5,998,415	3,137,421	52%
Gross profit	$ 9,285,174	$ 4,688,611	$ 4,596,563	98%

The cost of Products and Licensing segment revenues increased by $2.5 million, or 119%, to $4.6 million for the three months ended September 30, 2019, compared to $2.1 million for the three months ended September 30, 2018. This increase in cost of revenues primarily resulted from $2.3 million of cost of revenues from the legacy businesses of MOI and GP as well as the organic growth in sales of our communications test equipment. The 119% increase in cost of Products and Licensing segment revenues is consistent with our 122% increase in associated revenue as described above.

The cost of Technology Development segment revenues for the three months ended September 30, 2019 increased $0.7 million, or 17%, to $4.6 million compared to $3.9 million for the three months ended September 30, 2018. The increase in cost of Technology Development segment revenues was primarily attributable to additional labor costs associated with performing our awarded contracts. Cost of Technology Development segment revenues increased at a lower rate than Technology Development segment revenues due to decreased reliance on utilization of subcontractors to perform on our awarded contracts.

Our overall gross margin increased to 50% for the three months ended September 30, 2019, compared to 44% for the three months ended September 30, 2018, primarily as a result of our revenue mix, with Products and Licensing segment revenues representing a larger portion of our total revenues during the three months ended September 30, 2019.

Operating Expense

	Three Months Ended September 30,			
	2019	**2018**	**$ Difference**	**% Difference**
Operating expense:				
Selling, general and administrative	$ 5,753,649	$ 3,233,485	$ 2,520,164	78%
Research, development and engineering	2,047,524	873,629	1,173,895	134%
Total operating expense	$ 7,801,173	$ 4,107,114	$ 3,694,059	90%

Our selling, general and administrative expense increased $2.5 million, or 78%, to $5.8 million for the three months ended September 30, 2019, compared to $3.2 million for the three months ended September 30, 2018. Selling, general and administrative expense increased primarily due to $2.0 million of expenses associated with the legacy businesses of MOI and GP for the three months ended September 30, 2019, in addition to an increase in share-based compensation expenses of $0.3 million due to new stock awards and a $0.2 million increase in marketing expenses and additional resources as a result of increased revenue.

Research, development and engineering expense increased $1.2 million, or 134%, to $2.0 million for the three months ended September 30, 2019, compared to $0.9 million for the three months ended September 30, 2018, due to $0.8 million of research, development and engineering expenses associated with the legacy businesses of MOI and GP during the three months ended September 30, 2019 in addition to other engineering expenses of $0.3 million to support new product development activities.

Investment Income

Investment income was $0.1 million and $0.2 million for the three months ended September 30, 2019 and 2018. During the three months ended September 30, 2019 and 2018, we invested a portion of our cash in funds holding U.S. treasury securities.

Income Tax Expense/(Benefit)

For the three months ended September 30, 2019, we recognized an income tax expense from continuing operations of $0.3 million, compared to an income tax benefit from continuing operations of $0.6 million for the three months ended September 30, 2018, respectively. The increase in our income tax expense was primarily due to the intraperiod allocation of tax benefit from discontinued operations during the three months ended September 30, 2018.

We regularly evaluate the realizability of our net deferred tax assets based on all available evidence, both positive and negative. The realization of net deferred tax assets is dependent on our ability to generate sufficient future taxable income during periods prior to the expiration of tax attributes to fully utilize these assets. Given our history of operating losses, we have maintained a valuation allowance against our deferred tax asset. However, considering our current assessment of the probability of maintaining profitability, there is a reasonable possibility that, within the next 12 months, sufficient positive evidence may become available to reach a conclusion that a significant portion, or all, of the valuation allowance will no longer be needed. As such, we may release a significant portion, or all, of our valuation allowance against our deferred tax assets within the next 12 months. This release, if any, would result in the recognition of certain deferred tax assets and a decrease to our income tax expense for the period such release is recorded.

Income From Continuing Operations

During the three months ended September 30, 2019, we recognized income from continuing operations before income taxes of $1.6 million compared to $0.7 million for the three months ended September 30, 2018. After tax, our net income from continuing operations was $1.2 million compared to $1.3 million for the three months ended September 30, 2019 and 2018, respectively.

Net Income From Discontinued Operations

For the three months ended September 30, 2018, our net income from discontinued operations of $7.6 million represented the after-tax gain on sale of our optoelectronic components business in addition to the operating results of that business for the period prior to its sale. There were no results from discontinued operations for the three months ended September 30, 2019.

Nine Months Ended September 30, 2019 Compared to Nine Months Ended September 30, 2018

Revenues

	Nine Months Ended September 30,			
	2019	2018	$ Difference	% Difference
Revenues:				
Products and licensing	$ 31,459,323	$ 13,960,003	$ 17,499,320	125%
Technology development	19,576,574	15,418,919	4,157,655	27%
Total revenues	$ 51,035,897	$ 29,378,922	$ 21,656,975	74%

Our Products and Licensing segment included revenues from sales of test and measurement systems, primarily representing sales of our Optical Backscatter Reflectometer, ODiSI, and Optical Vector Analyzer platforms, optical components and sub-assemblies and sales of our Hyperion and Terahertz sensing platforms. Products and Licensing segment revenues for the nine months ended September 30, 2019 increased $17.5 million, or 125%, to $31.5 million compared to $14.0 million for the nine months ended September 30, 2018. The increase for the nine months ended September 30, 2019, compared to the nine months ended September 30, 2018, resulted primarily from $8.1 million of revenues realized from the legacy business of MOI and $7.1 million of revenues realized from the legacy business of GP during the period. Continued growth in sales of our fiber-optic sensing products, including our ODiSI products directed toward the expanding use of composite materials and the need for improved means of testing their structural integrity, and our communications test instruments also contributed to this increase.

Technology Development segment revenues increased $4.2 million, or 27%, to $19.6 million for the nine months ended September 30, 2019, compared to $15.4 million for the nine months ended September 30, 2018. The increase for the nine months ended September 30, 2019 compared to the nine months ended September 30, 2018 continues a growth trend experienced over the past two years largely driven by successes in Phase 2 SBIR awards. The increase was realized primarily in our advanced materials, optical systems, and terahertz research groups. As Phase 2 contracts generally have a performance period of a year or more, we currently expect revenues to remain at a similar level for the near term.

Cost of Revenues and Gross Profit

	Nine Months Ended September 30,			
	2019	2018	$ Difference	% Difference
Cost of revenues:				
Products and licensing	$ 12,357,961	$ 5,381,333	$ 6,976,628	130%
Technology development	13,874,156	11,131,965	2,742,191	25%
Total cost of revenues	26,232,117	16,513,298	9,718,819	59%
Gross profit	$ 24,803,780	$ 12,865,624	$ 11,938,156	93%

Costs of Products and Licensing segment revenues increased $7.0 million, or 130%, to $12.4 million for the nine months ended September 30, 2019, compared to $5.4 million for the nine months ended September 30, 2018. This increase in cost of revenues primarily resulted from $6.2 million of cost of revenues from the legacy businesses of MOI and GP, as well as an increase in sales volume.

Costs of Technology Development segment revenues increased $2.7 million, or 25%, to $13.9 million for the nine months ended September 30, 2019, compared to $11.1 million the nine months ended September 30, 2018. The increase in cost of Technology Development segment revenues was attributable to additional headcount and the increased utilization of third-party analytical services to support the growth in our research contracts and was consistent with the rate of revenue growth for this business segment.

Our overall gross margin for the nine months ended September 30, 2019 increased to 49% compared to 44% for the nine months ended September 30, 2018 primarily as a result of our revenue mix, with Products and Licensing segment revenues representing a larger portion of our total revenues during the nine months ended September 30, 2019.

Operating Expense

	Nine Months Ended September 30,			
	2019	**2018**	**$ Difference**	**% Difference**
Operating expense:				
Selling, general and administrative	$ 17,964,524	$ 9,898,064	$ 8,066,460	81%
Research, development and engineering	5,240,759	2,513,497	2,727,262	109%
Total operating expense	$ 23,205,283	$ 12,411,561	$ 10,793,722	87%

Selling, general and administrative expense increased $8.1 million, or 81%, to $18.0 million for the nine months ended September 30, 2019, compared to $9.9 million for the nine months ended September 30, 2018. Selling, general and administrative expense increased primarily due to $4.9 million of expenses associated with the legacy businesses of MOI and GP for the nine months ended September 30, 2019, in addition to $0.9 million in transaction costs associated with the acquisition of GP, a $0.8 million increase in share-based compensation as a result of new awards, increased audit and legal fees of $0.3 million due to increased company growth, and a $1.0 million increase in expenses related to marketing and additional resources as a result of increased revenue.

Research, development and engineering expense increased $2.7 million, or 109%, to $5.2 million for the nine months ended September 30, 2019, compared to $2.5 million for the nine months ended September 30, 2018 primarily due to $2.2 million of research, development and engineering expenses associated with the legacy businesses of MOI and GP during the nine months ended September 30, 2019 in addition to other engineering expenses of $0.5 million to support new product development activities.

Investment Income

Investment income was $0.3 million for the nine months ended September 30, 2019, compared to $0.4 million for the nine months ended September 30, 2018. During the nine months ended September 30, 2019 and 2018, we invested a portion of our cash in funds holding U.S. treasury securities.

Income Tax Benefit

For the nine months ended September 30, 2019, we recognized an income tax benefit from continuing operations of $1.3 million, compared to $0.7 million for the nine months ended September 30, 2018. The increase in our income tax benefit was primarily due to a reduction in our deferred tax asset valuation allowances as a result of the acquisition of GP.

We regularly evaluate the realizability of our net deferred tax assets based on all available evidence, both positive and negative. The realization of net deferred tax assets is dependent on our ability to generate sufficient future taxable income during periods prior to the expiration of tax attributes to fully utilize these assets. Given our history of operating losses, we have maintained a valuation allowance against our deferred tax asset. However, considering our current assessment of the probability of maintaining profitability, there is a reasonable possibility that, within the next 12 months, sufficient positive evidence may become available to reach a conclusion that a significant portion, or all, of the valuation allowance will no longer be needed. As such, we may release a significant portion, or all, of our valuation allowance against our deferred tax assets within the next 12 months. This release, if any, would result in the recognition of certain deferred tax assets and a decrease to our income tax expense for the period such release is recorded.

Income From Continuing Operations

During the nine months ended September 30, 2019, we recognized income from continuing operations before income taxes of $1.9 million compared to $0.7 million for the nine months ended September 30, 2018. After tax, our net income from continuing operations was $3.2 million for the nine months ended September 30, 2019, compared to income from continuing operations of $1.4 million for the nine months ended September 30, 2018.

Net Income From Discontinued Operations

For the nine months ended September 30, 2018, our net income from discontinued operations of $8.7 million included an after-tax gain of $7.6 million realized on the sale of our optoelectronic components business in addition to income of $1.1 million associated with the operating results of the optoelectronic components business prior to its sale. There were no results from discontinued operations for the nine months ended September 30, 2019.

Liquidity and Capital Resources

At September 30, 2019, our total cash and cash equivalents were $21.4 million.

On October 10, 2019, we entered into an Amended and Restated Loan and Security Agreement (the "Loan Agreement") with Silicon Valley Bank ("SVB"), which amended and restated in its entirety our previous Loan and Security Agreement dated as of February 18, 2010, as amended. Under the Loan Agreement, SVB agreed to make advances available up to $10.0 million (the "Revolving Line"). The Revolving Line terminates on October 10, 2020 unless earlier terminated by us. No amounts have been borrowed under this Loan Agreement.

We believe that our cash balance as of September 30, 2019 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. 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.

Discussion of Cash Flows

Recent Activity

	Nine Months Ended September 30,		
	2019	**2018**	**$ Difference**
Net cash provided by/(used in) operating activities	$ 1,084,960	$ (3,444,408)	$ 4,529,368
Net cash (used in)/provided by investing activities	(19,697,015)	14,227,434	(33,924,449)
Net cash used in financing activities	(2,433,940)	(619,840)	(1,814,100)
Net (decrease)/increase in cash and cash equivalents	$ (21,045,995)	$ 10,163,186	$ (31,209,181)

During the first nine months of 2019, the $1.1 million of net cash provided by operating activities consisted of our net income of $3.2 million, which included non-cash charges for depreciation and amortization of $1.8 million and share-based compensation of $1.1 million, offset by a tax benefit from a partial release of the valuation allowances associated with GP of $1.9 million, and a net cash outflow of $3.2 million from changes in working capital. The changes in working capital included an increase in accounts receivable of $2.2 million, an increase in contract assets of $1.1 million, an increase in other long term assets of $0.3 million, and a decrease in accounts payable and accrued expenses of $0.1 million partially offset by an increase in contract liabilities of $0.7 million.

During the first nine months of 2018, the $3.4 million of net cash used in operating activities consisted of our net income of $10.1 million, which included a gain recognized on the sale of our optoelectronic segment that was sold in July 2018 of $7.6 million in addition to non-cash charges for depreciation and amortization of $0.9 million and share-based compensation of $0.3 million, offset by a net cash outflow of $7.2 million from changes in working capital. The changes in working capital included a reduction in contract liabilities of $1.9 million as a result of the payment of $1.6 million in outstanding claims for excess billed amounts on government research contracts. The changes in working capital also included an increase in accounts receivable of $4.1 million, an increase in contract assets of $1.0 million, and an increase in inventory of $1.0 million, all partially offset by a reduction in other current assets of $0.5 million and an increase in accounts payable and accrued expenses of $0.2 million.

Cash used in investing activities for the nine months ended September 30, 2019 included $19.0 million to acquire the operations of GP, in addition to $0.5 million of fixed asset additions and $0.2 million of capitalized intellectual property costs. Cash provided by investing activities for the nine months ended September 30, 2018 included $14.8 million in proceeds from the sale of our optoelectronic segment partially offset by $0.3 million of fixed asset additions and $0.3 million of capitalized intellectual property costs.

Net cash used in financing activities during the nine months ended September 30, 2019 included long term debt repayments of $0.6 million, compared to $1.4 million of long-term debt repayments during the nine months ended September 30, 2018. During the nine months ended September 30, 2019 we also repurchased $2.2 million of our common stock, including $2.0 million on the open market, compared to $0.5 million of our common stock repurchases during the nine months ended September 30, 2018. During the nine months ended September 30, 2019 we received proceeds from the exercise of options and warrants of $0.4 million, compared to $1.3 million in proceeds received from the exercise of options and warrants during the nine months ended September 30, 2018.

Off-Balance Sheet Arrangements

We have no material off-balance sheet arrangements as defined in Regulation S-K Item 303(a)(4)(ii).

ITEM 3. *QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK*

Market risk represents the risk of loss that may impact our financial position due to adverse changes in financial market prices and rates. 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.

Interest Rate Risk

We do not use derivative financial instruments as a hedge against interest rate fluctuations, and, as a result, interest income earned on our cash and cash equivalents and short-term investments is subject to changes in interest rates. However, we believe that the impact of these fluctuations does not have a material effect on our financial position due to the immediately available liquidity or short-term nature of these financial instruments.

Foreign Currency Exchange Rate Risk

As of September 30, 2019, all payments made under our research contracts have been denominated in U.S. dollars. Our product sales to foreign customers are also generally denominated in U.S. dollars, and we generally do not receive payments in foreign currency. As such, we are not directly exposed to significant currency gains or losses resulting from fluctuations in foreign exchange rates.

ITEM 4. *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 principal executive officer and our principal 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 Quarterly Report. Based on this evaluation, our principal executive officer and our principal financial officer have concluded that, as of September 30, 2019, our disclosure controls and procedures were effective.

Changes in Internal Control over Financial Reporting

No change in our internal control over financial reporting (as defined in Rules 13a-15(f) and 15d-15(f) under the Exchange Act) occurred during the three months ended September 30, 2019 that has materially affected, or is reasonably likely to materially affect, our internal control over financial reporting.

PART II. OTHER INFORMATION

ITEM 1. *LEGAL PROCEEDINGS*

None.

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 SEC 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 GENERALLY

Our technology is subject to a license from Intuitive Surgical, Inc., which is revocable in certain circumstances. Without this license, we cannot continue to market, manufacture or sell 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 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 (except to perform on a development and supply project for Hansen Medical, Inc.), (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 fiber-optic products business, both for our telecom products and our ODiSI sensing 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.

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 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 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.

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 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. For example, the U.S. government may terminate any of our government contracts and, in general, subcontracts, at their convenience, as well as for default based on performance.

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 commercially selling certain products that we develop under our Technology Development segment or related products based on the same core technologies if the U.S. government determines that the commercial availability of those products could pose a risk to national security. For example, certain of our wireless technologies have been classified as secret by the U.S. government and as a result we cannot sell them commercially. Any of these determinations would limit our ability to generate product sales and license revenues.

We rely and will continue to rely on contracts and grants awarded under the SBIR program for a significant portion of our revenues. A finding by the SBA that we no longer qualify to receive SBIR awards could adversely affect our business.

We compete as a small business for some of our government contracts. Our revenues derived from the SBIR program account for a significant portion of our consolidated total revenues, and contract research, including SBIR contracts, will remain a significant portion of our consolidated total revenues for the foreseeable future. For the nine months ended September 30, 2019 and 2018, revenues generated under the SBIR program represented 37% and 39%, respectively, of our total revenues.

We may not continue to qualify to participate in the SBIR program or to receive new SBIR awards from federal agencies. In order to qualify for SBIR contracts and grants, we must meet certain size and ownership eligibility criteria. These eligibility criteria are applied as of the time of the award of a contract or grant. A company can be declared ineligible for a contract award as a result of a size challenge filed with the SBA by a competitor or a federal agency.

In order to be eligible for SBIR contracts and grants, under current SBA rules we must be more than 50% owned and controlled by individuals who are U.S. citizens or permanent resident aliens, and/or other small business concerns (each of which is more than 50% owned and controlled by individuals who are U.S. citizens or permanent resident aliens) or certain qualified investment companies. In the event our institutional ownership significantly increases, either because of increased buying by institutions or selling by individuals, we could lose eligibility for new SBIR contracts and grants.

Also, in order to be eligible for SBIR contracts and grants, the number of our employees, including those of any entities that are considered to be affiliated with us, cannot exceed 500. As of September 30, 2019, we had approximately 266 full-time employees. In determining whether we are affiliated with any other entity, the SBA may analyze whether another entity controls or has the power to control us. Carilion Clinic is our largest institutional stockholder. Since early 2011, a formal size determination by the SBA that focused on whether or not Carilion is or was our affiliate has been outstanding. Although we do not believe that Carilion has or had the power to control our company, we cannot assure you that the SBA will interpret its regulations in our favor on this question. If the SBA were to make a determination that we are or were affiliated with Carilion, we would exceed the size limitations, as Carilion has over 500 employees. In that case, we would lose eligibility for new SBIR contracts and grants and other awards that are set aside for small businesses based on the criterion of number of employees, and the relevant government agency would have the discretion to suspend performance on existing SBIR grants. The loss of our eligibility to receive SBIR awards would have a material adverse impact on our revenues, cash flows and our ability to fund our growth.

Moreover, as our business grows, it is foreseeable that we will eventually exceed the SBIR size limitations, in which case we may be required to seek alternative sources of revenues or capital.

A decline in government research contract awards or government funding for existing or future government research contracts, including SBIR contracts, could adversely affect our revenues, cash flows and ability to fund our growth.

Technology Development segment revenues, which consist primarily of government-funded research, accounted for 38% and 52% of our consolidated total revenues for the nine months ended September 30, 2019 and 2018, respectively. As a result, we are vulnerable to adverse changes in our revenues and cash flows if a significant number of our research contracts and subcontracts were to be simultaneously delayed or canceled for budgetary, performance or other reasons. For example, the U.S. government may cancel these contracts at any time without cause and without penalty or may change its requirements, programs or contract budget, any of which could reduce our revenues and cash flows from U.S. government research contracts. Our revenues and cash flows from U.S. government research contracts and subcontracts could also be reduced by declines or other changes in U.S. defense, homeland security and other federal agency budgets. In addition, we compete as a small business for some of these contracts, and in order to maintain our eligibility to compete as a small business, we, together with any affiliates, must continue to meet size and revenue limitations established by the U.S. government.

Our contract research customer base includes government agencies, corporations and academic institutions. Our customers are not obligated to extend their agreements with us and may elect not to do so. Also, our customers’ priorities regarding funding for certain projects may change and funding resources may no longer be available at previous levels.

In addition to contract cancellations and changes in agency budgets, our future financial results may be adversely affected by curtailment of or restrictions on the U.S. government’s use of contract research providers, including curtailment due to government budget reductions and related fiscal matters or any legislation or resolution limiting the number or amount of awards we may receive. These or other factors could cause U.S. defense and other federal agencies to conduct research internally rather than through commercial research organizations or direct awards to other organizations, to reduce their overall contract research requirements or to exercise their rights to terminate contracts. Alternatively, the U.S. government may discontinue the SBIR program or its funding altogether. Also, SBIR regulations permit increased competition for SBIR awards from companies that may not have previously been eligible, such as those backed by venture capital operating companies, hedge funds and private equity firms. Any of these developments could limit our ability to obtain new contract awards and adversely affect our revenues, cash flows and ability to fund our growth.

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 our board chairman to hold security clearances. In general, the failure for necessary persons to obtain or retain sufficient security clearances, any loss by us of a facility security clearance or any public reprimand related to security matters could result in a U.S. government customer terminating an existing contract or 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, fuel prices 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.

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 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 or 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.

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 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. 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 a history of losses, 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 a history of net losses from operations and only recently began generating positive net income from continuing operations. 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 to become 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 may require additional capital to support and expand our business.

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 become or 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. Furthermore, such financings may jeopardize our ability to apply for SBIR grants or qualify for SBIR contracts or grants, and our dependence on SBIR grants may restrict our ability to raise additional outside capital. 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.

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 are unable to successfully integrate acquired businesses, it could have an adverse effect on our future results and the market price of our common stock.

In the past, we have acquired businesses to support our growth strategy, including the acquisition of General Photonics Corporation in March 2019. In the future, we may continue to seek acquisition targets supporting our growth strategy. The success of an acquisition will depend, in large part, on sales of the acquired company's products and the realization of operating synergies. To realize these anticipated benefits, we must successfully integrate the acquired company's business into our existing business. Such integrations may be complex and time-consuming. The failure to successfully integrate and manage the challenges presented by the integration process may result in our failure to achieve some or all of the anticipated benefits of the acquisition. Potential difficulties that may be encountered in the integration process include the following:

- 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;
- potential unknown liabilities associated with the acquisition; 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. export control regulations and policies that restrict our ability to communicate with non-U.S. employees and supply foreign affiliates and 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;
- having to comply with a variety of U.S. laws, including the Foreign Corrupt Practices Act ("FCPA"); 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.

Recent developments relating to the United Kingdom's referendum vote in favor of withdrawal from the European Union could adversely affect us.

On June 23, 2016, the U.K. held a referendum in which a majority of the eligible members of the electorate voted for the U.K. to leave the EU. The U.K.'s withdrawal from the EU is commonly referred to as Brexit. Pursuant to Article 50 of the Treaty on European Union, the U.K. will cease to be an EU Member State either on the effective date of a withdrawal agreement (entry into such a withdrawal agreement will approval of the U.K. Parliament ("Parliament")) or, failing that, two years following the U.K.'s notification of its intention to leave the EU (the "Brexit Date"), unless the European Council (together with the U.K.) unanimously decides to extend the two year period. On March 29, 2017, the U.K. formally notified the European Council of its intention to leave the EU. It is unclear how long it will take to negotiate a withdrawal agreement, but it appears likely that Brexit will continue to involve a process of lengthy negotiations between the U.K. and EU Member States to determine the future terms of the U.K.'s relationship with the EU. Given that no formal withdrawal arrangements have been agreed, there have been several extensions to the Brexit Date and the U.K. has yet to formally leave the EU. On October 28, 2019, the EU granted the U.K. a further extension to the Brexit Date until January 31, 2020. Under the terms of the extension, the Brexit Date may be earlier than January 31, 2020, if a formal withdrawal agreement is ratified by Parliament. In addition, the U.K. will hold a general election on December 12, 2019. Until the post-election government is formed, there can be no guarantee or certainty as to which form Brexit will take and on which terms a withdrawal agreement with the EU will be agreed, if at all.

The lack of clarity over which EU laws and regulations will continue to be implemented in the U.K. after Brexit (in any form) (including financial laws and regulations, tax and free trade agreements, intellectual property rights, data protection laws, supply chain logistics, environmental, health and safety laws and regulations, immigration laws and employment laws) may negatively impact foreign direct investment in the U.K., increase costs, depress economic activity and restrict access to capital.

The uncertainty concerning the U.K.'s legal, political and economic relationship with the EU after Brexit may be a source of instability in the international markets, create significant currency fluctuations, and/or otherwise adversely affect trading agreements or similar cross-border cooperation arrangements (whether economic, tax, fiscal, legal, regulatory or otherwise) beyond the Brexit Date.

These developments, or the perception that any of them could occur, have had and may continue to have a significant adverse effect on global economic conditions and the stability of global financial markets, and could significantly reduce global market liquidity and limit the ability of key market participants to operate in certain financial markets. In particular, it could also lead to a period of considerable uncertainty in relation to the U.K. financial and banking markets, as well as on the regulatory process in Europe. Asset valuations, currency exchange rates and credit ratings may also be subject to increased market volatility.

If the U.K. and the EU are unable to negotiate acceptable withdrawal terms of if other EU Member States pursue withdrawal, barrier-free access between the U.K. and other EU Member States or among the European Economic Area overall could be diminished or eliminated. The long-term effects of Brexit will depend on any agreements (or lack thereof) between the U.K. and the EU and, in particular, any arrangements for the U.K. to retain access to EU markets either during a transitional period or more permanently.

Such a withdrawal from the EU is unprecedented, and it is unclear how the U.K.'s access to the European single market for goods, capital, services and labor within the EU, or single market, and the wider commercial, legal, regulatory environment, will impact us, and the occurrence of any such event adversely affect our operating results and financial condition.

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 our discontinued 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 including 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 could be negatively affected by a security breach, either through cyber-attack, cyber-intrusion or other significant disruption of our IT networks and related systems.

We face the risk, as does any company, of a security breach, whether through cyber-attack or cyber-intrusion over the internet, malware, computer viruses, attachments to e-mails, persons inside our organization or persons with access to systems inside our organization, or other significant disruption of our IT networks and related systems. The risk of a security breach or disruption, particularly through cyber-attack or cyber-intrusion, including by computer hackers, foreign governments and cyber terrorists, has increased as the number, intensity and sophistication of attempted attacks and intrusions from around the world have increased.

As a technology company, and particularly as a government contractor, we may face a heightened risk of a security breach or disruption from threats to gain unauthorized access to our proprietary, confidential or classified information on our IT networks and related systems. These types of information and IT networks and related systems are critical to the operation of our business and essential to our ability to perform day-to-day operations, and, in some cases, are critical to the operations of certain of our customers. In addition, as certain of our technological capabilities become widely known, it is possible that we may be subjected to cyber-attack or cyber-intrusion as third parties seek to gain improper access to information regarding these capabilities and cyber-attacks or cyber-intrusion could compromise our confidential information or our IT networks and systems generally, as it is not practical as a business matter to isolate all of our confidential information and trade secrets from email and internet access. To date, we have not experienced a significant cyber-intrusion or cyber-attack. There can be no assurance that our security efforts and measures will be effective or that attempted security breaches or disruptions would not be successful or damaging.

A security breach or other significant disruption involving these types of information and IT networks and related systems could disrupt the proper functioning of these networks and systems and therefore our operations, compromise our confidential information and trade secrets, or damage our reputation among our customers and the public generally. Any of these developments could have a negative impact on our results of operations, financial condition and cash flows.

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 the FCPA. The number of our various emerging technologies, the development of many of which has been funded by the Department of Defense, presents us with many regulatory challenges. Failure by us or our sales representatives or consultants to comply with these 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.

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.

Commercial application of nanotechnologies in particular, or technologies involving nanomaterials, is new and the scope and breadth of patent protection is uncertain. Consequently, the patent positions of companies involved in nanotechnologies have not been tested, and there are complex legal and factual questions for which important legal principles will be developed or may remain unresolved. In addition, it is not clear whether such patents will be subject to interpretations or legal doctrines that differ from conventional patent law principles. Changes in either the patent laws or in interpretations of patent laws in the United States and other countries may diminish the value of our nanotechnology-related intellectual property. Accordingly, we cannot predict the breadth of claims that may be allowed or enforced in our nanotechnology-related patents or in third party patents. 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 a federal funding 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 a federal funding 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

The United States Tax Cuts and Jobs Act of 2017 could adversely affect our business and financial condition.

The U.S. Tax Cuts and Jobs Act (the "TCJA") significantly reforms the US Internal Revenue Code. The TCJA, among other things, contains significant changes to U.S. federal corporate income taxation, including reduction of the U.S. federal corporate income tax rate from a top marginal rate of 35% to a flat rate of 21%, limitation of the tax deduction for interest expense to 30% of adjusted earnings (except for certain small businesses), limitation of the deduction for net operating losses to 80% of current year taxable income and elimination of net operating loss carrybacks, immediate deductions for certain new investments instead of deductions for depreciation expense over time, and modifying or repealing many business deductions and credits. Federal net operating losses arising in taxable year ending after December 31, 2017, will be carried forward indefinitely pursuant to the TCJA. We continue to examine the impact this tax reform legislation may have on our business. Notwithstanding the reduction in the corporate income tax rate, the overall impact of the TCJA is uncertain and our business and financial condition could be adversely affected. The impact of this tax reform on holders of our common stock is also uncertain and could be adverse. We urge our stockholders to consult with their legal and tax advisors with respect to such legislation and the potential tax consequences of investing in our common stock.

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.

Carilion Clinic holds more than 5% of our common stock. All of these shares have been registered for sale on a Form S-3 registration statement and, accordingly, may generally be freely sold by Carilion at any time. Any sales of these shares, or the perception that future sales of shares may occur by Carilion or any of our other significant stockholders, may have a material adverse effect on the market price of our 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.

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 $6.90 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;
- changes in our status as an entity eligible to receive SBIR contracts and grants;
- quarterly variations in our or our competitors’ results of operations;

- 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;
- 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.

We will have to implement additional finance and accounting systems, procedures and controls to satisfy additional SEC reporting requirements that we will become subject to in the near future, which will increase our costs and require additional management resources. If we are unable to maintain effective internal control over financial reporting, it could harm investor confidence.

Section 404(a) of the Sarbanes-Oxley Act of 2002 requires us to include an internal control report with our Annual Report on Form 10-K. That report must include management's assessment of the effectiveness of our internal control over financial reporting as of the end of the fiscal year. We evaluate our existing internal control over financial reporting based on the framework issued by the Committee of Sponsoring Organizations of the Treadway Commission. During the course of our ongoing evaluation of the internal controls, we may identify areas requiring improvement, and may have to design enhanced processes and controls to address issues identified through this review. Remedying any deficiencies, significant deficiencies or material weaknesses that we identify may require us to incur significant costs and expend significant time and management resources. We cannot assure you that any of the measures we implement to remedy any such deficiencies will effectively mitigate or remedy such deficiencies. Investors could lose confidence in our financial reports, and our stock price may be adversely affected, if our internal controls over financial reporting are found not to be effective by management or if we make disclosure of existing or potential significant deficiencies or material weaknesses in those controls.

We are currently classified as a non-accelerated filer under SEC regulations. As a non-accelerated filer, we have been exempt from compliance with Section 404(b) of the Sarbanes-Oxley Act of 2002, relating to the attestation and reporting by our external auditing firm on our internal control over financial reporting. As of June 30, 2019, we exceeded the threshold for accelerated filer status and, as a result, we will become an accelerated filer as of the end of 2019. We will be required to comply with Section 404(b) beginning with our Form 10-K for the year ending December 31, 2019 and will be required to incur additional costs, which increased costs could be material to us and affect our results of operations. In addition, this effort will require additional management attention and resources.

Additionally, if we fail to maintain or implement adequate controls, or if our independent registered public accounting firm is unable to provide us with an unqualified report as to the effectiveness of our internal control over financial reporting as of the date of our first Form 10-K for which compliance is required, investors could lose confidence in the reliability of our internal control over financial reporting and in the accuracy of our periodic reports filed under the Exchange Act. A lack of investor confidence in the reliability and accuracy of our public reporting could cause our stock price to decline.

If our internal control over financial reporting is found not to be effective or if we make disclosure of existing or potential material weaknesses in those controls, investors could lose confidence in our financial reports, and our stock price may be adversely affected.

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 new revenue recognition guidance, ASC Topic 606, *Revenue from Contracts with Customers*, requires more judgment than did the prior guidance.

Our financial results may be adversely affected by changes in accounting principles applicable to us.

U.S. GAAP are subject to interpretation by the FASB, the SEC, and other bodies formed to promulgate and interpret appropriate accounting principles. For example, in May 2014, the FASB issued ASC Topic 606, *Revenue from Contracts with Customers*, which supersedes nearly all existing revenue recognition guidance under U.S. GAAP. We adopted this guidance as of January 1, 2018. The most significant impact relates to changing the revenue recognition for custom optoelectronics to an over time method. Before the adoption of this standard, we deferred the recognition of revenue until products were shipped to the customer. Any difficulties in implementing these pronouncements or adequately accounting after adoption could cause us to fail to meet our financial reporting obligations, which could result in regulatory discipline and harm investors' confidence in us.

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.

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

(a) Unregistered Sales of Equity Securities during the Three Months Ended September 30, 2019

Common Stock Dividend Payable to Carilion

We issued 1,321,514 shares of Series A Preferred Stock, par value $0.001 per share, to Carilion Clinic ("Carilion") in January 2010, which shares were issued in reliance on the exemptions from registration under the Securities Act provided by Sections 3(a)(9) and 4 (a)(2) thereof. The Series A Preferred Stock accrued dividends at the rate of $0.2815 per share per annum, payable quarterly in arrears. Accrued dividends were payable in shares of our common stock, with the number of shares being equal to the quotient of (i) the cumulative aggregate balance of accrued but unpaid dividends on each share of Series A Preferred Stock divided by (ii) the conversion price of the Series A Preferred Stock of $4.69159 per share. Per the terms of the Series A Preferred Stock as set forth in the Certificate of Designations, the accrual of dividends ceased as of September 30, 2019, due to our common stock trading price maintaining a level of $5.16 or above for more than 30 consecutive trading days, which was achieved as of September 19, 2019. For the period from January 12, 2010, the original issue date of the Series A Preferred Stock, through September 30, 2019, the Series A Preferred Stock issued to Carilion accrued $1,703,084 in dividends. In September 2019, Carilion elected to convert the Series A Preferred Stock into an equal number of shares of our common stock. In addition, we issued 770,454 shares of our common stock in satisfaction of the accrued dividends earned on the Series A Preferred Stock prior to its conversion. As the Series A Preferred Stock was issued in reliance on the exemption provided by Section 3(a)(9), the shares of common stock issued as dividends were also exempt from registration in reliance on Section 3(a)(9) of the Securities Act.

(b) Use of Proceeds from Sale of Registered Equity Securities

Not applicable.

(c) Purchases of Equity Securities by the Registrant

In August 2019, our board of directors authorized a new stock repurchase program which allowed us to repurchase up to $2.0 million of our common stock through August 29, 2020. As of September 30, 2019, we had repurchased a total of 333,953 shares for an aggregate purchase price of $2.0 million under this new stock repurchase program, and accordingly the program expired.

The following table summarizes repurchases of our common stock during September 2019.

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
9/1/2019 - 9/30/2019	333,953	$ 5.99	333,953	$ —

ITEM 3. *DEFAULTS UPON SENIOR SECURITIES*

None.

ITEM 4. *MINE SAFETY DISCLOSURES*

Not applicable.

ITEM 5. *OTHER INFORMATION*

Not applicable.

ITEM 6. *EXHIBITS*

Exhibit Number	Description
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*	Certification of Principal Financial Officer pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.
101	The following materials from the Registrant's Quarterly Report on Form 10-Q for the three months and nine months ended September 30, 2019, formatted in XBRL (eXtensible Business Reporting Language): (i) Consolidated Balance Sheets at September 30, 2019 and December 31, 2018, (ii) Consolidated Statements of Operations for the three months and nine months ended September 30, 2019 and 2018, (iii) Consolidated Statements of Cash Flows for the nine months ended September 30, 2019 and 2018 and (iv) Notes to Unaudited Consolidated Financial Statements.

* These certifications are being furnished solely to accompany this quarterly 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.

SIGNATURES

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

			Luna Innovations Incorporated
Date:	November 5, 2019	By:	/s/ Dale Messick
			Dale Messick
			Chief Financial Officer **(principal financial and accounting officer and duly authorized officer)**

Exhibit 31.1

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 quarterly report on Form 10-Q 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: November 5, 2019

/s/ Scott A. Graeff

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

Exhibit 31.2

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

I, Dale E. Messick, certify that:

1. I have reviewed this quarterly report on Form 10-Q 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: November 5, 2019

/s/ Dale E. Messick

Dale E. Messick
Chief Financial Officer
(principal financial officer)

Exhibit 32.1

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

In connection with the quarterly report of Luna Innovations Incorporated (the “Company”) on Form 10-Q for the quarter ended September 30, 2019 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)

November 5, 2019

Exhibit 32.2

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

In connection with the quarterly report of Luna Innovations Incorporated (the “Company”) on Form 10-Q for the quarter ended September 30, 2019 as filed with the Securities and Exchange Commission on the date hereof (the “Report”), I, Dale E. Messick, 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/ Dale E. Messick

Dale E. Messick
Chief Financial Officer
(principal financial officer)

November 5, 2019