Lightwave Logic, Inc.
Form 424B3
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Registration No. 333-191296

PROSPECTUS

8,920,154 Shares

Common Stock

This prospectus relates to the sale of up to 8,920,154 shares of our common stock, par value $0.001, which may be offered by the selling shareholder, Lincoln Park Capital Fund, LLC, or Lincoln Park, from time to time. The shares of common stock being offered by the selling shareholder have been or are issuable pursuant to the Purchase Agreement with Lincoln Park dated as of June 6, 2013, which we refer to in this prospectus as the Purchase Agreement. Please refer to the section of this prospectus entitled The Lincoln Park Transactions for a description of the Purchase Agreement and the section entitled Selling Shareholder for additional information on Lincoln Park. Such registration does not mean that Lincoln Park will actually offer or sell the full number of these shares. We will not receive any proceeds from the sales of shares of our common stock by the selling shareholder; however, we may receive proceeds of up to $20,000,000 under the Purchase Agreement.

In consideration for entering into the Purchase Agreement, we issued to Lincoln Park 200,000 shares of our common stock as a commitment fee, and such shares are also being registered hereunder. The prices at which Lincoln Park may sell the shares will be determined by the prevailing market price for the shares or in negotiated transactions.

As of the date of this prospectus, the Company has issued 1,786,920 shares to Lincoln Park under the Purchase Agreement, including the 200,000 initial commitment shares, the sale of 1,563,648 purchase shares and the issuance of 23,272 additional commitment shares, for aggregate proceeds to the Company of $1,514,647, and 1,079,846 of such shares have been sold by Lincoln Park hereunder, with 8,920,154 shares remaining unsold as of the date of this prospectus.

The selling stockholder may sell the shares of common stock described in this prospectus in a number of different ways and at varying prices. See Plan of Distribution for more information about how the selling stockholder may sell the shares of common stock being registered pursuant to this prospectus. The selling stockholder is an underwriter within the meaning of Section 2(a)(11) of the Securities Act of 1933, as amended.

We will pay the expenses incurred in registering the shares, including legal and accounting fees. See Plan of Distribution .

Our common stock is currently quoted on the OTC Markets (OTCQB) under the symbol LWLG . On April 29, 2015, the last reported sale price of our common stock was $0.88 per share.

Investing in our securities involves a high degree of risk. See Risk Factors beginning on page 7 of this prospectus for a discussion of information that should be considered in connection with an investment in our securities.

Neither the Securities and Exchange Commission nor any state securities regulators have approved or disapproved of these securities or determined if this prospectus is truthful or complete. Any representation to the contrary is a criminal offense.

The date of this prospectus is May 6, 2015.

TABLE OF CONTENTS

You should rely only on the information contained in this prospectus. We have not, and the selling shareholder has not, authorized any person to provide you with different information. If anyone provides you with different or inconsistent information, you should not rely on it. This prospectus is not an offer to sell, nor is the selling shareholder seeking an offer to buy, securities in any state where the offer or solicitation is not permitted. The information contained in this prospectus is complete and accurate as of the date on the front cover of this prospectus, but information may have changed since that date. We are responsible for updating this prospectus to ensure that all material information is included and will update this prospectus to the extent required by law.

This prospectus includes statistical and other industry and market data that we obtained from industry publications and research, surveys and studies conducted by third parties. Industry publications and third-party research, surveys and studies generally indicate that their information has been obtained from sources believed to be reliable, although they do not guarantee the accuracy or completeness of such information. While we believe that these industry publications and third-party research, surveys and studies are reliable, we have not independently verified such data and we do not make any representation as to the accuracy of the information.

PROSPECTUS SUMMARY

The items in the following summary are described in more detail later in this prospectus. This summary does not contain all of the information you should consider. Before investing in our securities, you should read the entire prospectus carefully, including the Risk Factors beginning on page 7 and the financial statements and related notes beginning on page F-1.

Overview

We are a development stage, electro-optical device and organic nonlinear materials company. Our primary area of expertise is the chemical synthesis of chromophore dyes used in the development of organic Application Specific Electro-Optic Polymers (ASEOP) and Organic Non-Linear All-Optical Polymers (NLAOP) that have high electro-optic and optical activity. Our family of materials is thermally and photo-chemically stable, which we believe could have utility across a broad range of applications in devices that address markets like, telecommunication, data communications, high-speed computing and photovoltaic cells. Secondarily, the company is developing proprietary electro-optical and all-optical devices utilizing the advanced capabilities of our materials for the application in the fields mentioned above.

Electro-optic devices convert data from electric signals into optical signals for use in communications systems and in optical interconnects for high-speed data transfer. We expect our patented and patent-pending optical materials, when completed and tested, to be the core of the future generations of optical devices, modules, sub-systems and systems that we will develop or be licensed by electro-optic device manufacturers, such as telecommunications component and systems manufacturers, networking and switching suppliers, semiconductor companies, aerospace companies and government agencies.

Our optical polymers (polymers) are property-engineered at the molecular level (nanotechnology level) to meet the exacting thermal, environmental and performance specifications demanded by electro-optic devices. We believe that our patented and patent pending technologies will enable us to design optical polymers that are free from the numerous diverse and inherent flaws that plague competitive polymer technologies employed by other companies and research groups. We engineer our polymers with the intent to have temporal, thermal, chemical and photochemical stability within our patented and patent pending molecular architectures.

Our non-linear all optical polymers have demonstrated resonantly enhanced third-order properties approximately 2,630 times larger than fused silica, which means that they are highly photo-optically active in the absence of an RF layer. In this way they differ from other optical polymers and are considered more advanced next-generation materials.

Our patented and patent pending molecular architectures are based on a well-understood chemical and quantum mechanical occurrence known as aromaticity. Aromaticity provides a high degree of molecular stability. Aromaticity is what will enable our core molecular structures to maintain stability under a broad range of polymerization conditions that otherwise appear to affect other current polymer molecular designs. Polymers, polymer-based devices, hybrid devices and the processes used to create them are often patentable, which can provide the developers of such technology with a significant competitive advantage. We consider our proprietary intellectual property to be unique.

Our Business Development

PSI-TEC Corporation (PSI-TEC) was founded in 1991 and incorporated under the laws of the State of Delaware on September 12, 1995. Dr. Frederick J. Goetz founded PSI-TEC in Upland, Pennsylvania where he established a laboratory with a small amount of private funding. PSI-TEC subsequently moved its operations to laboratory space provided by the U.S. Army on the Aberdeen Proving Grounds in cooperation with a division of the Department of Defense for the advancement of ultra wide-bandwidth satellite telecommunications. Thereafter, PSI-TEC commenced operations of its own organic synthesis and thin-films laboratory in Wilmington, Delaware.

In order to become a non-reporting publicly-traded corporation, in July 2004 PSI-TEC reorganized with Eastern Idaho Internet Services, Inc. (Eastern Idaho) whereby (i) Eastern Idaho changed its name to PSI-TEC Holdings, Inc. (PSI-TEC Holdings); (ii) PSI-TEC Holdings acquired all of the issued and outstanding shares of PSI-TEC stock; (iii) PSI-TEC became PSI-TEC Holdings wholly-owned operating subsidiary; and (iv) PSI-TEC Holdings then sole officer and director resigned, PSI-TEC's nominees were elected to PSI-TEC Holdings board of directors and new management was appointed. For accounting purposes, this acquisition transaction was accounted for as a reverse-acquisition, whereby PSI-TEC was deemed to have purchased PSI-TEC Holdings. As a result, the historical financial statements of PSI-TEC became the historical financial statements of PSI-TEC Holdings.

Immediately prior to the time of the reorganization transaction, Eastern Idaho was a non-reporting development stage company whose stock was traded on the OTC: Pink Sheets. It had no substantive business operations and it was seeking other business opportunities. Eastern Idaho was originally incorporated under the laws of the State of Nevada on June 24, 1997 to operate as an Internet services marketing firm. It was unsuccessful in this venture, and in June 1998 it ceased its operations and sold all of its operating assets.

On October 20, 2006, in order to consolidate the operations of PSI-TEC Holdings, Inc. and PSI-TEC Corp. (PSI-TEC Holdings, Inc.'s wholly owned subsidiary), PSI-TEC Holdings, Inc. and PSI-TEC Corp. merged; and PSI-TEC Holdings, Inc., a Nevada corporation, became the surviving entity and subsequently changed its name to Third-Order Nanotechnologies, Inc. No change of control or domicile occurred as a result of the merger.

On March 10, 2008, Third-order Nanotechnologies, Inc. changed its name to Lightwave Logic, Inc. to better suit its strategic business plan and to facilitate stockholder recognition of the Company and its business.

Unless the context otherwise requires, all references to the Company, we, our or us and other similar terms means Lightwave Logic, Inc., a Nevada corporation.

Corporate Information

Our principal executive office is located at 1831 Lefthand Circle, Suite C, Longmont, CO 80501, and our telephone number is (720) 340-4949. Our website address is www.lightwavelogic.com. No information found on our website is part of this prospectus. Also, this prospectus includes the names of various government agencies and the trade names of other companies. Unless specifically stated otherwise, the use or display by us of such other parties' names and trade names in this prospectus is not intended to and does not imply a relationship with, or endorsement or sponsorship of us by, any of these other parties.

The Offering

Common stock outstanding prior to the offering (1)	58,414,270 shares, including 200,000 initial commitment shares previously issued to Lincoln Park under the Purchase Agreement (and included in this offering).
Common Stock offered by the selling shareholder	Up to 8,920,154 shares, consisting of the 707,074 shares previously issued to Lincoln Park and up to an additional 376,728 shares to be issued to Lincoln Park as additional commitment shares and the remaining shares to be purchased from time to time under the Purchase Agreement.
Common stock to be outstanding after giving effect to the issuance of 8,920,154 shares to Lincoln Park under the Purchase Agreement	67,334,424 shares
Use of proceeds	We will not receive any proceeds from the sale of the shares of common stock by Lincoln Park. However, we may receive up to $20,000,000 from sales of shares under the Purchase Agreement. Any proceeds that we receive from sales to Lincoln Park under the Purchase Agreement will be

	used to further our business plan of expanding our research and development of our polymer materials technologies, commercialize potential optical devices and materials and for general and administrative purposes. See Use of Proceeds .
OTC Markets (OTCQB) symbol	LWLG
Risk factors	This investment involves a high degree of risk. See Risk Factors for a discussion of factors you should consider carefully before making an investment decision.

(1)

The number of shares of our common stock set forth above is based on 58,414,270 shares of common stock outstanding as of April 29, 2015, and excludes:

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options to purchase 6,479,500 shares of our common stock pursuant to our 2007 Employee Stock Plan, of which 5,955,125 have vested as of April 29, 2015, at a weighted average exercise price of $1.14 per share; and

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warrants to purchase an aggregate of 5,220,100 shares of our common stock, of which 5,150,930 have vested as of April 29, 2015, at a weighted average exercise price of $1.11 per share.

The Lincoln Park Transaction

On June 6, 2013, we entered into a purchase agreement with Lincoln Park (referred to herein as the Purchase Agreement) pursuant to which Lincoln Park has agreed to purchase from us up to $20,000,000 of our common stock (subject to certain limitations) from time to time over a 30-month period. Also on June 6, 2013, we entered into a Registration Rights Agreement, or the Registration Rights Agreement, with Lincoln Park, pursuant to which we have filed with the SEC the registration statement (the Existing Registration Statement) that includes this prospectus to register for resale under the Securities Act of 1933, as amended, or the Securities Act, the shares that have been or may be issued to Lincoln Park under the Purchase Agreement. The SEC declared the Existing Registration Statement effective on October 4, 2013.

Other than 200,000 shares of our common stock that we have already issued to Lincoln Park pursuant to the terms of the Purchase Agreement as consideration for its commitment to purchase shares of our common stock under the Purchase Agreement, we did not have the right to make any sales to Lincoln Park under the Purchase Agreement until the SEC had declared effective the Existing Registration Statement. Thereafter, we may, from time to time and at our sole discretion, direct Lincoln Park to purchase shares of our common stock in amounts up to 100,000 shares on any single business day so long as at least one business day has passed since the most recent purchase. We can also accelerate the amount of our common stock to be purchased under certain circumstances to up to 200,000 shares or $500,000 per purchase plus an additional accelerated amount under certain circumstances. Except as described in this prospectus, there are no trading volume requirements or restrictions under the Purchase Agreement, and we will control the timing and amount of any sales of our common stock to Lincoln Park. The purchase price of the shares that may be sold to Lincoln Park under the Purchase Agreement will be based on the market price of our common stock immediately preceding the time of sale as computed under the Purchase Agreement without any fixed discount; provided that in no event will such shares be sold to Lincoln Park when our closing sale price is less than $1.00 per share, subject to adjustment as provided in the Purchase Agreement. The purchase price per share will be equitably adjusted for any reorganization, recapitalization, non-cash dividend, stock split, or other similar transaction occurring during the business days used to compute such price. We may at any time in our sole discretion terminate the Purchase Agreement without fee, penalty or cost upon one business day notice. Lincoln Park may not assign or transfer its rights and obligations under the Purchase Agreement.

As of the date of this prospectus, the Company has issued 1,786,920 shares to Lincoln Park under the Purchase Agreement, including the 200,000 initial commitment shares, the sale of 1,563,648 purchase shares and the issuance of 23,272 additional commitment shares, for aggregate proceeds to the Company of $1,514,647, and 1,079,846 of such shares have been sold by Lincoln Park hereunder, with 8,920,154 shares remaining unsold as of the date of this prospectus.

As of April 29, 2015, there were 58,414,270 shares of our common stock outstanding, of which 54,909,168 shares were held by non-affiliates, excluding the 1,079,846 shares that we have already issued to Lincoln Park under the Purchase Agreement.

Although the Purchase Agreement provides that we may sell up to $20,000,000 of our common stock to Lincoln Park, only 8,920,154 remaining shares of our common stock are being offered under this prospectus, which represents (i) 200,000 shares that we issued to Lincoln Park as a commitment fee, (ii) the 1,563,648 shares issued and sold to Lincoln Park under the Purchase Agreement, (iii) an additional 6,756,506 shares which may be issued to Lincoln Park in the future under the Purchase Agreement and (iv) 400,000 shares that we are required to issue proportionally in the future as an additional commitment fee, including, without limitation, the 23,272 additional commitment shares previously issued to Lincoln Park in connection with the purchase of the 1,563,648 shares by Lincoln Park, if and when we sell shares to Lincoln Park under the Purchase Agreement. If all of the 8,920,154 remaining shares offered by Lincoln Park under this prospectus were issued and outstanding as of April 29, 2015, such shares would represent 15% of the total number of shares of our common stock outstanding and 16% of the total number of outstanding shares held by non-affiliates, in each case as of April 29, 2015. If we elect to issue and sell more than the 8,920,154 remaining shares offered under this prospectus to Lincoln Park, which we have the right, but not the obligation, to do, we must first register for resale under the Securities Act any such additional shares, which could cause additional substantial dilution to our stockholders. The number of shares ultimately offered for resale by Lincoln Park is dependent upon the number of shares we sell to Lincoln Park under the Purchase Agreement.

Issuances of our common stock in this offering will not affect the rights or privileges of our existing stockholders, except that the economic and voting interests of each of our existing stockholders will be diluted as a result of any such issuance. Although the number of shares of common stock that our existing stockholders own will not decrease, the shares owned by our existing stockholders will represent a smaller percentage of our total outstanding shares after any such issuance to Lincoln Park.

Glossary of Select Technology Terms Used Herein

All-optical devices

All-optical devices convert data in the form of input light signals to a secondary light data stream. The future market of all-optical devices and switches is expected to include all-optical transistors.

All-optical transistors

All-optical transistors are devices currently under development that use an input light signal to switch a secondary light signal. All-optical transistors are expected to enable the fabrication of an entirely new generation of high-speed computers that operate on light instead of electricity. We believe that this will significantly improve computation speeds.

Aromaticity

Aromaticity causes an extremely high degree of molecular stability. It is a molecular arrangement wherein atoms combine into a ring or rings and share their electrons among each other. Aromatic compounds are extremely stable because the electronic charge distributes evenly over a great area preventing hostile moieties, such as oxygen and free radicals, from finding an opening to attack.

CLD-1

An electro-optic material based upon unstable polyene molecular architectures. Unlike our own molecular designs, CLD-1 is not a CSC model molecule and exhibits thermal degradation at low temperatures (~250 C) making it less suitable for commercial and military applications.

CSC (Cyclical Surface Conduction) theory

Most charge-transfer dyes (e.g. Disperse Red 1, CLD, FTC) are based upon a polyene architecture wherein the ground state and first excited state differ by the alteration of single and double bonds. CSC model molecules use nitrogenous heterocyclical structures.

Electro-optic devices

Electro-optic devices convert data from electric signals into optical signals for use in communications systems and in optical interconnects for high-speed data transfer.

Electro-optic material

Electro-optic material is the core active ingredient in high-speed fiber-optic telecommunication systems. Electro-optic materials are materials that are engineered at the molecular level. Molecular level engineering is commonly referred to as nanotechnology.

Electro-optic modulators

Electro-optic modulators are electro-optic devices that perform electric-to-optic conversions within the infrastructure of the Internet. Data centers may also benefit from this technology through devices that could significantly increase bandwidth and speed while decreasing costs.

Nanotechnology

Nanotechnology refers to the development of products and production processes at the molecular level, which is a scale smaller than 100 nanometers (a nanometer is one-billionth of a meter).

Nitrogenous heterocyclical structure

A multi-atom molecular ring or combination of rings that contain nitrogen.

Plastics/Polymers

Polymers, also known as plastics, are large carbon-based molecules that bond many small molecules together to form a long chain. Polymer materials can be engineered and optimized using nanotechnology to create a system in which unique surface, electrical, chemical and electro-optic characteristics can be controlled. Materials based on polymers are used in a multitude of industrial and consumer products, from automotive parts to home appliances and furniture, as well as scientific and medical equipment.

Polymerization

Polymerization is a molecular engineering process that provides the environmental and thermal stability necessary for functional electro-optical devices. Polymer materials can be engineered and optimized using nanotechnology to create a system in which unique surface, electrical, chemical and electro-optic characteristics can be controlled.

Thermal Gravimetric Analysis (TGA)

The basic principle in TGA is to measure the mass of a sample as a function of temperature. This, in principle, simple measurement is an important and powerful tool in solid-state chemistry and materials science. The method, for example, can be used to determine water of crystallization, follow degradation of materials, determine reaction kinetics, study oxidation and reduction, or to teach the principles of stoichiometry, formulae and analysis.

Zwitterionic-aromatic push-pull

Most charge-transfer dyes (e.g. Disperse Red 1, CLD, FTC) have an excited state (such as during photonic absorption) wherein a full charge is separated across the molecule. Such a molecule is said to be excited-state zwitterionic. Within such a molecular system the zwitterionic state is unstable and the molecule typically collapses rapidly into its lower dipole ground state. In our patented molecular designs, the excited state is further stabilized by the aromatization of the molecular core. In that aromaticity stabilizes this excited state, it is said to "pull" the molecule into this higher energy state; on the other hand, the unstable zwitterionic state is said to "push" the molecule out of the excited state.

SUMMARY FINANCIAL DATA

The following tables summarize our financial data. We have derived the following summary of our statement of operations data for the years ended December 31, 2014 and 2013 and our balance sheet data as of December 31, 2014 from our audited financial statements appearing later in this prospectus. Our historical results are not necessarily indicative of the results that may be expected in the future. You should read the summary of our financial data set forth below together with our financial statements and the related notes to those statements, as well as Management s Discussion and Analysis of Financial Condition and Results of Operations appearing later in this prospectus.

	Year Ending December 31, 2014	Year Ending December 31, 2013
NET SALES	$ 2,500	$
COST AND EXPENSE		
Research and development	2,849,620	2,068,050
General and administrative	1,546,064	1,632,387
	4,395,684	3,700,437
LOSS FROM OPERATIONS	(4,393,184)	(3,700,437)
OTHER INCOME (EXPENSE)		
Interest income	249	267
Commitment fee and interest expense	(16,862)	(212,156)
NET LOSS	$ (4,409,797)	$ (3,912,326)
Basic and Diluted Loss per Share	$ (0.08)	$ (0.08)
Basic and Diluted Weighted Average Number of Shares	55,637,906	51,672,177

	As of December 31, 2014
Balance Sheet Data:	
Current assets	$ 3,294,167
Property and equipment net	375,227
Other assets	
Intangible assets net	610,029
TOTAL ASSETS	$ 4,279,423

TOTAL LIABILITIES		221,841
TOTAL STOCKHOLDERS' EQUITY		4,057,582
TOTAL LIABILITIES AND STOCKHOLDERS' EQUITY	$	4,279,423

RISK FACTORS

Before you make a decision to invest in our securities, you should consider carefully the risks described below, together with other information in this prospectus. If any of the following events actually occur, our business, operating results, prospects or financial condition could be materially and adversely affected. This could cause the trading price of our common stock to decline and you may lose all or part of your investment. The risks described below are not the only ones that we face. Additional risks not presently known to us or that we currently deem immaterial may also significantly impair our business operations and could result in a complete loss of your investment.

We have incurred substantial operating losses since our inception and will continue to incur substantial operating losses for the foreseeable future.

Since our inception, we have been engaged primarily in the research and development of our electro-optic polymer materials technologies and potential products. As a result of these activities, we incurred significant losses and experienced negative cash flow since our inception. We incurred a net loss of $4,409,797 for the year ended December 31, 2014 and $3,912,326 for the year ended December 31, 2013. We anticipate that we will continue to incur operating losses through at least 2015.

We may not be able to generate significant revenue either through development contracts from the U.S. government or government subcontractors or through customer contracts for our potential products or technologies. We expect to continue to make significant operating and capital expenditures for research and development and to improve and expand production, sales, marketing and administrative systems and processes. As a result, we will need to generate significant additional revenue to achieve profitability. We cannot assure you that we will ever achieve profitability.

Our independent auditors have expressed substantial doubt about our ability to continue as a going concern.

Our independent auditors have included an explanatory paragraph in their audit report issued in connection with our financial statements that states that our ability to continue as a going concern is dependent upon our ability to successfully complete our development program and, ultimately, attain profitable operations, which is dependent upon future events, including obtaining adequate financing to fulfill our development activities. Our financial statements do not include any adjustments that might result from the outcome of these uncertainties. We cannot assure you that we will be able to secure the necessary financing and/or equity investment or achieve an adequate sales level.

We are subject to the risks frequently experienced by early stage companies.

The likelihood of our success must be considered in light of the risks frequently encountered by early stage companies, especially those formed to develop and market new technologies. These risks include our potential inability to:

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Establish product sales and marketing capabilities;

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Establish and maintain markets for our potential products;

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Identify, attract, retain and motivate qualified personnel;

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Continue to develop and upgrade our technologies to keep pace with changes in technology and the growth of markets using polymer based materials;

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Develop expanded product production facilities and outside contractor relationships;

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Maintain our reputation and build trust with customers;

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Scale up from small pilot or prototype quantities to large quantities of product on a consistent basis;

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Contract for or develop the internal skills needed to master large volume production of our products; and

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Fund the capital expenditures required to develop volume production due to the limits of our available financial resources.

If we fail to effectively manage our growth, and effectively transition from our focus on research and development activities to commercially successful products, our business could suffer.

Failure to manage growth of operations could harm our business. To date, a large number of our activities and resources have been directed at the research and development of our technologies and development of potential related products. The transition from a focus on research and development to being a vendor of products requires effective planning and management. Additionally, growth arising from the expected synergies from future acquisitions will require effective planning and management. Future expansion will be expensive and will likely strain management and other resources.

In order to effectively manage growth, we must:

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Continue to develop an effective planning and management process to implement our business strategy;

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Hire, train and integrate new personnel in all areas of our business; and

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Expand our facilities and increase capital investments.

We cannot assure you that we will be able to accomplish these tasks effectively or otherwise effectively manage our growth.

We are entering new markets, and if we fail to accurately predict growth in these new markets, we may suffer substantial losses.

We are devoting significant resources to engineer next-generation organic nonlinear optical materials for future applications to be utilized by electro-optic device manufacturers, such as telecommunications component and systems manufacturers, networking and switching suppliers, semiconductor companies, aerospace companies and government agencies as well as the our proprietary photonic devices. We expect to continue to develop products for these markets and to seek to identify new markets. These markets change rapidly and we cannot assure you that they will grow or that we will be able to accurately forecast market demand, or lack thereof, in time to respond appropriately. Our investment of resources to develop products for these markets may either be insufficient to meet actual demand or result in expenses that are excessive in light of actual sales volumes. Failure to predict growth and demand accurately in new markets may cause us to suffer substantial losses. In addition, as we enter new markets, there is a significant risk that:

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The market may not accept the price and/or performance of our products;

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There may be issued patents we are not aware of that could block our entry into the market or could result in excessive litigation; and

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The time required for us to achieve market acceptance of our products may exceed our capital resources that would require additional investment.

Our plan to develop relationships with strategic partners may not be successful.

Part of our business strategy is to maintain and develop strategic relationships with government agencies, private firms, and academic institutions to conduct research and development of technologies and products. For these efforts to be successful, we must identify partners whose competencies complement ours. We must also successfully enter into agreements with them on terms attractive to us, and integrate and coordinate their resources and capabilities with our own. We may be unsuccessful in entering into agreements with acceptable partners or negotiating favorable terms in these agreements. Also, we may be unsuccessful in integrating the resources or capabilities of these partners. In addition, our strategic partners may prove difficult to work with or less skilled than we originally expected. If we are unsuccessful in our collaborative efforts, our ability to develop and market products could be severely limited.

The failure to establish and maintain collaborative relationships may have a materially adverse affect on our business.

We plan to sell many of our products directly to commercial customers or through potential industry partners. For example, we expect to sell our electro-optic polymer products to electro-optic device manufacturers, such as telecommunications component and systems manufacturers, networking and switching suppliers, semiconductor companies, aerospace companies and government agencies. Our ability to generate revenues depends significantly on the extent to which potential customers and other potential industry partners develop, promote and sell systems that incorporate our products, which, of course, we cannot control. Any failure by potential customers and other potential industry partners to successfully develop and market systems that incorporate our products could adversely affect our sales. The extent to which potential customers and other industry partners develop, promote and sell systems incorporating our products is based on a number of factors that are largely beyond our ability to control.

We may participate in joint ventures that expose us to operational and financial risk.

We may participate in one or more joint ventures for the purpose of assisting us in carrying out our business expansion, especially with respect to new product and/or market development. We may experience with our joint venture partner(s) issues relating to disparate communication, culture, strategy, and resources. Further, our joint venture partner(s) may have economic or business interests or goals that are inconsistent with ours, exercise their rights in a way that prohibits us from acting in a manner which we would like or they may be unable or unwilling to fulfill their obligations under the joint venture or other agreements. We cannot assure you that the actions or decisions of our joint venture partners will not affect our operations in a way that hinders our corporate objectives or reduces any anticipated cost savings or revenue enhancement resulting from these ventures.

If we fail to develop and introduce new or enhanced products on a timely basis, our ability to attract and retain customers could be impaired and our competitive position could be harmed.

We plan to operate in a dynamic environment characterized by rapidly changing technologies and industry standards and technological obsolescence. To compete successfully, we must design, develop, market and sell products that provide increasingly higher levels of performance and reliability and meet the cost expectations of our customers. The introduction of new products by our competitors, the market acceptance of products based on new or alternative technologies, or the emergence of new industry standards could render our anticipated products obsolete. Our failure to anticipate or timely develop products or technologies in response to technological shifts could adversely affect our operations. In particular, we may experience difficulties with product design, manufacturing, marketing or certification that could delay or prevent our development, introduction or marketing of products. If we fail to introduce products that meet the needs of our customers or penetrate new markets in a timely fashion our Company will be adversely affected.

Our future growth will suffer if we do not achieve sufficient market acceptance of our organic nonlinear optical material products or our proprietary photonic devices.

We are developing our organic nonlinear optical material products to be utilized by electro-optic device manufacturers, such as telecommunications component and systems manufacturers, networking and switching suppliers, semiconductor companies, aerospace companies and government agencies as well as the our proprietary photonic devices. All of our potential products are still in the development stage, and we do not know when a market for these products will develop, if at all. Our success depends, in part, upon our ability to gain market acceptance of our products. To be accepted, our products must meet the technical and performance requirements of our potential customers. OEMs, suppliers or government agencies may not accept polymer-based products. In addition, even if we achieve some degree of market acceptance for our potential products in one industry, we may not achieve market acceptance in other industries for which we are developing products.

Achieving market acceptance for our products will require marketing efforts and the expenditure of financial and other resources to create product awareness and demand by customers. We may be unable to offer products that compete effectively due to our limited resources and operating history. Also, certain large corporations may be predisposed against doing business with a company of our limited size and operating history. Failure to achieve broad acceptance of our products by customers and to compete effectively would harm our operating results.

Our potential customers require our products to undergo a lengthy and expensive qualification process, which does not assure product sales.

Prior to purchasing our products, our potential customers require that both our products undergo extensive qualification processes. These qualification processes may continue for several months or more. However, qualification of a product by a customer does not assure any sales of the product to that customer. Even after successful qualification and sales of a product to a customer, a subsequent revision to the product, changes in our customer s manufacturing process or our selection of a new supplier may require a new qualification process, which may result in additional delays. Also, once one of our products is qualified, it could take several additional months or more before a customer commences volume production of components or devices that incorporate our products. Despite these uncertainties, we are devoting substantial resources, including design, engineering, sales, marketing and management efforts, to qualifying our products with customers in anticipation of sales. If we are unsuccessful or delayed in qualifying any of our products with a customer, sales of our products to a customer may be precluded or delayed, which may impede our growth and cause our business to suffer.

Obtaining a sales contract with a potential customer does not guarantee that a potential customer will not decide to cancel or change its product plans, which could cause us to generate no revenue from a product and adversely affect our results of operations.

Even after we secure a sales contract with a potential customer, we may experience delays in generating revenue from our products as a result of a lengthy development cycle that may be required. Potential customers will likely take a considerable amount of time to evaluate our products; it could take 12 to 24 months from early engagement by our sales team to actual product sales. The delays inherent in these lengthy sales cycles increase the risk that a customer will decide to cancel, curtail, reduce or delay its product plans, causing us to lose anticipated sales. In addition, any delay or cancellation of a customer s plans could materially and adversely affect our financial results, as we may have incurred significant expense and generated no revenue. Finally, our customers failure to successfully market and sell their products could reduce demand for our products and materially and adversely affect our business, financial condition and results of operations. If we were unable to generate revenue after incurring substantial expenses to develop any of our products, our business would suffer.

Many of our products will have long sales cycles, which may cause us to expend resources without an acceptable financial return and which makes it difficult to plan our expenses and forecast our revenue.

Many of our products will have long sales cycles that involve numerous steps, including initial customer contacts, specification writing, engineering design, prototype fabrication, pilot testing, regulatory approvals (if needed), sales and marketing and commercial manufacture. During this time, we may expend substantial financial resources and management time and effort without any assurance that product sales will result. The anticipated long sales cycle for some of our products makes it difficult to predict the quarter in which sales may occur. Delays in sales may cause us to expend resources without an acceptable financial return and make it difficult to plan expenses and forecast revenues.

Successful commercialization of our current and future products will require us to maintain a high level of technical expertise.

Technology in our target markets is undergoing rapid change. To succeed in our target markets, we will have to establish and maintain a leadership position in the technology supporting those markets. Accordingly, our success will depend on our ability to:

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Accurately predict the needs of our target customers and develop, in a timely manner, the technology required to support those needs;

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Provide products that are not only technologically sophisticated but are also available at a price acceptable to customers and competitive with comparable products;

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Establish and effectively defend our intellectual property; and

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Enter into relationships with other companies that have developed complementary technology into which our products may be integrated.

We cannot assure you that we will be able to achieve any of these objectives.

Two of our significant target markets are the telecommunications and networking markets, which are subject to slow growth and overcapacity.

Two of our significant target markets are the telecommunications and networking markets, and developments that adversely affect the telecommunications or networking markets, including delays in traffic growth and changes in U.S. government regulation, could slow down, or even halt our efforts to enter into these markets. Reduced spending and technology investment by telecommunications companies may make it more difficult for our products to gain market acceptance. Such companies may be less willing to purchase new technology such as ours or invest in new technology development when they have reduced capital expenditure budgets.

Our inability to successfully acquire and integrate other businesses, assets, products or technologies could harm our business and cause us to fail at achieving our anticipated growth.

It is our intent to continue to grow our business through strategic acquisitions and investments and we are actively evaluating acquisitions and strategic investments in businesses, products or technologies that we believe could complement or expand our product offering, create and/or expand a client base, enhance our technical capabilities or otherwise offer growth or cost-saving opportunities. From time to time, we may enter into letters of intent with companies with which we are negotiating potential acquisitions or investments or as to which we are conducting due diligence. Although we are currently not a party to any binding definitive agreement with respect to potential investments in, or acquisitions of, complementary businesses, products or technologies, we may enter into these types of arrangements in the future, which could materially decrease the amount of our available cash or require us to seek additional equity or debt financing. We have limited experience in successfully acquiring and integrating businesses, products and technologies. We may not be successful in negotiating the terms of any potential acquisition, conducting thorough due diligence, financing the acquisition or effectively integrating the acquired business, product or technology into our existing business and operations. Our due diligence may fail to identify all of the problems, liabilities or other shortcomings or challenges of an acquired business, product or technology, including issues related to intellectual property, product quality or product architecture, regulatory compliance practices, revenue recognition or other accounting practices, or employee or customer issues.

Additionally, in connection with any acquisitions we complete, we may not achieve the synergies or other benefits we expected to achieve, and we may incur write-downs, impairment charges or unforeseen liabilities that could negatively affect our operating results or financial position or could otherwise harm our business. If we finance acquisitions using existing cash, the reduction of our available cash could cause us to face liquidity issues or cause other unanticipated problems in the future. If we finance acquisitions by issuing convertible debt or equity securities, the ownership interest of our existing stockholders may be diluted, which could adversely affect the market price of our stock. Further, contemplating or completing an acquisition and integrating an acquired business, product or technology could divert management and employee time and resources from other matters, which could harm our business, financial condition and operating results.

We will require additional capital to continue to fund our operations and if we do not obtain additional capital, we may be required to substantially limit our operations.

Our business does not presently generate the cash needed to finance our current and anticipated operations. Based on our current operating plan and budgeted cash requirements, we believe that we have sufficient funds to finance our operations through October 2015; however, we will need to obtain additional future financing after that time to finance our operations until such time that we can conduct profitable revenue-generating activities. We expect that we will need to seek additional funding through public or private financings, including equity financings, and through other arrangements, including collaborative arrangements. Poor financial results, unanticipated expenses or unanticipated opportunities could require additional financing sooner than we expect. Other than the Lincoln Park financing transaction (described in the paragraph below), we have no plans or arrangements with respect to the possible acquisition of additional financing, and such financing may be unavailable when we need it or may not be available on acceptable terms.

In June 2013, we entered into a purchase agreement (the Purchase Agreement) with Lincoln Park, under which we may direct Lincoln Park to purchase up to $20,000,000 worth of shares of our registered common stock over a 30-month period. If we make sales of our common stock under the Purchase Agreement, we would be able to fund our operations for a longer period of time. However, the extent to which we will rely on the Purchase Agreement with Lincoln Park as a source of funding will depend on a number of factors, including the prevailing market price of our common stock and the extent to which we are able to secure working capital from other sources. Specifically, Lincoln Park does not have the obligation to purchase any shares of our common stock on any business day that the price of our common stock is less than $1.00 per share.

Our forecast of the period of time through which our financial resources will be adequate to support our operations is a forward-looking statement and involves risks and uncertainties, and actual results could vary as a result of a number of factors, including the factors discussed elsewhere in this annual report. We have based this estimate on assumptions that may prove to be wrong, and we could use our available capital resources sooner than we currently expect.

Additional financing may not be available to us, due to, among other things, our Company not having a sufficient credit history, income stream, profit level, asset base eligible to be collateralized, or market for its securities. If we raise additional funds by issuing equity or convertible debt securities, the percentage ownership of our existing shareholders may be reduced, and these securities may have rights superior to those of our common stock. If adequate funds are not available to satisfy our long-term capital requirements, or if planned revenues are not generated, we may be required to substantially limit our operations.

We may not be able to access the full amounts available under the Purchase Agreement, which could prevent us from accessing the capital we need to continue our operations that could have an adverse affect on our business.

Under the Purchase Agreement, we may direct Lincoln Park to purchase up to $20,000,000 worth of shares of our common stock over a 30-month period. On any trading day selected by us, we may sell shares of common stock to Lincoln Park in amounts up to 100,000 shares per regular sale (Regular Purchases), which may be increased to up to 200,000 shares depending on certain conditions as set forth in the Purchase Agreement, up to the aggregate commitment of $20,000,000. If the market price of our common stock is not below $2.00 per share on the purchase date, then the Regular Purchase amount may be increased to 150,000 shares. If the market price is not below $2.50 per share on the purchase date, then the Regular Purchase amount may be increased to 200,000 shares. Although there are no upper limits on the per share price Lincoln Park may pay to purchase our common stock, the Company may not sell more than $500,000 in shares of common stock to Lincoln Park per Regular Purchase.

In addition to Regular Purchases, we may in our sole discretion direct Lincoln Park on each purchase date to make accelerated purchases on the following business day up to the lesser of (i) two (2) times the number of shares purchased pursuant to such Regular Purchase or (ii) 30% of the trading volume on the accelerated purchase date at a purchase price equal to the lesser of (i) the closing sale price on the accelerated purchase date and (ii) 93% of the accelerated purchase date s volume weighted average price.

The purchase price of the shares related to the Purchase Agreement will be based on the prevailing market prices of the Company s shares of common stock, which shall be equal to the lesser of the lowest sale price of the common shares during the purchase date and the average of the three (3) lowest closing sale prices of the common shares during the twelve (12) business days prior to the purchase date without any fixed discount. However, Lincoln Park shall not have the right or the obligation to purchase any shares of our common stock pursuant to a Regular Purchase on a purchase date where the closing sale price on the purchase date is below $1.00. To the extent that the closing sale price of our common stock is below $1.00 per share on a purchase date, we would not receive any proceeds under the Purchase Agreement for that day.

Depending on the prevailing market price of our common stock, we may not be able to sell shares to Lincoln Park for the maximum $20,000,000 over the term of the Purchase Agreement. In addition, we only registered up to 10,000,000 shares of our common stock in connection with the Purchase Agreement, which includes 200,000 shares previously issued to Lincoln Park as initial commitment shares. As of the date of this prospectus, the Company has issued 1,786,920 shares to Lincoln Park under the Purchase Agreement, including the 200,000 initial commitment shares, the sale of 1,563,648 purchase shares and the issuance of 23,272 additional commitment shares, for aggregate proceeds to the Company of $1,514,647, and 1,079,846 of such shares have been sold by Lincoln Park hereunder, with 8,920,154 shares remaining unsold as of the date of this prospectus.

Assuming a purchase price of $1.00 per share, which is the minimum purchase price at which shares can be sold under the Purchase Agreement, and the issuance to Lincoln Park of 9,800,000 additional shares under the Purchase Agreement, which would be comprised of 9,400,000 shares purchased at $1.00 per share and 400,000 shares issued as additional pro rata commitment shares for no additional consideration, the proceeds to us would only be $9,400,000. In the event we elect to issue more than 9,800,000 shares, we would be required to file a new registration statement and have it declared effective by the SEC.

The sale of shares of our common stock to Lincoln Park under the Purchase Agreement may cause substantial dilution to our existing stockholders and could cause the price of our common stock to decline.

Under the Purchase Agreement, we may sell to Lincoln Park, from time to time and under certain circumstances, up to $20,000,000 of our common stock over approximately 30 months commencing in October 2013. Generally, with respect to the Purchase Agreement, we have the right, but no obligation, to direct Lincoln Park to periodically purchase up to $20,000,000 of our common stock in specific amounts under certain conditions, which periodic purchase amounts can be increased under specified circumstances.

We also agreed to issue to Lincoln Park up to an aggregate of 600,000 shares of common stock as a fee for Lincoln Park s commitment to purchase our shares under the Purchase Agreement. Of these commitment shares, we issued 200,000 shares upon entering into the Purchase Agreement. The remaining 400,000 commitment shares are issuable to Lincoln Park on a pro rata basis as additional purchases are made under the Purchase Agreement.

Depending upon market liquidity at the time, sales of shares of our common stock to Lincoln Park may cause the trading price of our common stock to decline. Lincoln Park may ultimately purchase all, some or none of the $20,000,000 of common stock under the Purchase Agreement, and after it has acquired shares, Lincoln Park may sell all, some or none of those shares. Therefore, sales to Lincoln Park by us could result in substantial dilution to the interests of other holders of our common stock. The sale of a substantial number of shares of our common stock to Lincoln Park, or the anticipation of such sales, could make it more difficult for us to sell equity or equity-related securities in the future at a time and at a price that we might otherwise wish to effect sales. However, we have the right to control the timing and amount of any sales of our shares to Lincoln Park, and the Purchase Agreement may be terminated by us at any time at our discretion without any cost to us.

The exercise of options and warrants and other issuances of shares of common stock or securities convertible into common stock will dilute your interest.

As of December 31, 2014, we have outstanding options and warrants to purchase an aggregate of 11,819,600 shares of our common stock at exercise prices ranging from $0.63 - $1.75 per share with a weighted average exercise price of $1.15 per share. The exercise of options and warrants at prices below the market price of our common stock could adversely affect the price of shares of our common stock. Additional dilution may result from the issuance of shares of our capital stock in connection with any collaboration (although none are contemplated at this time) or in connection with other financing efforts, including pursuant to the Purchase Agreement with Lincoln Park.

Any issuance of our common stock that is not made solely to then-existing stockholders proportionate to their interests, such as in the case of a stock dividend or stock split, will result in dilution to each stockholder by reducing his, her or its percentage ownership of the total outstanding shares. Moreover, if we issue options or warrants to purchase our common stock in the future and those options or warrants are exercised or we issue restricted stock, stockholders may experience further dilution. Holders of shares of our common stock have no preemptive rights that entitle them to purchase their pro rata share of any offering of shares of any class or series.

We may incur debt in the future that might be secured with our intellectual property as collateral, which could subject our Company to the risk of loss of all of our intellectual property.

If we incur debt in the future, we may be required to secure the debt with our intellectual property, including all of our patents and patents pending. In the event we default on the debt, we could incur the loss of all of our intellectual property, which would materially and adversely affect our Company and cause you to lose your entire investment in our Company.

Our quarter-to-quarter performance may vary substantially, and this variance, as well as general market conditions, may cause our stock price to fluctuate greatly and even potentially expose us to litigation.

We have generated no sales to date and we cannot accurately estimate future quarterly revenue and operating expenses based on historical performance. Our quarterly operating results may vary significantly based on many factors, including:

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Fluctuating demand for our potential products and technologies;

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Announcements or implementation by our competitors of technological innovations or new products;

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Amount and timing of our costs related to our marketing efforts or other initiatives;

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The status of particular development programs and the timing of performance under specific development agreements;

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Timing and amounts relating to the expansion of our operations;

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Product shortages requiring suppliers to allocate minimum quantities;

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Announcements or implementation by our competitors of technological innovations or new products;

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The status of particular development programs and the timing of performance under specific development agreements;

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Our ability to enter into, renegotiate or renew key agreements;

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Timing and amounts relating to the expansion of our operations;

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Costs related to possible future acquisitions of technologies or businesses; or

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Economic conditions specific to our industry, as well as general economic conditions.

Our current and future expense estimates are based, in large part, on estimates of future revenue, which is difficult to predict. We expect to continue to make significant operating and capital expenditures in the area of research and development and to invest in and expand production, sales, marketing and administrative systems and processes. We may be unable to, or may elect not to, adjust spending quickly enough to offset any unexpected revenue shortfall. If our increased expenses were not accompanied by increased revenue in the same quarter, our quarterly operating results would be harmed.

Our failure to compete successfully could harm our business.

The markets that we are targeting for our organic nonlinear optical material technology are intensely competitive. Most of our present and potential competitors have or may have substantially greater research and product development capabilities, financial, scientific, marketing, manufacturing and human resources, name recognition and experience than we have. As a result, these competitors may:

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Succeed in developing products that are equal to or superior to our potential products or that will achieve greater market acceptance than our potential products;

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Devote greater resources to developing, marketing or selling their products;

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Respond more quickly to new or emerging technologies or scientific advances and changes in customer requirements, which could render our technologies or potential products obsolete;

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Introduce products that make the continued development of our potential products uneconomical;

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Obtain patents that block or otherwise inhibit our ability to develop and commercialize our potential products;

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Withstand price competition more successfully than we can;

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Establish cooperative relationships among themselves or with third parties that enhance their ability to address the needs of our prospective customers.

The failure to compete successfully against these existing or future competitors could harm our business.

We may be unable to obtain effective intellectual property protection for our potential products and technology.

Our intellectual property, or any intellectual property that we have or may acquire, license or develop in the future, may not provide meaningful competitive advantages. Our patents and patent applications, including those we license, may be challenged by competitors, and the rights granted under such patents or patent applications may not provide meaningful proprietary protection. For example, numerous patents held by third parties relate to polymer materials and electro-optic devices. These patents could be used as a basis to challenge the validity or limit the scope of our patents or patent applications. A successful challenge to the validity or limitation of the scope of our patents or patent applications could limit our ability to commercialize our polymer materials technology and, consequently, reduce our revenues.

Moreover, competitors may infringe our patents or those that we license, or successfully avoid these patents through design innovation. To combat infringement or unauthorized use, we may need to resort to litigation, which can be expensive and time-consuming and may not succeed in protecting our proprietary rights. In addition, in an infringement proceeding a court may decide that our patents or other intellectual property rights are not valid or are unenforceable, or may refuse to stop the other party from using the intellectual property at issue on the ground that it is non-infringing. Policing unauthorized use of our intellectual property is difficult and expensive, and we may not be able to, or have the resources to, prevent misappropriation of our proprietary rights, particularly in countries where the laws may not protect these rights as fully as the laws of the United States.

We also rely on the law of trade secrets to protect unpatented technology and know-how. We try to protect this technology and know-how by limiting access to those employees, contractors and strategic partners with a need to know this information and by entering into confidentiality agreements with these parties. Any of these parties could breach the agreements and disclose our trade secrets or confidential information to our competitors, or these competitors might learn of the information in other ways. Disclosure of any trade secret not protected by a patent could materially harm our business.

We may be subject to patent infringement claims, which could result in substantial costs and liability and prevent us from commercializing our potential products.

Third parties may claim that our potential products or related technologies infringe their patents. Any patent infringement claims brought against us may cause us to incur significant expenses, divert the attention of our management and key personnel from other business concerns and, if successfully asserted against us, require us to pay substantial damages. In addition, as a result of a patent infringement suit, we may be forced to stop or delay developing, manufacturing or selling potential products that are claimed to infringe a patent covering a third party's intellectual property unless that party grants us rights to use its intellectual property. We may be unable to obtain these rights on terms acceptable to us, if at all. Even if we are able to obtain rights to a third party's patented intellectual property, these rights may be non-exclusive, and therefore our competitors may obtain access to the same intellectual property. Ultimately, we may be unable to commercialize our potential products or may have to cease some of our business operations as a result of patent infringement claims, which could severely harm our business.

If our potential products infringe the intellectual property rights of others, we may be required to indemnify customers for any damages they suffer. Third parties may assert infringement claims against our current or potential customers. These claims may require us to initiate or defend protracted and costly litigation on behalf of customers, regardless of the merits of these claims. If any of these claims succeed, we may be forced to pay damages on behalf of these customers or may be required to obtain licenses for the products they use. If we cannot obtain all necessary licenses on commercially reasonable terms, we may be unable to continue selling such products.

Our technology may be subject to government rights and retained research institution rights.

We may have obligations to government agencies or universities in connection with the technology that we have developed, including the right to require that a compulsory license be granted to one or more third parties selected by certain government agencies. In addition, academic research partners often retain certain rights, including the right to use the technology for noncommercial academic and research use, to publish general scientific findings from research related to the technology, and to make customary scientific and scholarly disclosures of information relating to the technology. It is difficult to monitor whether our partners will limit their use of the technology to these uses, and we could incur substantial expenses to enforce our rights to our licensed technology in the event of misuse.

The loss of certain of our key personnel, or any inability to attract and retain additional personnel, could impair our ability to attain our business objectives.

Our future success depends to a significant extent on the continued service of our key management personnel, particularly Thomas E. Zelibor, our Chief Executive Officer and James S. Marcelli our President and Chief Operating Officer. Accordingly, the loss of the services of either of these persons would adversely affect our business and our ability to timely commercialize our products, and impede the attainment of our business objectives.

Our future success will also depend on our ability to attract, retain and motivate highly skilled personnel to assist us with product development and commercialization. Competition for highly educated qualified personnel in the polymer industry is intense. If we fail to hire and retain a sufficient number of qualified management, engineering, sales and technical personnel, we will not be able to attain our business objectives.

If we fail to develop and maintain the quality of our manufacturing processes, our operating results would be harmed.

The manufacture of our potential products is a multi-stage process that requires the use of high-quality materials and advanced manufacturing technologies. Also, polymer-related device development and manufacturing must occur in a highly controlled, clean environment to minimize particles and other yield and quality-limiting contaminants. In spite of stringent quality controls, weaknesses in process control or minute impurities in materials may cause a substantial percentage of a product in a lot to be defective. If we are not able to develop and continue to improve on our manufacturing processes or to maintain stringent quality controls, or if contamination problems arise, our operating results would be harmed.

The complexity of our anticipated products may lead to errors, defects and bugs, which could result in the necessity to redesign products and could negatively, impact our reputation with customers.

Products as complex as those we intend to market might contain errors, defects and bugs when first introduced or as new versions are released. Delivery of products with production defects or reliability, quality or compatibility problems could significantly delay or hinder market acceptance of our products or result in a costly recall and could damage our reputation and adversely affect our ability to sell our products. If our products experience defects, we may need to undertake a redesign of the product, a process that may result in significant additional expenses.

We may also be required to make significant expenditures of capital and resources to resolve such problems. There is no assurance that problems will not be found in new products after commencement of commercial production, despite testing by us, our suppliers, and our customers.

If we decide to make commercial quantities of products at our facilities, we will be required to make significant capital expenditures to increase capacity.

We lack the internal ability to manufacture products at a level beyond the stage of early commercial introduction. To the extent we do not have an outside vendor to manufacture our products, we will have to increase our internal production capacity and we will be required to expand our existing facilities or to lease new facilities or to acquire entities with additional production capacities. These activities would require us to make significant capital investments and may require us to seek additional equity or debt financing. We cannot assure you that such financing would be available to us when needed on acceptable terms, or at all. Further, we cannot assure you that any increased demand for our potential products would continue for a sufficient period of time to recoup our capital investments associated with increasing our internal production capacity.

In addition, we do not have experience manufacturing our potential products in large quantities. In the event of significant demand for our potential products, large-scale production might prove more difficult or costly than we anticipate and lead to quality control issues and production delays.

We may not be able to manufacture products at competitive prices.

To date, we have produced limited quantities of products for research, development, demonstration and prototype purposes. The cost per unit for these products currently exceeds the price at which we could expect to profitably sell them. If we cannot substantially lower our cost of production as we move into sales of products in commercial quantities, our financial results will be harmed.

We conduct significantly all of our research and development activities at a limited number of facilities, and circumstances beyond our control may result in considerable interruptions.

We conduct significantly all of our research and development activities at a limited number of facilities. A disaster such as a fire, flood or severe storm at or near one of our facilities could prevent us from further developing our technologies or manufacturing our potential products, which would harm our business.

We are subject to regulatory compliance related to our operations.

We are subject to various U.S. governmental regulations related to occupational safety and health, labor and business practices. Failure to comply with current or future regulations could result in the imposition of substantial fines, suspension of production, alterations of our production processes, cessation of operations, or other actions, which could harm our business.

We may be unable to export our potential products or technology to other countries, convey information about our technology to citizens of other countries or sell certain products commercially, if the products or

technology are subject to United States export or other regulations.

We are developing certain polymer-based products that we believe the United States government and other governments may be interested in using for military and information gathering or antiterrorism activities. United States government export regulations may restrict us from selling or exporting these potential products into other countries, exporting our technology to those countries, conveying information about our technology to citizens of other countries or selling these potential products to commercial customers. We may be unable to obtain export licenses for products or technology if necessary. We currently cannot assess whether national security concerns would affect our potential products and, if so, what procedures and policies we would have to adopt to comply with applicable existing or future regulations.

We may incur liability arising from the use of hazardous materials.

Our business and our facilities are subject to a number of federal, state and local laws and regulations relating to the generation, handling, treatment, storage and disposal of certain toxic or hazardous materials and waste products that we use or generate in our operations. Many of these environmental laws and regulations subject current or previous owners or occupiers of land to liability for the costs of investigation, removal or remediation of hazardous materials. In addition, these laws and regulations typically impose liability regardless of whether the owner or occupier knew of, or was responsible for, the presence of any hazardous materials and regardless of whether the actions that led to the presence were taken in compliance with the law. In our business, we use hazardous materials that are stored on site. We use various chemicals in our manufacturing process that may be toxic and covered by various environmental controls. An unaffiliated waste hauler transports the waste created by use of these materials off-site. Many environmental laws and regulations require generators of waste to take remedial actions at an off-site disposal location even if the disposal was conducted lawfully. The requirements of these laws and regulations are complex, change frequently and could become more stringent in the future. Failure to comply with current or future environmental laws and regulations could result in the imposition of substantial fines, suspension of production, alteration of our production processes, cessation of operations or other actions, which could severely harm our business.

A material weakness in internal controls may remain undetected for a longer period because of our Company's exemption from the auditor attestation requirements under Section 404(b) of Sarbanes-Oxley.

Our annual report does not include an attestation report of the Company s independent registered public accounting firm regarding internal control over financial reporting. Management s report was not subject to attestation by the Company s registered public accounting firm pursuant to rules of the Securities and Exchange Commission that permit the Company to provide only management s attestation in this annual report. As a result, a material weakness in our internal controls may remain undetected for a longer period.

Shares Eligible for Future Sale May Adversely Affect the Market.

From time to time, certain of the Company s shareholders may be eligible to sell all or some of their shares of common stock by means of ordinary brokerage transactions in the open market pursuant to Rule 144, promulgated under the Securities Act, subject to certain limitations. In general, a non-affiliate stockholder who has satisfied a six-month holding period may, under certain circumstances, sell its shares, without limitation. Any substantial sale of the Company s common stock pursuant to Rule 144 or pursuant to any resale prospectus may have a material adverse effect on the market price of our common stock.

There Is A Limited Market For Our Common Stock, Which May Make It More Difficult For You To Sell Your Stock.

Our Company s common stock is quoted on the OTC Market (OTCQB) under the symbol "LWLG." The trading market for our common stock is limited, accordingly, there can be no assurance as to the liquidity of any markets that may develop for our common stock, your ability to sell our common stock, or the prices at which you may be able to sell our common stock.

We are subject to the penny stock rules and brokers cannot generally solicit the purchase of our common stock, which adversely affects its liquidity and market price.

The SEC has adopted regulations that generally define penny stock to be an equity security that has a market price of less than $5.00 per share, subject to specific exemptions. The market price of our common stock on the over-the-counter market has been substantially less than $5.00 per share and therefore we are currently considered a penny stock according to SEC rules. This designation requires any broker-dealer selling these securities to disclose certain information concerning the transaction, obtain a written agreement from the purchaser and determine that the purchaser is reasonably suitable to purchase the securities. These rules limit the ability of broker-dealers to solicit purchases of our common stock and therefore reduce the liquidity of the public market for our shares.

Our Company s Stock Price May Be Volatile.

The market price of our Company s common stock is likely to be highly volatile and could fluctuate widely in price in response to various factors, many of which are beyond our control, including:

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Technological innovations or new products and services by our Company or our competitors;

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Additions or departures of key personnel;

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Sales of our Company s common stock;

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Our Company s ability to integrate operations, technology, products and services;

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Our Company s ability to execute our business plan;

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Operating results below expectations;

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Loss of any strategic relationship;

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Industry developments

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Economic and other external factors; and

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Period-to-period fluctuations in our Company s financial results.

Because we have a limited operating history, you may consider any one of these factors to be material. Our stock price may fluctuate widely as a result of any of the above listed factors.

In addition, the securities markets have from time to time experienced significant price and volume fluctuations that are unrelated to the operating performance of particular companies. These market fluctuations may also materially and adversely affect the market price of our Company s common stock.

SPECIAL NOTE REGARDING FORWARD-LOOKING STATEMENTS

This prospectus contains forward-looking statements that involve substantial risks and uncertainties. The forward-looking statements are contained principally in the sections entitled Prospectus Summary , Risk Factors , Management s Discussion and Analysis of Financial Condition and Results of Operations and Business but are also contained elsewhere in this prospectus. In some cases, you can identify forward-looking statements by the words may , might , will , could , would , should , expect , intend , plan , objective , anticipate , believe , estimat potential , continue and ongoing, or the negative of these terms, or other comparable terminology intended to identify statements about the future. These statements involve known and unknown risks, uncertainties and other factors that may cause our actual results, levels of activity, performance or achievements to be materially different from the information expressed or implied by these forward-looking statements. Although we believe that we have a reasonable basis for each forward-looking statement contained in this prospectus, we caution you that these statements are based on a combination of facts and factors currently known by us and our expectations of the future, about which we cannot be certain. Forward-looking statements include, but are not limited to, statements about:

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lack of available funding;

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general economic and business conditions;

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competition from third parties;

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intellectual property rights of third parties;

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regulatory constraints;

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changes in technology and methods of marketing;

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Delays in completing various engineering and manufacturing programs;

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changes in customer order patterns;

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changes in product mix;

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success in technological advances and delivering technological innovations;

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shortages in components;

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production delays due to performance quality issues with outsourced components;

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other risks to which our Company is subject; and

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other factors beyond the Company's control.

In addition, you should refer to the Risk Factors section of this prospectus for a discussion of other important factors that may cause our actual results to differ materially from those expressed or implied by our forward-looking statements. As a result of these factors, we cannot assure you that the forward-looking statements in this prospectus will prove to be accurate or that we will achieve the plans, intentions or expectations expressed or implied in our forward-looking statements. Furthermore, if our forward-looking statements prove to be inaccurate, the inaccuracy may be material. In light of the significant uncertainties in these forward-looking statements, you should not regard these statements as a representation or warranty by us or any other person that we will achieve our objectives and plans in any specified time frame, or at all. Any forward-looking statements we make in this prospectus speak only as of its date, and we undertake no obligation to publicly update any forward-looking statements, whether as a result of new information, future events or otherwise, except as required by law.

You should read this prospectus and the documents that we reference in this prospectus and have filed as exhibits to the registration statement, of which this prospectus is a part, completely and with the understanding that our actual future results may be materially different from what we expect. We qualify all of our forward-looking statements by these cautionary statements.

USE OF PROCEEDS

This prospectus relates to shares of our common stock that may be offered and sold from time to time by Lincoln Park. We will not receive any proceeds upon the sale of shares by Lincoln Park. However, we may receive proceeds of up to $20,000,000 under the Purchase Agreement with Lincoln Park, subject to the terms and conditions of the Purchase Agreement.

As of the date of this prospectus, the Company has issued 1,786,920 shares to Lincoln Park under the Purchase Agreement, including the 600,000 initial commitment shares, the sale of 1,563,648 purchase shares and the issuance of 23,272 additional commitment shares, for aggregate proceeds to the Company of $1,514,647, and 1,079,846 of such shares have been sold by Lincoln Park hereunder, with 8,920,154 shares remaining unsold as of the date of this prospectus.

We will retain broad discretion in determining how we will allocate the proceeds from any sales to Lincoln Park. However, any proceeds that we receive from sales to Lincoln Park under the Purchase Agreement will be used to further our business plan of expanding our research and development of our polymer materials technologies, commercialize potential optical devices and materials and for general and administrative purposes.

Although we have no specific plans for use of proceeds as of the date of this prospectus, we believe that approximately 65% of any proceeds received may be used towards our research and development efforts which may include, without limitation, (a) retaining additional management, sales, marketing, technical and other staff to our workforce, (b) expanding our research and development facilities, including the purchase of additional laboratory and production equipment, (c) marketing our future products as they are introduced into the marketplace, (d) developing and maintaining collaborative relationships with strategic partners, (e) developing and improving our manufacturing processes and quality controls, and approximately 35% of any proceeds received may used for increasing our general and administrative activities related to our operations as a reporting public company and related corporate compliance requirements.

CAPITALIZATION

The following table sets forth our cash and cash equivalents and our capitalization as of December 31, 2014:

Cash and cash equivalents	$ 3,165,940
Stockholders equity:	
Preferred stock, $0.001 par value, 1,000,000 shares authorized, no shares issued or outstanding	
Common stock, $0.001 par value, 100,000,000 shares authorized, 58,381,854 issued and outstanding	58,382
Additional paid-in-capital	40,753,189
Accumulated deficit	(36,753,989)
Total stockholders equity	4,057,582
Total capitalization	$ 4,279,423

The number of shares of common stock outstanding in the table above excludes, as of December 31, 2014 (a) 6,212,000 shares of our common stock issuable upon the exercise of outstanding options and (b) 5,607,600 shares of our common stock issuable upon the exercise of outstanding warrants, with a weighted average exercise price of $1.15 per share.

MARKET FOR COMMON EQUITY AND RELATED SHAREHOLDER MATTERS

Market Information

Our common stock is traded on the OTCQB under the symbol LWLG . The following table set forth below lists the range of high and low bids for our common stock for our two most recent fiscal years. The prices in the table reflect inter-dealer prices, without retail markup, markdown or commission and may not represent actual transactions or a liquid trading market.

		High	Low
2013	1st Quarter	$ 1.65	$ 0.83
	2nd Quarter	$ 1.55	$ 0.83
	3rd Quarter	$ 0.94	$ 0.74
	4th Quarter	$ 1.11	$ 0.69
2014	1st Quarter	$ 1.03	$ 0.68
	2nd Quarter	$ 0.94	$ 0.70
	3rd Quarter	$ 1.19	$ 0.87
	4th Quarter	$ 0.91	$ 0.74

As of March 31, 2015, we have a total of 58,414,270 shares of common stock outstanding, held by approximately 122 record shareholders. We do not have any shares of preferred stock outstanding.

Dividends

No cash dividends have been declared or paid on our common stock to date. No restrictions limit our ability to pay dividends on our common stock. The payment of cash dividends in the future, if any, will be contingent upon our Company's revenues and earnings, if any, capital requirements and general financial condition. The payment of any dividends is within the discretion of our board of directors. Our board of director's present intention is to retain all earnings, if any, for use in our business operations and, accordingly, the board of directors does not anticipate paying any cash dividends in the foreseeable future.

Securities Authorized for Issuance under Equity Compensation Plans

Equity Compensation Plans as of December 31, 2014

Equity Compensation Plan Information

Plan category	Number of securities to be issued upon exercise of outstanding options, warrants and rights (a)	Weighted-average exercise price of outstanding options, warrants and rights (b)	Number of securities remaining available for future issuance under equity compensation plans (excluding securities reflected in column (a)) (c)
Equity compensation plans approved by security holders (1)	6,212,000	$1.15	2,544,100
Equity compensation plans not approved by security holders (2)	5,607,600	$1.15	0
Total	11,819,600	$1.15	2,544,100

1.

Reflects our 2007 Employee Stock Plan for the benefit of our directors, officers, employees and consultants. We have reserved 10,000,000 shares of common stock for such persons pursuant to that plan.

2.

Comprised of common stock purchase warrants we issued for services.

Penny Stock Regulations and Restrictions on Marketability

The SEC has adopted rules that regulate broker-dealer practices in connection with transactions in penny stocks. Penny stocks are generally equity securities with a market price of less than $5.00, other than securities registered on certain national securities exchanges or quoted on the NASDAQ system, provided that current price and volume information with respect to transactions in such securities is provided by the exchange or system. The penny stock rules require a broker-dealer, prior to a transaction in a penny stock, to deliver a standardized risk disclosure document prepared by the SEC, that: (a) contains a description of the nature and level of risk in the market for penny stocks in both public offerings and secondary trading; (b) contains a description of the broker's or dealer's duties to the customer and of the rights and remedies available to the customer with respect to a violation of such duties or other requirements of the securities laws; (c) contains a brief, clear, narrative description of a dealer market, including bid and ask prices for penny stocks and the significance of the spread between the bid and ask price; (d) contains a toll-free telephone number for inquiries on disciplinary actions; (e) defines significant terms in the disclosure document or in the conduct of trading in penny stocks; and (f) contains such other information and is in such form, including language, type size and format, as the SEC shall require by rule or regulation.

The broker-dealer also must provide, prior to effecting any transaction in a penny stock, the customer with (a) bid and offer quotations for the penny stock; (b) the compensation of the broker-dealer and its salesperson in the transaction; (c) the number of shares to which such bid and ask prices apply, or other comparable information relating to the depth and liquidity of the market for such stock; and (d) a monthly account statement showing the market value of each penny stock held in the customer's account.

In addition, the penny stock rules require that prior to a transaction in a penny stock not otherwise exempt from those rules, the broker-dealer must make a special written determination that the penny stock is a suitable investment for the purchaser and receive the purchaser's written acknowledgment of the receipt of a risk disclosure statement, a written agreement as to transactions involving penny stocks, and a signed and dated copy of a written suitability statement.

These disclosure requirements may have the effect of reducing the trading activity for our common stock. Therefore, stockholders may have difficulty selling our securities.

Recent Sales of Unregistered Securities

The Company made the following securities issuances without registering the securities under the Securities Act:

Securities Issued for Cash

Fiscal Year Ended December 31, 2012:

January 2012

	Warrant Exercise	250,000 shares of common stock at $.65 per share for aggregate proceeds of $162,500.
January 2012	Warrant Exercise	40,000 shares of common stock at $1.25 per share for aggregate proceeds of $50,000.
February 2012	Warrant Exercise	20,000 shares of common stock at $.34 per share for aggregate proceeds of $6,900.
April 2012	Warrant Exercise	400,000 shares of common stock at $.25 per share for aggregate proceeds of $100,000.
April 2012	Warrant Exercise	500,000 shares of common stock at $.25 per share for aggregate proceeds of $125,000.

Fiscal Year Ending December 31, 2013:

March 2013	Warrant Exercise -	12,500 shares of common stock purchased at $1.25 for proceeds of $15,625.
June 2013	Warrant Exercise	20,000 shares of common stock purchased at $0.345 for proceeds of $6,900.

Fiscal Year Ending December 31, 2014:

January 2014	Common Stock 10,000 shares of common stock at $0.25 per share pursuant to an option exercise for total proceeds of $2,500.
March 2014	Common Stock 250,000 shares of common stock at $0.345 per share pursuant to a warrant exercise for total proceeds of $86,250.
May 2014	Common Stock 25,000 shares of common stock at $0.34 per share pursuant to an option exercise for total proceeds of $8,500.
June 2014	Common Stock 164,000 shares of common stock at $0.345 per share pursuant to a warrant exercise for total proceeds of $56,580.
June August 2014	Units - 4,207,600 shares of common stock and warrants to purchase 4,207,600 shares of common stock contained in units for total proceeds of $3,140,000.

Securities Issued For Services

Fiscal Year Ended December 31, 2012:

February 2012	Common Stock - 1,406 shares of common stock at $1.14 per share for services.
March 2012	Warrant - 10,000 shares of common stock at $1.69 per share for services.
May 2012	Warrant - 100,000 shares of common stock at $1.20 per share for services.
December 2012	Warrant - 125,000 shares of common stock at $0.93 per share for services.

Fiscal Year Ended December 31, 2013:

March 2013	Option grant - 75,000 shares of common stock at $1.16 per share issued for services. The option was valued at $81,076 using the Black-Scholes Option Pricing Formula.
May 2013	Option grant 10,000 shares of common stock at $1.03 per share issued for services. The option was valued at $9,574 using the Black-Scholes Option Pricing Formula.
May 2013	Option grant 100,000 shares of common stock at $1.00 per share issued for services. The option was valued at $80,824 using the Black-Scholes Option Pricing Formula.
June 2013	Common Stock 200,000 shares of common stock for services valued at $170,000.
July 2013	Warrant - 100,000 shares of common stock at $0.90 per share for services.

Fiscal Year Ended December 31, 2014:

January 2014	Warrant	right to buy 100,000 shares of common stock at $0.715 per share.
March 2014	Warrant	right to buy 100,000 shares of common stock at $0.92 per share.
June 2014	Common Stock	2,371 shares of common stock at $0.84 per share.
July 2014	Common Stock	2,081 shares of common stock at $0.96 per share.
July 2014	Warrant	100,000 shares of common stock at $0.95 per share.
August 2014	Common Stock	1,897 shares of common stock at $1.05 per share.
September 2014	Common Stock	2,121 shares of common stock at $0.94 per share.

October 2014	Common Stock	2,408 shares of common stock at $0.83 per share.
November 2014	Common Stock	2,322 shares of common stock at $0.86 per share.
November 2014	Common Stock	6,250 shares of common stock at $0.87 per share.
December 2014	Common Stock	6,250 shares of common stock at $0.81 per share.
December 2014	Common Stock	2,487 shares of common stock at $0.80 per share.

Securities Issued Pursuant to our 2007 Employee Stock Plan

Fiscal Year Ended December 31, 2012:

March 2012	Stock options - 100,000 shares of common stock at $1.69 per share.
March 2012	Stock options - 25,000 shares of common stock at $1.69 per share.
May 2012	Stock options - 500,000 shares of common stock at $1.30 per share.
June 2012	Stock options 200,000 shares of common stock at $0.90 per share.
August 2012	Stock options - 100,000 shares of common stock at $0.925 per share.
August 2012	Stock options - 50,000 shares of common stock at $0.93 per share.

Fiscal Year Ending December 31, 2013:

March 2013	Stock options - 75,000 shares of common stock at $1.16 per share.

May 2013	Stock options - 10,000 shares of common stock at $1.03 per share.
May 2013	Stock options - 100,000 shares of common stock at $1.00 per share.
August 2013	Stock options 50,000 shares of common stock to a Director at $0.84 per share.
October 2013	Stock options - 200,000 shares of common stock at $0.93 per share.

Fiscal Year Ended December 31, 2014:

January 2014	Stock Options	200,000 shares of common stock at $0.715 per share.
March 2014	Stock Options	350,000 shares of common stock at $0.92 per share.
May 2014	Stock Options	200,000 shares of common stock at $0.763 per share.

No underwriters were utilized and no commissions or fees were paid with respect to any of the above transactions. These persons were the only offerees in connection with these transactions. We relied on Section 4(a)(2) and Rule 506 of Regulation D of the Securities Act since the transaction does not involve any public offering.

DILUTION

Investors who purchase our common stock will be diluted to the extent of the difference between the public offering price per share of our common stock and the pro forma as adjusted net tangible book value per share of our common stock immediately after this offering. Net tangible book value per share is determined by dividing our total tangible assets less total liabilities by the number of outstanding shares of our common stock. As of December 31, 2014, we had a net tangible book value of $3,447,553, or approximately $0.0591 per share of common stock.

Dilution in net tangible book value per share represents the difference between the amount per share paid by purchasers of common stock in this offering, assuming a purchase price of $1.00 per share, which is the minimum purchase price at which shares can be sold under the Purchase Agreement, and the pro forma as adjusted net tangible book value per share of common stock immediately after the completion of this offering. Of the 8,920,154 shares being offered hereunder, 200,000 shares were previously issued to Lincoln Park as an initial commitment fee, 1,563,648 shares were issued and sold to Lincoln Park under the Purchase Agreement and 23,272 additional shares have been issued as an additional commitment fee. Therefore, after giving effect to our assumed receipt of approximately $7,170,308 in estimated net proceeds from the issuance of 8,920,154 additional shares of common stock under the Purchase Agreement and registered in this offering (assuming a purchase price of $1.00 per share and the issuance of 376,728 additional commitment shares for no additional cash consideration, offering expenses of $70,000, and assuming all such sales and issuances were made on December 31, 2014), our pro forma as adjusted net tangible book value as of December 31, 2014 would have been approximately $10,617,861, or $0.1609 per share. This would represent an immediate increase in the net tangible book value of $0.1018 per share to existing shareholders attributable to this offering. The following table illustrates this per share dilution:

Assumed public offering price per share of common stock (minimum allowed price)	$	1.00
As adjusted net tangible book value per share as of December 31, 2013		0.0591
Increase in as adjusted net tangible book value per share attributable to this offering		0.1018
Pro forma net tangible book value per share after this offering		0.1609
Dilution per share to new investors	$	0.8391

To the extent that we sell more or less than $20,000,000 worth of shares under the Purchase Agreement, or to the extent that some or all sales are made at prices in excess of the minimum allowable purchase price of $1.00 per share, then the dilution reflected in the table above will differ. The above table is based on 58,381,854 shares of our common stock outstanding as of December 31, 2014, adjusted for the assumed sale of $7,240,308 in shares to Lincoln Park under the Purchase Agreement at the assumed minimum purchase price described above. In addition, the calculations in the foregoing table do not take into account, as of December 31, 2014:

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6,212,000 shares of our common stock issuable upon the exercise of outstanding options; and

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5,607,600 shares of our common stock issuable upon the exercise of outstanding warrants, with a weighted average exercise price of $1.15 per share.

To the extent that options or warrants are exercised, new options are issued under our equity benefit plans, or we issue additional shares of common stock in the future, there may be further dilution to investors participating in this offering. In addition, we may choose to raise additional capital because of market conditions or strategic considerations, even if we believe that we have sufficient funds for our current or future operating plans. If we raise additional capital through the sale of equity or convertible debt securities, the issuance of these securities could result in further dilution to our shareholders.

SELECTED FINANCIAL DATA

You should read the following selected financial data together with Management s Discussion and Analysis of Financial Condition and Results of Operations and our financial statements and accompanying notes included later in this prospectus. The selected financial data in this section is not intended to replace our financial statements and the accompanying notes.

We have derived the selected statement of operations data for the years ended December 31, 2014 and 2013 and the selected balance sheet data as of December 31, 2014 and 2013 from our audited financial statements that are included in this prospectus. We have derived the statement of operations data for the years ended December 31, 2012, 2011 and 2010 and the selected balance sheet data as of December 31, 2012, 2011 and 2010 from our audited financial statements that are not included in this prospectus.

Our historical results are not necessarily indicative of the results to be expected in any future period.

	2014	2013	2012	2011	2010
Statement of Operations Data:					
NET SALES	$ 2,500	$	$	$	$ 3,200
COST AND EXPENSE					
Research and development	2,849,620	2,068,050	2,489,747	1,682,557	1,709,171
General and administrative	1,546,064	1,632,387	1,936,417	1,633,786	2,006,900
LOSS FROM OPERATIONS	(4,393,184)	(3,700,437)	(4,426,164)	(3,316,343)	(3,712,871)
OTHER INCOME (EXPENSE)	(16,862)	(212,156)	(130,374)	(166,279)	(361)
NET LOSS	$ (4,409,797)	$ (3,912,326)	$ (4,556,538)	$ (3,482,622)	$ (3,713,232)
Basic and Diluted Loss per Share	$ (0.08)	$ (0.08)	$ (0.09)	$ (0.08)	$ (0.09)
Basic and Diluted Weighted Average Number of Shares	55,637,906	51,672,177	48,778,783	44,386,149	42,253,450

	2014	2013	2012	2011	2010
Balance Sheet Data:					
Current assets	$ 3,294,167	$ 2,402,908	$ 3,026,854	$ 401,580	$ 1,028,056
Property and equipment - net	375,227	298,360	300,994	88,751	97,568
Other assets					
Intangible assets - net	610,029	543,540	488,526	431,104	346,009
TOTAL ASSETS	$ 4,279,423	$ 3,244,808	$ 3,816,374	$ 921,435	$ 1,471,633

TOTAL LIABILITIES		221,841		122,176		155,328		238,426		116,012
TOTAL STOCKHOLDERS' EQUITY		4,057,582		3,122,632		3,661,046		683,009		1,355,621
TOTAL LIABILITIES AND STOCKHOLDERS' EQUITY	$	4,279,423	$	3,244,808	$	3,816,374	$	921,435	$	1,471,633

MANAGEMENT S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS

The following management's discussion and analysis of financial condition and results of operations provides information that management believes is relevant to an assessment and understanding of our plans and financial condition. The following selected financial information is derived from our historical financial statements and should be read in conjunction with such financial statements and notes thereto set forth elsewhere herein and the "Forward-Looking Statements" explanation included herein.

Overview

We are a development stage, electro-optical device and organic nonlinear materials company. Our primary area of expertise is the chemical synthesis of chromophore dyes used in the development of organic Application Specific Electro-Optic Polymers (ASEOP) and organic Non-Linear All-Optical Polymers (NLAOP) that have high electro-optic and optical activity. Our family of materials are thermally and photo-chemically stable, which we believe could have utility across a broad range of applications in devices that address markets like, telecommunication, data communications, high-speed computing and photovoltaic cells. Secondarily, our Company is developing proprietary electro-optical and all-optical devices utilizing the advanced capabilities of our materials for the application in the fields mentioned above.

Electro-optic devices convert data from electric signals into optical signals for use in communications systems and in optical interconnects for high-speed data transfer. We expect our patented and patent-pending optical materials (chromophores), when combined with selected polymers to make ASEOP and NLAOP material systems and when completed and tested, to be the core of the future generations of optical devices, modules, sub-systems and systems that we will develop or be licensed by electro-optic device manufacturers, such as telecommunications component and systems manufacturers, networking and switching suppliers, semiconductor companies, aerospace companies and government agencies.

Our ASEOP material systems are property-engineered at the molecular level (nanotechnology level) to meet the exacting thermal, environmental and performance specifications demanded by electro-optic devices. We believe that our patented and patent pending technologies will enable us to design polymer based material systems that are free from the numerous diverse and inherent flaws that plague competitive polymer technologies employed by other companies and research groups. We engineer our polymer based material systems with the intent to have temporal, thermal, chemical and photochemical stability within our patented and patent pending molecular chromophore architectures.

Our non-linear all optical NLAOP material systems have demonstrated resonantly enhanced third-order properties approximately 2,630 times larger than fused silica, which means that they are highly photo-optically active in the absence of an RF circuit. In this way they differ from other polymer technologies and are considered more advanced next-generation materials.

Our revenue model relies substantially on the assumption that we will be able to successfully develop our polymer based material systems and photonic device products, which will use our polymer based material systems, for applications within the industries named below. When appropriate, we intend to create specific materials for each of these applications and use our proprietary knowledge base to continue to enhance its discoveries.

- cloud computing and data centers
- telecommunications/data communications
- backplane optical interconnects
- photovoltaic cells
- medical applications
- satellite reconnaissance
- navigation systems
- radar applications
- optical filters
- special light modulators
- all-optical switches

To be successful, we must, among other things:

- Develop and maintain collaborative relationships with strategic partners;
- Continue to expand our research and development efforts for our products;
- Develop and continue to improve on our manufacturing processes and maintain stringent quality controls;
- Produce commercial quantities of our products at commercially acceptable prices;
- Rapidly respond to technological advancements;
- Attract, retain and motivate qualified personnel; and
- Obtain and retain effective intellectual property protection for our products and technology.

We believe that Moore's Law (a principle which states the number of transistors on a silicon chip doubles approximately every eighteen months) will create markets for our high-performance electro-optic materials and photonic device products.

Plan of Operation

Since inception, we have been engaged primarily in the research and development of our polymer based material systems and photonic device products. We are devoting significant resources to engineer next-generation polymer based material systems for future applications to be utilized by electro-optic device manufacturers, such as telecommunications component and systems manufacturers, networking and switching suppliers, semiconductor companies, aerospace companies, government agencies and internal device development. We expect to continue to develop products that we intend to introduce to these rapidly changing markets and to seek to identify new markets. We expect to continue to make significant operating and capital expenditures for research and development activities.

As we move from a development stage company to a product supplier, we expect that our financial condition and results of operations will undergo substantial change. In particular, we expect to record both revenue and expense from product sales, to incur increased costs for sales and marketing and to increase general and administrative expense. Accordingly, the financial condition and results of operations reflected in our historical financial statements are not expected to be indicative of our future financial condition and results of operations.

Some of our more significant milestones that we achieved during 2014 include:

In January 2014 we created a new methodology to combine multiple chromophores into a single polymer host that will significantly improve their ability to generate more powerful organic, nonlinear electro-optical polymer systems.

The new synthetic chemistry process can enable multiple chromophores (dyes) to work in concert with each other within a single polymer host. This proprietary process has created two new material systems, which have demonstrated outstanding electro-optic values. In addition, we now have a significant amount of data on the thermal aging of our materials. We have demonstrated that our materials can withstand considerably more than 500 hours at 110 degrees C with little to no change in electro-optic activity in our materials, which is a significant milestone. To our knowledge, this is something that has not occurred before in any polymer. We are also concurrently coating prototype waveguides with our proprietary material system.

In February 2014 we received our first purchase order for our advanced organic nonlinear electro-optic polymer from Boulder Nonlinear Systems (BNS) of Boulder, Colorado in connection with the development of a next generation LADAR system. A LADAR system is a radar system that utilizes a pulse laser to calculate the distance to a target, but is also capable of rendering a 3-D image. In the event BNS continues to move forward with the development of this LADAR system, we expect to receive additional purchase orders from BNS.

In March 2014 we began the process of manufacturing an advanced design Silicon Organic Hybrid Transceiver prototype and we released the completed chip design to the OpSIS Center at the University of Delaware who produced initial silicon chips, which were delivered to us in December 2014 and January 2015. We are currently qualifying and testing these chips for utilization in our Silicon Organic Hybrid Transceiver. The initial application will target inter-data center interconnections of more than 10 kilometers. Our next design will utilize a different frequency and address the current bottleneck in the rack-to-server layer.

In April 2014 we entered into a sole worldwide license agreement with Corning Incorporated enabling us to integrate Corning's organic electro-optical chromophores into our portfolio of electro-optic polymer materials. The agreement allows us to use the licensed patents within a defined license field that includes communications, computing, power, and power storage applications utilizing the nonlinear optical properties of their materials. As a result of obtaining this license agreement, we created a new powerful and durable nonlinear organic electro-optical material that will be used in photonic device development and is based on our new multi-chromophore approach that allows two or more chromophores to work in concert. This multi-chromophore system has achieved a 50% increase in chromophore concentration, leading to higher electro-optical activity when compared to an equivalent single chromophore system. Repeated, multi-point measurements multi-chromophore system shows approximately twice the electro-optic effect of Lithium Niobate with excellent durability.

In August 2014 the University of Colorado successfully fabricated and tested a bleached electro-optic waveguide modulator designed and fabricated through a sponsored collaborative research agreement. The results of this initial bleached waveguide modulator correlated well with previous electro-optic thin film properties. These initial results of our first in-house device are significant to our entire device program and are an important starting point for modulators that are being developed for target markets. We have multiple generations of new materials that we will soon be optimizing for this specific design.

In October 2014 we submitted an order with Reynard Corporation to produce gold-layered fused silica substrates for our bleached waveguide modulators to be coated with several of our organic electro-optical polymers, which we received in early November and performance tested throughout December. Upon completion of our side-by-side comparative testing of our organic polymers versus duplicate silicon photonic devices, we will coat the gold-layered fused silica substrates with our proprietary polymers and begin to produce working demonstration prototype devices that we will use to present to potential customers and development partners. The bleached waveguide modulator represents our first commercially viable device, and targets metro networks (< 10Km) within large scale telecommunications and data communications networks and represents approximately a $300MM per year market opportunity for us.

In December 2014 we subjected several blends of materials created by our multi-chromophore process to thermal aging tests that included lengthy exposure to high temperatures (85C and 110C) for 300 hours. The data collected indicated minimal loss of electro-optical activity (R33), even after over 500 hours at 110C. Extrapolated internal aging calculations indicated that our organic polymers are expected to provide decades of operational performance. These results exceed previously published efforts for other organic polymers.

We ultimately intend to use our next-generation electro-optic polymer material systems and non-linear all-optical polymer material systems for future applications vital to the following industries. We expect to create specific materials for each of these applications as appropriate:

- Cloud computing and data centers
- Telecommunications/data communications
- Backplane optical interconnects
- Photovoltaic cells
- Medical applications
- Satellite reconnaissance
- Navigation systems
- Radar applications
- Optical filters
- Special light modulators
- All-optical switches

In an effort to maximize our future revenue stream from our electro-optic polymer material systems and non-linear all-optical polymer material systems, our business model anticipates that our revenue stream will be derived from one or some combination of the following: (i) technology licensing for specific product applications; (ii) joint venture relationships with significant industry leaders; or (iii) the production and direct sale of our own photonic device components. Our objective is to be a leading provider of proprietary technology and know-how in the photonic device markets. In order to meet this objective, subject to successful testing of our technology and having available financial resources, we intend to:

- Develop electro-optic polymer material systems and non-linear all-optical polymer material systems and photonic devices
- Continue to develop proprietary intellectual property
- Streamline our product development process
- Develop a comprehensive marketing plan
- Maintain/develop strategic relationships with government agencies, private firms, and academic institutions
- Continue to attract and retain high level science and technology personnel to our Company

Our Proprietary Products in Development

As part of a two-pronged marketing strategy, our Company is developing several devices, which are in various stages of development that utilize our organic nonlinear optical materials.

They include:

- Bleached waveguide modulator
- Slot waveguide modulator
- Spatial light modulator
- 100 Gbps telecommunications modulator
- 200 Gbps datacomm/telecomm photonic transceiver
- Integrated photonic system

Additionally, we must continue to create and maintain an infrastructure, including operational and financial systems, and related internal controls, and recruit qualified personnel. Failure to do so could adversely affect our ability to support our operations.

Capital Requirements

As a development stage company, we do not generate revenues. We have incurred substantial net losses since inception. We have satisfied our capital requirements since inception primarily through the issuance and sale of our common stock. During 2014 we received $4,329,978 in cash proceeds from the issuance and sale of our common stock.

Results of Operations

Comparison of fiscal 2014 to fiscal 2013

Revenues

As a development stage company, we had revenues of $2,500 during the year ended December 31, 2014 and $0 for the year ending December 31, 2013. The Company is in various stages of material and photonic device development and evaluation with potential customers and strategic partners. We expect the next revenue stream to be in sale of prototype devices, product development agreements, electro-optic polymer materials and non-linear all-optical polymer materials prior to moving into production.

Operating Expenses

Our operating expenses were $4,395,684 and $3,700,437 for the years ended December 31, 2014 and 2013, respectively, for an increase of $695,247. This increase in operating expenses was due primarily to increases in research and development salaries and wages, laboratory electro-optic device prototype, development and outsourced testing expenses, laboratory materials and supplies, research and development non-cash stock option and warrant amortization, license fees, professional fees and consulting expenses, rent and utility expenses, depreciation, office expenses, software expense, annual shareholder meeting expense, human resource support and 401(k) Plan processing fees, moving expenses and accounting fees offset by decreases in general and administrative non-cash amortization of options and warrants, travel and lodging expenses and legal expenses.

Included in our operating expenses for the year ended December 31, 2014 was $2,849,620 for research and development expenses compared to $2,068,050 for the year ended December 31, 2013, for an increase of $781,570. This is primarily due to increases in research and development salaries and wages, laboratory electro-optic devices prototype, development and outsourced testing expenses, laboratory materials and supplies, research and development non-cash stock option and warrant amortization, license fees, consulting expense, rent and depreciation.

Research and development expenses currently consist primarily of compensation for employees engaged in internal research, product and application development activities; laboratory operations, internal and outsourced material and device testing and prototype electro-optic device design, development and processing work; costs; and related operating expenses.

We expect to continue to incur substantial research and development expense to develop and commercialize our electro-optic material platform. These expenses will increase as a result of accelerated development effort to support commercialization of our non-linear optical polymer materials technology; outsourcing work to build device prototypes; expanding and equipping in-house laboratories; hiring additional technical and support personnel; engaging a senior technical advisor; pursuing other potential business opportunities and collaborations; customer testing and evaluation; and incurring related operating expenses.

Wages and salaries and benefits increased $123,751 from $769,377 for the year ended December 31, 2013 to $893,128 for the year ended December 31, 2014 primarily due to additional employees hired to perform in-house material development, testing and device design and development.

Laboratory material testing expense and electro-optic device development increased $169,194 from $357,337 for the year ended December 31, 2013 to $526,531 for the year ended December 31, 2014. Laboratory materials and supplies also increased $60,186 from $80,753 for the year ended December 31, 2013 to $140,939 for the year ended December 31, 2014.

Non-cash stock compensation and stock option and warrant amortization increased $295,994 from $454,735 for the year ended December 31, 2013 to $750,729 for the year ended December 31, 2014.

License fees increased $30,000 to $30,000 for the year ended December 31, 2014 from $0 for the year ended December 31, 2013 for the license fee paid to Corning in accordance with a license agreement.

Consulting expenses increased $32,786 from $39,048 for the year ended December 31, 2013 to $71,834 for the year ended December 31, 2014.

Rent expense increased $31,665 from $77,994 for the year ended December 31, 2013 to $109,659 for the year ended December 31, 2014 due to the lease of the new Colorado corporate office, optical lab facility and clean room.

Depreciation expense increased $19,874 from $110,624 for the year ended December 31, 2013 to $130,498 for the year ended December 31, 2014 primarily due to the additional equipment purchased for the Company s Delaware and Colorado laboratory facilities.

General and administrative expense consists primarily of compensation and support costs for management staff, and for other general and administrative costs, including executive, sales and marketing, investor relations, accounting and finance, legal, consulting and other operating expenses.

General and administrative expenses decreased $86,323 to $1,546,064 for the year ended December 31, 2014 from $1,632,387 for the year ended December 31, 2013. The decrease is due primarily to decreases in general and administrative non-cash amortization of options and warrants, travel expenses and legal fees offset by increases in office expenses, software expense, professional fees, annual shareholder meeting expense, human resource support and 401(k) Plan processing fees, general and administrative moving expenses, rent and utility expenses and accounting fees.

Legal fees decreased $13,362 to $180,057 for the year ended December 31, 2014 from $193,419 for the year ended December 31, 2013.

Travel expenses were $61,826 and $95,406 for the year ended December 31, 2014 and December 31, 2013, respectively. The decrease of $33,580 was primarily due to the relocation of the Company s headquarter and optical lab to Colorado.

Non-cash stock compensation and stock option amortization decreased $133,335 from $356,013 for the year ended December 31, 2013 to $222,678 for the year ended December 31, 2014.

Accounting fees were $99,453 and $89,590 in 2014 and 2013, respectively, for an increase of $9,863.

Office expenses including administrative and receptionist expenses increased $28,393 from $10,599 for the year ended December 31, 2013 to $38,992 for the year ended December 31, 2014 for expenses related to the Company s new headquarter in Colorado.

Software expenses increased $4,246 from $11,900 for the year ended December 31, 2013 to $16,146 for the year ended December 31, 2014 primarily for the implementation during the second quarter of 2013, of an employee stock option software program for interactive option exercises by employees and directors under the 2007 Employee Stock Plan.

Professional fees increased $19,904 from $7,661 for the year ended December 31, 2013 to $27,565 for the year ended December 31, 2014.

Expenses for the annual shareholder meeting increased $7,730 from $29,580 for the year ended December 31, 2013 to $37,310 for the year ended December 31, 2014.

Human resource support and 401(k) Plan processing fees increased $11,622 from $3,367 for the year period ended December 31, 2013 to $14,989 for the year period ended December 31, 2014 for the increased human resource support and 401(k) Plan support.

Moving expenses incurred during the year ending December 31, 2014, for the move of the Company s corporate office to the new headquarter facility in Colorado were $8,306.

Rent and utility expenses increased $8,720 for the year ended December 31, 2013 to $24,320 for the year ended December 31, 2014 primarily for the expenses of the new headquarter facility in Colorado.

We expect general and administrative expense to increase in future periods as we increase the level of corporate and administrative activity, including increases associated with our operation as a public company; and significantly increase expenditures related to the future production and sales of our products.

Other Income (Expense)

Other income (expense) decreased $195,294 to ($16,862) for the year ending December 31, 2014 from ($212,156) for the year ending December 31, 2013, relating primarily to the commitment fee associated with the purchase of shares by an institutional investor for sale under a stock purchase agreement during the corresponding one year period.

Net Loss

Net loss was $4,409,797 and $3,912,326 for the years ended December 31, 2014 and 2013, respectively, for an increase of $497,471, due primarily to increases in research and development salaries and wages, laboratory electro-optic device prototype, development and outsourced testing expenses, laboratory materials and supplies, research and development non-cash stock option and warrant amortization, license fees, professional fees and consulting expenses, depreciation, office expenses, software expense, annual shareholder meeting expense, human resource support and 401(k) Plan processing fees, moving expenses, rent and utility expenses and accounting fees offset by decreases in commitment fee associated with the purchase of shares by an institutional investor for sale under a stock purchase agreement, general and administrative non-cash amortization of options and warrants, travel and lodging expenses and legal expenses.

Significant Accounting Policies

Our Company's accounting policies are more fully described in Note 1 of Notes to Financial Statements. As disclosed in Note 1 of Notes to Financial Statements, the preparation of financial statements in conformity with accounting principles generally accepted in the United States requires management to make estimates and assumptions that affect the amounts reported in the financial statements and accompanying disclosures. Although these estimates are based on our management s best knowledge of current events and actions our Company may undertake in the future, actual results could differ from the estimates.

Stock Based Compensation

Our Company uses the Black-Scholes option pricing model to calculate the grant-date fair value of an award, with the following assumptions for 2014 and 2013: no dividend yield in both years, expected volatility, based on the Company s historical volatility, 70.25% to 109% in 2014 and between 107% to 113% in 2013, risk-free interest rate between 0.58% to 2.08% in 2014 and between 0.94% to 1.86% in 2013 and expected option life of 2.13 to 7.25 years in 2014 and 3 to 10 years in 2013.

As of December 31, 2014, there was $324,004 of unrecognized compensation expense related to non-vested market-based share awards that is expected to be recognized through May 2017.

Liquidity and Capital Resources

During the year ended December 31, 2014, net cash used in operating activities was $3,140,203 and net cash used in investing activities was $294,539, which was due primarily to the Company s research and development activities and general and administrative expenditures. Net cash provided by financing activities for the year ended December 31, 2014 was $4,329,978. At December 31, 2014, our cash and cash equivalents totaled $3,165,940, our assets totaled $4,279,423, our liabilities totaled $221,841, and we had stockholders equity of $4,057,582.

During the year ended December 31, 2013, net cash used in operating activities was $2,838,030 and net cash used in investing activities was $179,153, which was due primarily to the Company s research and development activities and general and administrative expenditures. Net cash provided by financing activities for the year ended December 31, 2013 was $2,351,008. At December 31, 2013, our cash and cash equivalents totaled $2,270,704, our assets totaled $3,244,808, our liabilities totaled $122,176, and we had stockholders equity of $3,122,632.

Sources and Uses of Cash

Our future expenditures and capital requirements will depend on numerous factors, including: the progress of our research and development efforts; the rate at which we can, directly or through arrangements with original equipment manufacturers, introduce and sell products incorporating our polymer materials systems; the costs of filing, prosecuting, defending and enforcing any patent claims and other intellectual property rights; market acceptance of our products and competing technological developments; and our ability to establish cooperative development, joint venture and licensing arrangements. We expect that we will incur approximately $3,500,000 of expenditures over the next 12 months. Our cash requirements are expected to increase at a rate consistent with the Company s path to revenue growth as we expand our activities and operations with the objective of commercializing our electro-optic polymer technology during 2015.

Our business does not presently generate the cash needed to finance our current and anticipated operations. We believe we have raised sufficient capital to finance our operations through October 2015, however, we will need to obtain additional future financing after that time to finance our operations until such time that we can conduct profitable revenue-generating activities.

Such future sources of financing may include cash from equity offerings, exercise of stock options, warrants and proceeds from debt instruments; but we cannot assure you that such equity or borrowings will be available or, if available, will be at rates or prices acceptable to us.

In May 2011 we signed our stock purchase agreement with Lincoln Park whereby subject to certain conditions and at our sole discretion, Lincoln Park has committed to purchase up to $20 million of our common stock over a 30-month period. We registered for resale by Lincoln Park 10,000,000 shares of our common stock in June 2011. The stock purchase agreement expired in December 2013. In June 2013 we signed our new stock purchase agreement with Lincoln Park to sell up to $20 million of common stock whereby subject to certain conditions and at our sole discretion, Lincoln Park has committed to purchase up to $20 million of our common stock over a 30-month period. We registered for resale by Lincoln Park 10,000,000 shares of our common stock in October 2013. Pursuant to the new stock purchase agreement, Lincoln Park is obligated to make purchases as the Company directs in accordance with the purchase agreement, which may be terminated by the Company at any time, without cost or penalty. Sales of shares will be made in specified amounts and at prices that are based upon the market prices of our Company's common stock immediately preceding the sales to Lincoln Park. We expect this financing to provide our Company with sufficient funds to maintain its operations for the foreseeable future. With the additional capital, we expect to achieve a level of revenues attractive enough to fulfill our development activities and adequate enough to support our business model for the foreseeable future. We cannot assure you that we will meet the conditions of the stock purchase agreement with Lincoln Park in order to obligate Lincoln Park to purchase our shares of common stock. In the event we fail to do so, and other adequate funds are not available to satisfy either short-term or long-term capital requirements, or if planned revenues are not generated, we may be required to substantially limit our operations. This limitation of operations may include reductions in capital expenditures and reductions in staff and discretionary costs.

There are no trading volume requirements or restrictions under the new stock purchase agreement, and we will control the timing and amount of any sales of our common stock to Lincoln Park. Lincoln Park has no right to require any sales by us, but is obligated to make purchases from us as we direct in accordance with the purchase agreement. We can also accelerate the amount of common stock to be purchased under certain circumstances. There are no limitations on use of proceeds, financial or business covenants, restrictions on future funding, rights of first refusal, participation rights, penalties or liquidated damages in the purchase agreement. We may terminate the stock purchase agreement at any time, at our discretion, without any penalty or cost to us. Lincoln Park may not assign or transfer its rights and obligations under stock the purchase agreement.

We expect that our cash used in operations will increase during 2015 and beyond as a result of the following planned activities:

- The addition of management, sales, marketing, technical and other staff to our workforce;
- Increased spending for the expansion of our research and development efforts, including purchases of additional laboratory and production equipment;
- Increased spending in marketing as our products are introduced into the marketplace;
- Developing and maintaining collaborative relationships with strategic partners;
- Developing and improving our manufacturing processes and quality controls; and
- Increases in our general and administrative activities related to our operations as a reporting public company and related corporate compliance requirements.

Analysis of Cash Flows

For the year ended December 31, 2014

Net cash used in operating activities was $3,140,203 for the year ended December 31, 2014, primarily attributable to the net loss of $4,409,797 adjusted by $148,681 in warrants issued for services, $824,726 in options issued for services, $41,362 in common stock issued for services, $151,183 in depreciation expenses and patent amortization expenses, $3,977 in prepaid expenses and $99,665 in accounts payable and accrued expenses. Net cash used in operating activities consisted of payments for research and development, legal, professional and consulting expenses, rent and other expenditures necessary to develop our business infrastructure.

Net cash used in investing activities was $294,539 for the year ended December 31, 2014, consisting of $81,350 in cost for intangibles and $213,189 in asset additions primarily for the new lab facility.

Net cash provided by financing activities was $4,329,978 for the year ended December 31, 2014 and consisted of $3,140,000 proceeds from private placement, $1,036,148 in proceeds from sale of common stock to an institutional investor and $153,830 from the exercise of options and warrants.

For the year ended December 31, 2013

Net cash used in operating activities was $2,838,030 for the year ended December 31, 2013, primarily attributable to the net loss of $3,912,326 adjusted by $135,851 in warrants issued for services, $674,897 in options issued for services, $212,156 in common stock issued for services, $126,773 in depreciation expenses and patent amortization expenses, ($42,229) in prepaid expenses and ($33,152) in accounts payable and accrued expenses. Net cash used in operating activities consisted of payments for research and development, legal, professional and consulting expenses, rent and other expenditures necessary to develop our business infrastructure.

Net cash used in investing activities was $179,153 for the year ended December 31, 2013, consisting of $69,875 in cost for intangibles and $109,278 in asset additions primarily for the new lab facility.

Net cash provided by financing activities was $2,351,008 for the year ended December 31, 2013 and consisted of $2,278,500 proceeds from resale of common stock to an institutional investor and $72,508 from the exercise of options and warrants.

BUSINESS

Lightwave Logic, Inc. is developing a new generation of advanced organic nonlinear chromophores to be used to make electro-optic polymer material systems and non-linear all-optical polymer material systems. We are developing a new generation of photonic devices that utilize our unique polymer based material systems. These polymer based material systems, when used in modulators or waveguide structures, can convert high-speed electronic signals into optical (light) signals for use in communications systems, high-speed data transfer or advanced high speed computing. Our Company is developing proprietary all-optical devices utilizing the advanced capabilities of our materials for the application mentioned above. These all-optical devices use light waves to switch other light waves meaning these material systems have third-order properties.

Inorganic material with electro-optic characteristics is the core active ingredient in high-speed fiber-optic telecommunication systems. Utilizing our proprietary technology, we are in the process of engineering advanced organic electro-optic polymer material systems that we believe may lead to significant performance advancements, component size and cost reduction, ease of processing, and thermal and temporal stability. We believe that our electro-optic polymer material systems engineered at the molecular level may have a significant role in the future development of commercially significant electro-optic related products.

Our organic electro-optic polymer material systems work by affecting the optical properties of light in the presence of an electric field at extremely high frequencies (wide bandwidths), but possess inherent advantages to inorganic materials.

Currently, the core electro-optic material contained in most modulators is a crystalline material, such as lithium niobate or gallium arsenide. The following chart describes some of the characteristics of crystalline materials and electro-optical polymers.

Crystalline Materials	**Electro-optical Polymers**
Must be manufactured in strict dust-free conditions since even slight contamination can render them inoperable	Capable of being manufactured in less stringent environmental conditions. Capable of being tailored at the molecular level for optimal performance characteristics
More expensive to manufacture	Less expensive to manufacture
Limited to telecommunication speeds that are less than 40Gb/s (40 billion digital bits of data per second)	Demonstrated the ability to perform at speeds that are greater than 100Gb/s (100 billion digital bits of data per second)

Lithium niobate devices require large power levels (modulation voltages) to operate and are large in size -- typically measuring about four inches long (considering that most integrated circuits are literally invisible to the naked eye, these devices are enormous)	Require significantly lower power levels, up to 60% less (modulation voltages) to operate and are capable of miniaturization
Requires more elaborate, expensive mechanical packaging (housings) generally comprised of materials, such as gold-plated Kovar, in order to assure operational integrity over required time and operating temperature ranges	Initial tests indicate no requirement for more elaborate, expensive packaging (housings)

We consider organic polymers with electro-optic qualities to be the most feasible technology for future high-speed (wide bandwidth) electronic-optical conversion. Due to the ease of processing afforded by electro-optic polymers, as well as their capacity to foster component size reduction, we believe electro-optic polymers have the potential to replace more expensive, lower-performance materials and devices used in fiber-optic ground, wireless and satellite communication networks that are used today in commercial and military telecommunications and advanced computational systems.

We also believe potential future applications may include: (i) cloud computing and data centers; (ii) telecommunications/data communications; (iii) backplane optical interconnects; (iv) photovoltaic cells; (v) medical applications; (vi) satellite reconnaissance; (vii) navigation systems; (viii) radar applications; (ix) optical filters; (x) spatial light modulators; and (xi) all-optical switches.

Our Electro-Optic Technology Approach

Our proposed solution to produce high-performance, high-stability electro-optic polymers for high-speed (wide bandwidth) telecommunication applications lies in a less mainstream, yet firmly established, scientific phenomenon called aromaticity. Aromaticity causes a high degree of molecular stability. It is a molecular arrangement wherein atoms combine into multi-membered rings and share their electrons among each other. Aromatic compounds are stable because the electronic charge distributes evenly over a great area preventing hostile moieties, such as oxygen and free radicals, from finding an opening to attack.

For the past two decades, diverse corporate interests, including, to our knowledge, IBM, Lockheed Martin, DuPont, AT&T Bell Labs, Honeywell and 3M, as well as numerous universities and U.S. Government Agencies, have been attempting to produce high-performance, high-stability electro-optic polymers for high-speed (wide bandwidth) telecommunication applications. These efforts have largely been unsuccessful due, in our opinion, to the industry's singular adherence to an industry pervasive engineering model known as the Bond Length Alternation ("BLA") theory model. The BLA model, like all other current industry-standard molecular designs, consists of molecular designs containing long strings of atoms called polyene chains. Longer polyene chains provide higher electro-optic performance, but are also more susceptible to environmental threats, which result in unacceptably low-performing, thermally unstable electro-optic polymers.

As a result, high frequency modulators engineered with electro-optic polymers designed on the BLA model or any other polyene chain design models are unstable over typical operating temperature ranges, and often exhibit performance degradation within days, hours or even minutes. Similarly, lower frequency modulators exhibit comparable failings, but to a lesser extent. These flaws, in most cases, have prevented commercial quality polymer-based modulators operating at 10-40Gb/s from entering the commercial marketplace. The thermal stability of these devices does not generally meet the minimum Telcordia GR-468 operating temperature range (-40 degrees Celsius to +85 degrees Celsius) much less the more harsh MILSPEC 883D (military specification) range of -55 degrees Celsius to 150 degrees Celsius.

None of our patented molecular designs rely on the BLA polyene chain design model.

Our Intellectual Property

Issued U.S. Patents:

- Heterocyclical Chromophore Architectures (Granted April 5, 2011)
- Tricyclic Spacer Systems for Nonlinear Optical Devices (Granted February 22, 2011)
- Heterocyclical Chromophore Architectures (Granted September 18, 2012)
- Tricyclic Spacer Systems for Nonlinear Optical Devices (Granted- October 30, 2012)

Issued Australian Patents:

- Heterocyclical Chromophore Architectures (Granted November 29, 2012)

Allowed Japanese Patents:

- Heterocyclical Chromophore Architectures (Granted March 19, 2013)

We have twenty-four pending patent applications (including six patent families with applications in Australia, Canada, China, European Patent Office, Japan and the U.S. based on the PCT and U.S. applications below) in the field of nonlinear optic chromophore design as follows:

- Stable Free Radical Chromophores, processes for preparing the same
- Stable Free Radical Chromophores, processes for preparing the same
- Tricyclic Spacer Systems for Nonlinear Optical Devices
- Anti-Aromatic Chromophore Architectures
- Heterocyclical Anti-Aromatic Chromophore Architectures
- Heterocyclical Chromophore Architectures
- Heterocyclical Chromophore Architectures with Novel Electronic Acceptor Systems

Heterocyclical Anti-Aromatic Systems Two of our provisional patents cover heterocyclical anti-aromatic electronic conductive pathways, which are the heart of our high-performance, high-stability molecular designs. The completely heterocyclical nature of our molecular designs "lock" conductive atomic orbitals into a planar (flat) configuration, which provides improved electronic conduction and a significantly lower reaction to environmental threats (e.g. thermal, chemical, photochemical, etc.) than the BLA design paradigm employed by other competitive electro-optic polymers.

The anti-aromatic nature of these structures dramatically improves the "zwitterionic-aromatic push-pull" of the systems, providing for low energy charge transfer. Low energy charge transfer is important for the production of extremely high electro-optic character.

Heterocyclical Steric Hindering System This patent describes a nitrogenous heterocyclical structure for the integration of steric hindering groups that are necessary for the nanoscale material integration. Due to the [pi]-orbital configuration of the nitrogen bridge, this structure has been demonstrated not to interfere with the conductive nature of the electronic conductive pathway and thus is non-disruptive to the electro-optic character of the core molecular construction. The quantum mechanical design of the system is designed to establish complete molecular planarity (flatness) for optimal performance.

Totally Integrated Material Engineering System This patent covers material integration structures under a design strategy known as Totally Integrated Material Engineering. These integration structures provide for the "wrapping" of the core molecule in sterically hindering groups that maximally protect the molecule from environmental threats and maximally protect it from microscopic aggregation (which is a major cause of performance degradation and optical loss) within a minimal molecular volume. These structures also provide for the integration of polymerizable groups for integration of materials into a highly stable cross-linked material matrix.

Historic Breakthroughs and Results

During 2004, independent quantum mechanical calculations performed on our electro-optic polymer designs at government laboratories located at the Naval Air Warfare Center Weapons Division in China Lake, California suggested that our initial aromatic molecules perform two and a half (2.5) to three and three-tenths (3.3) times more efficiently than currently available telecom grade electro-optic polymers. Our conclusion was that performance improvements of this magnitude indicate a significant breakthrough in the field of fiber-optic telecommunication.

In May and June of 2006, performance evaluations of one of our first extremely high-performance electro-optic materials were performed by electro-optic expert, Dr. C.C. Teng, co-inventor of the renowned Teng-Man test, and subsequently confirmed by the University of Arizona's College of Optical Sciences. Under identical laboratory conditions at low molecular loadings, one of our molecular designs outperformed one of the industry's highest performance electro-optic systems by a factor as high as 650%. Our conclusion was that the Teng-Man test established the validity of our novel, patent pending molecular design paradigm known as CSC (Cyclical Surface Conduction) theory; and that the success of CSC theory has the potential to establish the fundamental blueprint of electro-optic material design for decades to come, and to have broad application in commercial and military telecommunication and advanced computational systems.

On September 25, 2006 we obtained independent laboratory results that confirmed the thermal stability of our Perkinamine electro-optic materials. Thermal stability as high as 350 degrees Celsius was confirmed, significantly exceeding many other then commercially available high performance electro-optic materials, such as CLD-1 that exhibits thermal degradation in the range of 250 degrees Celsius to 275 degrees Celsius. This high temperature stability of our materials eliminates a major obstacle to vertical integration of electro-optic polymers into standard microelectronic manufacturing processes (e.g. wave/vapor-phase soldering) where thermal stability of at least 300 degrees Celsius is required. In independent laboratory tests, ten-percent material degradation, a common evaluation of overall thermal stability, did not occur until our Perkinamine materials base was exposed to temperatures as high as 350 degrees Celsius, as determined by Thermo-Gravimetric Analysis (TGA). The test results supported our Company's progress to introduce our materials into commercial applications such as optical interconnections, high-speed telecom and datacom modulators, and military/aerospace components.

On September 26, 2006, we were awarded the 2006 Electro-Optic Materials Technology Innovation of the Year Award by Frost & Sullivan. Frost & Sullivan's Technology Innovation of the Year Award is bestowed upon candidates whose original research has resulted in innovations that have, or are expected to bring, significant contributions to multiple industries in terms of adoption, change, and competitive posture. This award recognizes the quality and depth of our Company's research and development program as well as the vision and risk-taking that enabled us to undertake such an endeavor.

In July 2007, our Company developed an innovative process to integrate our unique architecture into our anticipated commercial devices, whereby dendritic spacer systems are attached to its core chromophore. In the event we are successful in developing a commercially viable product, we believe these dendrimers will reduce the cost of manufacturing materials and reduce the cost and complexity of tailoring the material to specific customer requirements.

In March 2008, we commenced production of our first prototype photonic chip, which we delivered to Photon-X, LLC to fabricate a prototype polymer optical modulator and measure its technical properties. In June 2009 we released test results conducted by Dr. C.C. Teng that re-confirmed our previous test results.

In August 2009, Photon-X, LLC commenced a compatibility study, process sequences, and fabricated wafers/chips containing arrays of phase modulators. The first one hundred plus modulators (bench top devices) were completed at the end of October 2009, and were successfully characterized for insertion loss, Vpi, modulation dynamic range and initial frequency response in March 2010. The multi-step manufacturing process we utilized to fabricate our modulators involved exposing our proprietary Perkinamine materials to extreme conditions that are typically found in standard commercial manufacturing settings. Our step-by-step analysis throughout the fabrication process demonstrated to us that our Perkinamine materials could successfully withstand each step of the fabrication process without damage.

In August 2009, we retained Perdix, Inc. in Boulder, Colorado to help us identify and build prototype products for high growth potential target markets in fiber optic telecommunications systems. During October 2009, we initiated the development and production of our prototype amplitude modulator, which can ultimately be assembled into 1- and 2-dimensional arrays that are useful for optical computing applications, such as encryption and pattern recognition. We expected our initial prototype amplitude modulator to be completed by the end of the second quarter 2010. We continued to work on this device throughout 2010 and discovered its design had limitations so we terminated the program to take a different design approach. We embarked on the new design approach in 2011 with another partner, Boulder Nonlinear Systems (BNS). A feasibility study with our new design partner was started in late 2011. This research and development program continued through 2013, and was completed the end of the third quarter of 2013. The results of this study gave us a guide on how to move forward with the design of our prototype spatial light modulator. The second phase of the program is under review and we expected to start the second phase sometime the second half of 2014; but funding for phase two of this program was delayed. We hope to reengage our work on this program in 2015 after funding is approved.

In March 2010 we successfully concluded initial electrical and optical performance testing of our prototype phase modulator and began Application Engineering of our technology in customer design environments and working directly with interested large system suppliers to attempt to engineer specific individual product materials and device designs for sale to or by these suppliers.

In October of 2010, we completed the concept stage of a novel design for an advanced optical computing application and moved forward into the design stage with Celestech, Inc. of Chantilly, Virginia. Several projects with Celestech are currently on hold. If these projects move forward, they will incorporate one or more of our Company s advanced electro-optical polymer materials.

In October of 2010 we announced the results of testing performed by Lehigh University that demonstrated the third-order non-linear properties of our proprietary molecules in the PerkinamineNR chromophore class. Lehigh University determined that the material was 100 times stronger than the highest off-resonance small molecule currently known. They also determined that it was 2,600 times more powerful than fused silica and demonstrated extremely fast (less than 1 picosecond) photo-induced non-linear response that would be capable of modulation at rates of 1 THz (terahertz). Additional testing at Lehigh University of the Company s other Perkinamine class of materials demonstrated third-order non-linear properties, which may have utility in all optical switches.

In March 2011 we entered into a research and development agreement with the City University of New York s Laboratory for Nano Micro Photonics (LaNMP) to develop third-order non-linear devices. The combination of LaNMP s device capabilities together with our materials expertise should accelerate the development of all-optical devices. This effort, starting with an all-optical switch, is being continued at the University of Colorado, Boulder through an agreement entered into in January 2013. This research and development effort continued through 2014, but not at the pace we expected. In 2015 we hope to engage a product development partner, which should accelerate the product development program.

In March 2011, we entered into a research and development agreement with the City University of New York s (CUNY) Laboratory for Nano Micro Photonics (LaNMP) to develop third-order non-linear devices. The combination of LaNMP s device capabilities together with our materials expertise showed promise for the development of all-optical devices. The agreement ran through the end of 2011. The goal of the project was to fabricate and test slot waveguides embedded with two types of nonlinear optical polymers obtained from our Company. These two polymers were Perkinamine and PerkinamineNR . In CUNY s final report it showed they successfully demonstrated that the Perkinamine and PerkinamineNR survived their 170 degrees C processing temperature without degradation. According to their report, they were successful in one processing run wherein they showed the possibility to realize waveguides with very smooth sidewalls. Reflectivity measurements carried out under optical pumping showed phase shift in the Perkinamine material. We are continuing research in this area with the University of Colorado, Boulder.

In March 2011 we announced a two-year research and development collaboration with the University of Alabama to explore the advanced energy capture properties of our Perkinamine class of chromophores. Our material absorbs light across a wide range of wavelengths from near infrared into the near ultraviolet. We have subsequently ended our relationship with the University.

In December 2011, we announced the discovery of a new material named Perkinamine Indigo . We believe this represents a major advancement in the field of organic nonlinear optical materials. These were initial results and we have much to learn about how to harness full potential of Perkinamine Indigo . The material demonstrated an unusually high electro-optical effect of greater than 250 picometers per volt at 1550 nanometers with excellent thermal and photo stability. Independent research laboratories at Micron Inc., Photon-X and The University of Colorado confirmed these characteristics. More recent measurements have shown an electro-optical effect closer to 100 picometers per volt in a 500 nm thin films. We continued the development work to better understand these results. In January 2014 we created a new methodology to combine multiple chromophores into a single polymer host that will significantly improve its ability to generate more powerful organic, nonlinear electro-optical polymer systems. The new synthetic chemistry process can enable multiple chromophores (dyes) to work in concert with each other within a single polymer host. This proprietary process has created two new material systems, which have demonstrated outstanding electro-optic values. In addition, initial thermal stability results exceed any commercially available organic nonlinear polymer material systems.

In June 2012 we opened a new internal research laboratory facility in Newark, Delaware in the Delaware Technology Park, near the University of Delaware. This new lab facility enables us to synthesize and test our materials in the same facility and will help us accelerate our development efforts. It is equipped with state of the art equipment necessary to expand our ability to conduct synthetic chemistry in much more tightly controlled conditions. Additionally, we equipped a separate advanced optical laboratory at the same location where the necessary testing of material candidates will be performed as they emerge from our new synthesis laboratory.

In July 2012 we entered into an agreement with The University of Colorado, Boulder, GWOL to conduct analytical testing and to carry out studies that will give a better understanding of the properties of a new class of composite organic electro-optic materials. This class of materials is our Perkinamine Indigo . The processing and measurements were carried out primarily at the university s Guided Wave Optics Laboratory (GWOL). The work was completed in close collaboration with Company personnel. It was determined a new synthetic chemistry and material process methodology was needed for consistent and repeatable results. That methodology was announced in January 2014.

In February 2013 we delivered to a potential large system supplier customer prototype devices that were coated with our advanced organic nonlinear electro-optical polymer, Perkinamine Indigo . Tests conducted by the University of Colorado, Boulder on coupons coated with the material demonstrated R_{33} measurements from 100-125 picometers per volt, as measured by the University of Colorado which exceeded the potential large system supplier customer's stated electro-optical requirements.

In March 2013 we entered into a product development contractor agreement with EM Photonics (EMP) of Newark, Delaware to fabricate and test waveguides and phase modulators during an initial development phase using existing EMP polymer modulator design and processes. In June 2013 we consolidated the EMP design program into our University of Colorado, Boulder (UCB) program after we fabricated structures with UCB that will be used as the basic building blocks of our Integrated Optical Device effort for the construction of both our advanced telecom modulator and data communications transceiver. In August 2013 in a combined effort of the Company s chemists, the University of Colorado, Boulder, and a third party research group, we successfully fabricated Silicon Organic Hybrid (SOH) slot waveguide modulators. The devices utilized an existing modulator structure with one of our proprietary electro-optic polymer material systems as the enabling material layer. In October 2013, we confirmed the functionality of the SOH slot waveguide modulators as operating devices.

In April 2013 our potential large system supplier customer informed us that their preliminary testing results on the prototype devices coated with Perkinamine Indigo that we delivered to them in February 2013 demonstrated several of the key performance parameters that they desired. There are still additional tests that need to be completed. We worked with our potential customer utilizing our Perkinamine family of chromophores in a number of host polymers to evaluate these polymers in conjunction with our chromophores for a specific performance attributes for their application. Currently, this potential customer s program is on hold, and we do not know when or if this program will restart. We are currently talking to potential new development partners.

In August 2013 in a combined effort of the Company s chemists, the University of Colorado, Boulder, and a third party research group we successfully fabricated Silicon Organic Hybrid (SOH) slot waveguide modulators. The devices utilized an existing modulator structure with one of our proprietary electro-optic polymer material systems as the enabling material layer. In October 2013, we confirmed the functionality of the SOH slot waveguide modulators as operating prototype devices. These first-generation devices have achieved greater electro-optical activity and dramatically lower drive voltage than industry standard modulators based on inorganic materials. We continued this effort in 2014 and have signed an agreement with the third party research group to continue our collaboration through 2015.

In November 2013, preliminary testing and initial data on our SOH slot waveguide modulators demonstrated several promising characteristics. The tested SOH chip had a 1-millimeter square footprint, enabling the possibility of sophisticated integrated optical circuits on a single silicon substrate. In addition, the waveguide structure was approximately 1/20 the length of a typical inorganic-based silicon photonics modulator waveguide. With the combination of our proprietary electro-optic polymer material and the extremely high optical field concentration in the slot waveguide modulator, the test modulators demonstrated less than 2.2 volts to operate. Initial data rates exceeded 30-35 Gb/sec in the telecom, 1550 nanometer frequency band. This is equivalent to four, 10Gb/sec, inorganic, lithium niobate modulators that would require approximately 12-16 volts to move the same amount of information. Our material also operates in the 1310 nanometer frequency band, which is suitable for data communications applications.

In January 2014 we created a new methodology to combine multiple chromophores into a single polymer host that will significantly improve their ability to generate more powerful organic, nonlinear electro-optical polymer systems. The new synthetic chemistry process can enable multiple chromophores (dyes) to work in concert with each other within a single polymer host. This proprietary process has created two new material systems, which have demonstrated outstanding electro-optic values. In addition, we now have a significant amount of data on the thermal aging of our materials. We have demonstrated that our materials can withstand considerably more than 500 hours at 110 degrees C with little to no change in electro-optic activity in our materials, which is a significant milestone. To our knowledge, this is something that has not occurred before in any polymer. We are also concurrently coating prototype waveguides with our proprietary material system.

In February 2014 we received our first purchase order for our advanced organic nonlinear electro-optic polymer from Boulder Nonlinear Systems (BNS) of Boulder, Colorado in connection with the development of a next generation

LADAR system. A LADAR system is a radar system that utilizes a pulse laser to calculate the distance to a target, but is also capable of rendering a 3-D image. In the event BNS continues to move forward with the development of this LADAR system, we expect to receive additional purchase orders from BNS.

In March 2014 we began the process of manufacturing an advanced design Silicon Organic Hybrid Transceiver prototype and we released the completed chip design to the OpSIS Center at the University of Delaware who produced initial silicon chips, which were delivered to us in December 2014 and January 2015. We are currently qualifying and testing these chips for utilization in our Silicon Organic Hybrid Transceiver. The initial application will target inter-data center interconnections of more than 10 kilometers. Our next design will utilize a different frequency and address the current bottleneck in the rack-to-server layer.

In April 2014 we entered into a sole worldwide license agreement with Corning Incorporated enabling us to integrate Corning's organic electro-optical chromophores into our portfolio of electro-optic polymer materials. The agreement allows us to use the licensed patents within a defined license field that includes communications, computing, power, and power storage applications utilizing the nonlinear optical properties of their materials. As a result of obtaining this license agreement, we created a new powerful and durable nonlinear organic electro-optical material that will be used in photonic device development and is based on our new multi-chromophore approach that allows two or more chromophores to work in concert. This multi-chromophore system has achieved a 50% increase in chromophore concentration, leading to higher electro-optical activity when compared to an equivalent single chromophore system. Repeated, multi-point measurements multi-chromophore system shows approximately twice the electro-optic effect of Lithium Niobate with excellent durability.

In August 2014 the University of Colorado successfully fabricated and tested a bleached electro-optic waveguide modulator designed and fabricated through a sponsored collaborative research agreement. The results of this initial bleached waveguide modulator correlated well with previous electro-optic thin film properties. These initial results of our first in-house device are significant to our entire device program and are an important starting point for modulators that are being developed for target markets. We have multiple generations of new materials that we will soon be optimizing for this specific design.

In October 2014 we submitted an order with Reynard Corporation to produce gold-layered fused silica substrates for our bleached waveguide modulators to be coated with several of our organic electro-optical polymers, which we received in early November and performance tested throughout December. Upon completion of our side-by-side comparative testing of our organic polymers versus duplicate silicon photonic devices, we will coat the gold-layered fused silica substrates with our proprietary polymers and begin to produce working demonstration prototype devices that we will use to present to potential customers and development partners. The bleached waveguide modulator represents our first commercially viable device, and targets metro networks (< 10Km) within large scale telecommunications and data communications networks and represents approximately a $300MM per year market opportunity for us.

In December 2014 we subjected several blends of materials created by our multi-chromophore process to thermal aging tests that included lengthy exposure to high temperatures (85C and 110C) for 300 hours. The data collected indicated minimal loss of electro-optical activity (R33), even after over 500 hours at 110C. Extrapolated internal aging calculations indicated that our organic polymers are expected to provide decades of operational performance. These results exceed previously published efforts for other organic polymers.

The Electro-Optic Device Market

General

Electro-optic devices such as fiber-optic modulators translate electric signals into optical signals. Such devices are used in communication systems to transfer data over fiber-optic networks. Optical data transfer is significantly faster and more efficient than transfer technologies using only electric signals, permitting more cost-effective use of bandwidth for broadband Internet and voice services.

Two distinct technologies currently exist for the fabrication of fiber-optic devices, such as fiber-optic modulators. The first, which is the more traditional technology, utilizes an electro-optically active inorganic core crystalline material (e.g. lithium niobate). The second, which is the focus of the Company s research and development, involves the exploitation of electro-optic polymers.

Traditional Technology - Inorganic Crystals

Traditional technology translates electric signals into optical signals generally relying upon electro-optic materials, such as lithium niobate or gallium arsenide. Five of the largest inorganic fiber-optic component manufactures hold approximately 85% of the electro-optic modulator component market. They are JDSU, Sumitomo, Oclaro, Fujitsu and ThorLabs. These companies are heavily invested in the production of crystalline-based electro-optic modulator technologies, as well as the development of novel manufacturing techniques and integrated laser/modulator designs. While each company possesses their own modulator design and processing patents, the underlying core constituents (lithium niobate, gallium arsenide, indium phosphide) occur in nature and as such cannot be patented.

New Technology - Organic Polymers

Our developing technology that translates electric signals into optical signals relies upon organic electro-optic materials, such as electro-optic polymers. Electro-optic polymers involve the material integration of specifically engineered organic (carbon-based) compounds. The molecular designs of these compounds are precise and do not occur naturally; thus they may be protected under patent law.

Polymer-based electro-optic modulators may provide considerable advantages over traditional inorganic fiber-optic technology in terms of:

- Cost
- Size and versatility
- Modulating/switching speed
- Optical transmission properties
- Lower operating voltages
- Generate less heat

Our Company holds an extensive amount of internally developed intellectual property in the field of electro-optic molecular design that, as a whole, attempts to fundamentally solve these and other problems associated with these molecular structures. We believe our provisional patents describe broad, highly unique techniques for novel paradigms in molecular design.

Our innovative solution lies in a very well known scientific phenomenon called aromaticity, which causes a high degree of molecular stability. Aromaticity is a molecular arrangement wherein atoms combine into multi-membered rings and share their electrons among each other. Aromatic compounds are extremely stable because the electronic charge distributes evenly over a great area preventing hostile moieties, such as oxygen and free radicals, from finding an opening to attack. Until now, to our knowledge, no one has been able to propose molecular designs that could effectively exploit aromaticity in the design of a high-performance electro-optic polymer.

We believe now that we have fabricated electro-optic molecular architectures that do in fact exhibit extremely high thermal stability, our technologies may soon replace inorganic electro-optic materials in the marketplace due to their considerable advantages over traditional inorganic fiber-optic materials.

Our Target Markets

Our proprietary electro-optic polymers are designed at the molecular level for potentially superior performance, stability and cost-efficiency and we believe may have the potential to replace more expensive, lower-performance materials and devices used in fiber-optic ground, wireless and satellite communication networks. We believe our organic electro-optic polymers may have broad applications in civilian and military telecommunications and advanced computational systems. Potential future applications may include: (i) cloud computing and data centers; (ii) telecommunications/data communications; (iii) backplane optical interconnects; (iv) photovoltaic cells; (v) medical applications; (vi) satellite reconnaissance; (vii) navigation systems; (viii) radar applications; (ix) optical filters; (x) spatial light modulators; and (xi) all-optical switches.

Cloud computing and data centers

Big data is a general term used to describe the voluminous amount of unstructured and semi-structured data a company creates -- data that would take too much time and cost too much money to load into a relational database for analysis. Companies are looking to cloud computing in their data centers to access all the data. Inherent speed and bandwidth limits of traditional solutions and the potential of organic polymer devices offer an opportunity to increase the bandwidth, reduce costs and improved speed of access.

Telecommunications/Data Communications

Telecommunications is one of the primary initial target applications for electro-optic polymers. Telecommunication companies are currently faced with the enormous challenge to keep up with the tremendous explosion in demand for bandwidth due to the popularity of Internet enabled devices accessing all forms of streaming media, along with voice messaging, text messaging and cloud based data access.

The challenge for these companies is converting digital information in the form of electric signals into optical information and back. Their networks rely upon optical modulators based around inorganic materials, such as lithium niobate, to accomplish this task. These existing legacy modulators have inherent limitations in terms of maximum data rates, error correction, and costs associated with their manufacture and other operating costs related to drive voltage and heat dissipation due to the complexities of producing single crystalline ingots of sufficient diameter (3 to 5 inches). Also, strict environmental controls must be enforced during the growth of the core crystalline material.

Replacing these inorganic materials with organic polymer materials made with Perkinamine chromophores would offer significant improvements in data rates; reduce form factor; require less error correction along with a significant reduction in drive voltage leading to less heat dissipation and hence reduce the overall cost of operation with regard to site cooling. Polymers are not inherently costly to produce nor do they require such strict environmental conditions. Due to their material flexibility (e.g. ability to more easily mold into specific topologies) they are expected to enable smaller, faster, less expensive, and more integrated network components. In many laboratory tests, electro-optic polymers have demonstrated substantial (3-10x) transmission data speed improvements over crystalline technologies (lithium niobate, gallium arsenide, indium phosphide).

Backplane Optical Interconnects

Organic nonlinear polymer based devices offer advantages in Active Optical cables that are used in data communications in computer-to-computer or server-to-server applications. It is reported that backplane optical interconnects are envisioned by members within leading corporations (including IBM, Intel and Agilent Technologies) as the future of high-speed computation. These components can potentially replace copper circuitry with photons carrying digital information over fiber optic cable in CPU architecture to manage CPU-to-graphics, CPU to-memory and CPU-to-I/O device interactions that have previously operated over an internal electrical bus. On-Chip optical buses can increase performance and decrease cost. They could speed the transmission of information within an integrated circuit, among integrated circuit chips in a module, and across circuit boards at speeds unattainable with traditional metallic interconnections and bus structures. Additionally, our organic polymer material possesses the thermal stability necessary to survive Complementary Metal Oxide Semiconductor (CMOS) processing temperatures that gives it the ability to be spin-coated directly on silicon substrates. In the future, all-optical (light-switching-light) signal processing could become possible using an advanced version of our chemistry.

Photovoltaic Cells

A solar cell (also called a photovoltaic cell) is an electrical device that converts the energy of light directly into electricity by the photovoltaic effect. It is a form of photoelectric cell (in that its electrical characteristics e.g. current, voltage, or resistance vary when light is incident upon it) which, when exposed to light, can generate and support an electric current without being attached to any external voltage source. These cells are very inefficient. Organic nonlinear polymers offer potential increases in the efficiency of photovoltaic cells that could be orders of magnitude greater than LCD technology.

Medical Applications

Medical Applications for electro-optic polymers have been proposed for many varied applications, including dentistry, oncology and protein identification. Although experimental, it is believed that the successful fabrication of high-stability electro-optic polymers could open up many future applications such as these. Other medical applications such as the higher-speed transmission of medical records, X-ray and MRI scans over the Internet would be improved by the broadening of Internet bandwidth.

Satellite Reconnaissance

Satellite reconnaissance applications include a specific target market within the Department of Defense, the 14-member Intelligence Community and their contractors. Electro-optic polymers have historically been seen as attractive for potential application in this market due to the constant need for the fastest bandwidth transmission to meet the needs of national security.

Navigation Systems

Navigation systems for both advanced aerial and missile guidance require the use of electro-optic gyroscopes. These devices are currently fabricated out of lithium niobate or similar electro-optic materials; the application of electro-optic polymers would facilitate the development of more accurate and architecturally simple device designs.

Radar Applications

Radar Applications, specifically phased array radar, has been traditionally understood as a potential application for successful electro-optic material designs, along with electronic counter measure systems (ECM) systems, ultra-fast analog-to-digital conversion, LADAR, land mine detection, radio frequency photonics and spatial light modulation.

Optical Filters

Optical filters are devices that utilize optical waveguides and various other structures like ring resonators that can be made with organic nonlinear materials that can filter out a specific wavelengths from one waveguide and redirect them to a different waveguide.

Spatial Light Modulators