Lightwave Logic, Inc.
Form 424B3
June 23, 2011

Filed Pursuant to Rule 424(b)(3)

Registration No.: 333-174648

10,000,000 Shares

Common Stock

This prospectus relates to the sale of up to 10,000,000 shares of our common stock 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 are issuable pursuant to the Lincoln Park Purchase Agreement, which we refer to in this prospectus as the Purchase Agreement. Please refer to the section of this prospectus entitled The Lincoln Park Transaction for a description of the Purchase Agreement and the section entitled Selling Shareholder for additional information. Such registration does not mean that Lincoln Park will actually offer or sell any 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.

Our common stock is currently quoted on the Over-the-Counter Bulletin Board under the symbol LWLG . On May 19, 2011, the last reported sale price of our common stock was $1.25 per share.

Investing in our securities involves a high degree of risk. See Risk Factors beginning on page 11 of this prospectus for a discussion of information that should be considered in connection with an investment in our securities.

The selling shareholder is an underwriter within the meaning of the Securities Act of 1933, as amended. The selling shareholder is offering these shares of common stock and may sell all or a portion of these shares from time to time in market transactions, in negotiated transactions or otherwise, and at prices and on terms that will be determined by the then prevailing market price or at negotiated prices directly or through a broker or brokers, who may act as agent or as principal or by a combination of such methods of sale. For additional information on the methods of sale, you should refer to the section entitled Plan of Distribution .

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 June 8, 2011.

TABLE OF CONTENTS

2

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 11 and the financial statements and related notes beginning on page F-1.

Overview

We are a development stage research and development company. We have developed and are continuing to develop Application Specific Electro-Optic Polymers (ASEOP) and Non-Linear All-Optical Polymers (NLAOP) which have high electro-optic and optical activity. Both types 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 including, without limitation, telecommunication, data communications, computing and photovoltaic cells.

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 technologies, when completed and tested, 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.

Our electro-optic polymers (polymers) are property-engineered at the molecular level (nanotechnology level) to meet the exacting thermal, environment and performance specifications demanded by electro-optic devices. We believe that

our patented and patent pending technologies will enable us to design electro-optic polymers that are free from the numerous diverse 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 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 our electro-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 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, referred to in this prospectus as PSI-TEC, was founded in 1991 and incorporated under the laws of the State of Delaware on September 12, 1995. PSI-TEC was founded in Upland, Pennsylvania by Dr. Frederick J. Goetz 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 our Company whereby (i) our Company changed its name from Eastern Idaho Internet Services, Inc. to PSI-TEC Holdings, Inc.; (ii) our Company acquired all of the issued and outstanding shares of PSI-TEC stock; (iii) PSI-TEC became our Company s wholly-owned operating subsidiary; and (iv) our Company's then sole officer and director resigned, PSI-TEC's nominees were elected to our Company's 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 our Company. As a result, the historical financial statements of PSI-TEC became the historical financial statements of our Company.

Immediately prior to the time of the reorganization transaction, our Company was a non-reporting development stage company whose stock was traded on the Pink Sheets and that was seeking other business opportunities. It had no substantive business operations. Our Company was originally incorporated under the laws of the State of Nevada on June 24, 1997 as Eastern Idaho Internet Services, Inc. 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 (PSI-TEC Holdings, Inc.'s wholly-owned subsidiary), PSI-TEC Holdings, Inc. and PSI-TEC completed a parent-subsidiary merger whereby PSI-TEC Holdings, Inc., a Nevada corporation, survived and 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 shareholder 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.

Recent Developments

In January 2010, we entered into an agreement with the University of Alabama at Tuscaloosa to conduct cooperative development, analytical testing, optimization, and scale-up of our proprietary materials platform, which should help shorten the time to market for our new Polymeric Electro-Optic materials.

In March 2010, we successfully concluded the electrical and optical performance testing stage of our proof of principle 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 Chantilley, Virginia. This project will incorporate one of our Company s advanced electro-optical polymer materials.

In October of 2010, we announced the results of testing performed by Lehigh University which demonstrated the Third-order non-linear properties of our proprietary molecules in the Perkinamine NR ™ 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 raters of 1 THz (terahertz).

In February and April 2011, respectively, the United States Patent Office granted our Company two patents: US Patent No. 7,894,695 covering our Tricyclic Spacer System for Non-Linear Optical Devices and US Patent No. 7,919,619 for Heterocyclical Chromophore Architectures directed to our Perkinamine ™ chromophores. These composition of matter patents taken together protect the core of our electro-optical materials portfolio.

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. We believe that the combination of LaNMP s device capabilities together with our materials expertise should accelerate the development of all-optical devices.

In March 2011, the City University of New York s Laboratory for Nano Micro Photonics (LaNMP) fabricated our first-ever all optical waveguide using one of our Perkinamine NR ™ chromophores. It is anticipated that LaNMP will use this device architecture to develop various all-optical devices including an all-optical transistor.

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 infra-red into the near ultraviolet. The University intends to explore how to efficiently capture a wide range of solar radiation with our material.

Award

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.

Corporate Information

Our principal executive office is located at 121 Continental Drive, Suite 110, Newark, Delaware 19713, and our telephone number is (302)-356-2717. Our website address is www.lightwavelogic.com. Information contained in, or accessible through, our website does not constitute a part of, and is not incorporated into, 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)	44,126,872 shares, including the 150,830 initial commitment shares already issued to Lincoln Park under the Purchase Agreement and included in this offering
Common Stock offered by the selling shareholder	10,000,000 shares, consisting of the 150,830 initial commitment shares already issued to Lincoln Park, up to 301,659 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 10,000,000 shares to Lincoln Park under the Purchase Agreement	54,126,872 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 .
Over-the-Counter Bulletin Board 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 44,126,872 shares of common stock outstanding as of May 18, 2011, and excludes:

options to purchase 4,097,000 shares of our common stock pursuant to our 2007 Employee Stock Plan, of which 3,409,500 have vested as of May 18, 2011, at a weighted average exercise price of $1.20 per share; and

warrants to purchase an aggregate of 3,264,000 shares of our common stock, of which 2,845,250 have vested as of May 18, 2011, at a weighted average exercise price of $0.77 per share.

On May 3, 2011, we executed a Purchase Agreement and a Registration Rights Agreement with the selling shareholder, Lincoln Park Capital Fund, LLC, or Lincoln Park. Under the Purchase Agreement, we have the right to sell to Lincoln Park up to $20,000,000 of our common stock at our option as described below.

Pursuant to the Registration Rights Agreement, we are filing this prospectus with the SEC covering the shares that may be issued to Lincoln Park under the Purchase Agreement. Over approximately 30 months, and subject to certain terms and conditions, we have the right to direct Lincoln Park to make periodic purchases of up to $1,000,000 of our common stock per sale depending on certain conditions as set forth in the Purchase Agreement as often as every five business days up to the aggregate commitment of $20,000,000. The purchase price of the shares will be based on the market prices of our shares immediately prior to the time of sale as computed under the Purchase Agreement without any fixed discount. In no event, however, will Lincoln Park be obligated to purchase shares of our common stock under the Purchase Agreement at a price of less than $1.00 per share. We may, at any

time, and in our sole discretion, terminate the Purchase Agreement without fee, penalty or cost upon notice to Lincoln Park. Lincoln Park may not assign or transfer its rights and obligations under the Purchase Agreement.

Upon signing the Purchase Agreement, we issued 150,830 shares of our common stock to Lincoln Park as a commitment fee for entering into the Purchase Agreement(which shares are included in this offering), and we may issue up to an additional 301,659 shares pro rata (which shares are included in this offering) if and when we sell additional shares to Lincoln Park under the Purchase Agreement.

Under the Purchase Agreement and the Registration Rights Agreement, we are required to register 10,000,000 shares, which includes the 150,839 shares already issued and the 301,659 shares which we are required to issue pro rata in the future as a commitment fee if and when we sell shares 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, we are only registering 10,000,000 shares to be purchased thereunder, which may or may not cover all such shares purchased by Lincoln Park under the Purchase Agreement, depending on the purchase price per share.

Of the 10,000,000 shares offered under this prospectus:

150,839 shares already issued to Lincoln Park as a commitment fee for entering into the Purchase Agreement; and

301,659 shares represent shares that we are required to issue proportionally in the future, as a commitment fee, if and when we sell additional shares to Lincoln Park under the Purchase Agreement; and

The remainder represents shares we may sell to Lincoln Park under the Purchase Agreement.

Except as otherwise indicated herein, all information in this prospectus, including the number of shares that will be outstanding after this offering, assumes or gives effect to no exercise of options or warrants outstanding on the date of this prospectus or in the future, except as specifically set forth herein.

As of May 18, 2011, there were 44,126,872 shares outstanding, of which 30,597,321 shares were held by non-affiliates. If all of the 10,000,000 shares offered by Lincoln Park were issued and outstanding as of the date hereof, such shares would represent 18.48% of the total common stock outstanding, or 24.64% of the non-affiliates shares outstanding (assuming that the shares offered by Lincoln Park are not held by affiliates). The number of shares ultimately offered for sale by Lincoln Park is dependent upon the number of shares that we sell to Lincoln Park under the Purchase Agreement. If we elect to issue more than the 10,000,000 shares offered under this prospectus, which we have the right but not the obligation to do, we must first register under the Securities Act the resale by Lincoln Park of any additional shares we may elect to sell to Lincoln Park before we can sell such additional shares.

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-optic devices 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 materials

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.

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 crystallisation, 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 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, 2010 and 2009 from our audited financial statements appearing later in this prospectus. We have derived the following summary of our statement of operations data for the three months ended March 31, 2011 and 2010 and balance sheet data as of March 31, 2011 from our unaudited 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.

	Years Ended December 31,		Three Months Ended March 31,	
	2010	**2009**	**2011**	**2010**
Statement of Operations Data:				
NET SALES	$ 3,200	$ -	$ -	-
COST AND EXPENSE				
Research and development	1,709,171	1,662,813	466,864	366,432
General and administrative	2,006,900	1,058,071	459,246	644,274
LOSS FROM OPERATIONS	(3,712,871)	(2,720,884)	(926,110)	(1,010,706)
OTHER INCOME (EXPENSE)	(361)	(987)	115	54
NET LOSS	$ (3,713,232)	$ (2,721,871)	$ (925,995)	(1,010,652)
Basic and Diluted Loss per Share	$ (0.09)	$ (0.07)	$ (0.02)	(0.03)
Basic and Diluted Weighted Average Number of Shares	42,253,450	39,431,766	43,966,153	41,166,542

	As of March 31, 2011
Balance Sheet Data:	
Current assets	$ 631,728

Property and equipment - net		94,849
Other assets		
Intangible assets - net		359,308
TOTAL ASSETS	$	1,085,885
TOTAL LIABILITIES		147,169
TOTAL STOCKHOLDERS' EQUITY		938,716
TOTAL LIABILITIES AND STOCKHOLDERS' EQUITY	$	1,085,885

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 $3,713,232 for the year ended December 31, 2010 and $2,721,871 for the year ended December 31, 2009. We anticipate that we will continue to incur operating losses through at least the remainder of 2011.

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 which states that our significant losses and negative cash flow during our development stage raise substantial doubt about our ability to continue as a going concern. 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 and achieving a level of revenue adequate to support our cost structure. 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 will require additional capital to continue to fund our operations. 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 August 2011, 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, 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 May 2011, we entered into 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 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 volume of trading 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.

We are registering the resale of 10,000,000 shares by Lincoln Park pursuant to this prospectus. In the event we elect to issue more than the 10,000,000 shares offered hereby, we would be required to file a new registration statement and have it declared effective by the SEC. If obtaining sufficient funding from Lincoln Park does not occur or is prohibitively dilutive, we will need to secure another source of funding in order to satisfy our working capital needs. Should the financing we require to sustain our working capital needs be unavailable or prohibitively expensive when we require it, the consequences could be a material adverse effect on our business, operating results, financial condition and prospects.

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 prospectus. 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 either short-term or 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 which 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 to Lincoln Park up to $200,000 of common stock by delivering a purchase notice to Lincoln Park. The Purchase Price of such shares is equal to the lesser of: (i) the lowest sale price of our common stock on the purchase date; or (ii) the arithmetic average of the three lowest closing sale prices for our common stock during the twelve consecutive trading days ending on the trading day immediately preceding the purchase date. Lincoln Park does not have the right or the obligation to purchase any shares of our common stock on any business day that the market price of our common stock is less than $1.00. To the extent that the market price of our common stock is below $1.00 per share on a trading day, we would not receive any proceeds under the Purchase Agreement for that day.

If the market price of our common stock is not below $9.50 per share, our sales will be limited to up to $1,000,000 of our common stock on each purchase date. If the market price of our common stock is not below $4.50 per share, our sales will be limited to up to $500,000 of our common stock on each purchase date. If the market price of our common stock is not below $3.50 per share, our sales will be limited to up to $400,000 of our common stock on each purchase date. If the market price of our common stock is not below $2.50 per share, our sales will be limited to up to $300,000 of our common stock on each purchase date.

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 agreement. In addition, we are only registering 10,000,000 shares of our common stock under this prospectus. Assuming a purchase price of $1.25 per share, the closing sale price of our common stock on May 19, 2011, and the issuance to Lincoln Park of 10,000,000 shares, which would be comprised of 9,851,412 shares purchased at $1.25 per share and 148,588 shares issued as additional pro rata commitment shares for no additional consideration, the proceeds to us would only be $12,500,000. In the event we elect to issue more than 10,000,000 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, generally, 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 452,489 shares of common stock as a fee for Lincoln Park s commitment to purchase our shares. Of these commitment shares, we issued 150,830 shares upon entering into the agreement with Lincoln Park. The remaining 301,659 commitment shares are issuable to Lincoln Park on a pro rata basis as 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, 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 the date of this prospectus, there are outstanding options to purchase an aggregate of 4,097,000 shares of our common stock at exercise prices ranging from $0.25 per share to $1.75 per share and outstanding warrants to purchase 3,264,000 shares of our common stock at a weighted average exercise price of $0.77 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 collaborations (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.

You will experience immediate dilution in the book value per share of the common stock you purchase.

Because the price per share of our common stock being offered is likely to be substantially higher than the book value per share of our common stock, you will suffer substantial dilution in the net tangible book value of the common stock you purchase in this offering. Based on the assumed minimum allowed offering price of $1.00 per share in this offering and a pro forma net tangible book value per share of our common stock of $0.19 as of March 31, 2011, if you purchase securities in this offering, you will suffer immediate and substantial dilution of $0.81 per share in the net tangible book value of the common stock purchased. See Dilution on page 28 for a more detailed discussion of the dilution you will incur in connection with this offering.

Management will have broad discretion as to the use of the proceeds from sales under the Purchase Agreement, and we may not use the proceeds effectively which could have a materially adverse affect on our business.

We have not designated any portion of the proceeds from sales to Lincoln Park under the Purchase Agreement to be used for any particular purpose. Accordingly, our management will have broad discretion as to the application of the proceeds from any such sales and could spend the proceeds in ways that do not necessarily improve our operating results or enhance the value of our common stock.

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; and

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

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 electro-optic plastics 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. 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 which would require additional investment.

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

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 plastic 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.

Our future growth will suffer if we do not achieve sufficient market acceptance of our electro-optic plastic products.

We are developing our electro-optic polymer 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. 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.

Commercialization of our current and future products will require us to maintain a high level of technical expertise and if we fail to do so, our business could suffer.

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 continue to be subject to overcapacity and slow growth or decline.

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.

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 revenues which could have a materially adverse affect on our business.

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, device certification, 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 which could have a materially adverse affect on our business.

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 are 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 electro-optic polymer 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 which could have a materially adverse affect on our business.

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.

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

The stock market has from time to time experienced significant price and volume fluctuations that have affected the market prices for the common stock of pharmaceutical and biotechnology companies. These broad market fluctuations may cause the market price of our common stock to decline. In the past, following periods of volatility in the market price of a particular company s securities, securities class action litigation has often been brought against that company. We may become involved in this type of litigation in the future. Litigation often is expensive and diverts management s attention and resources, which could hurt our business, operating results and financial condition.

Our technology may be subject to government rights and retained research institution rights which could have a materially adverse affect on our Company.

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 James S. Marcelli, our Chief Executive Officer and Dr. David F. Eaton our Chief Technology Officer. Accordingly, the loss of the services of any 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.

If we decide to make commercial quantities of products at our facilities, we will be required to make significant capital expenditures to increase capacity which could have a materially adverse affect on our Company.

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 which could have a materially adverse affect on our business.

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 single facility, and circumstances beyond our control may result in considerable interruptions.

We conduct significantly all of our research and development activities at a single facility. A disaster such as a fire, flood or severe storm at or near this facility 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. The waste created by use of these materials is transported off-site by an unaffiliated waste hauler. 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.

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.

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, pursuant to recent amendments to Rule 144, a non-affiliate shareholder 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 Over-the-Counter Bulletin Board 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.

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.

Our common stock is considered a penny stock and as a result, related broker-dealer requirements may hamper its trading and liquidity.

Our common stock is considered to be a penny stock since it meets one or more of the definitions in Rules 15g-2 through 15g-6 promulgated under Section 15(g) of the Exchange Act. These include but are not limited to the following: (i) the common stock trades at a price less than $5.00 per share; (ii) the common stock is not traded on a recognized national exchange; (iii) the common stock is not quoted on the NASDAQ Stock Market, or (iv) the common stock is issued by a company with average revenues of less than $6.0 million for the past three (3) years. The principal result or effect of being designated a penny stock is that securities broker-dealers cannot recommend our common stock to investors, thus hampering its liquidity.

Section 15(g) and Rule 15g-2 require broker-dealers dealing in penny stocks to provide potential investors with documentation disclosing the risks of penny stocks and to obtain a manually signed and dated written receipt of the documents before effecting any transaction in a penny stock for the investor s account. Potential investors in our common stock are urged to obtain and read such disclosure carefully before purchasing any of our shares.

Moreover, Rule 15g-9 requires broker-dealers in penny stocks to approve the account of any investor for transactions in such stocks before selling any penny stock to that investor. This procedure requires the broker-dealer to (i) obtain from the investor information concerning his or her financial situation, investment experience and investment objectives; (ii) reasonably determine, based on that information, that transactions in penny stocks are suitable for the investor and that the investor has sufficient knowledge and experience as to be reasonably capable of evaluating the risks of penny stock transactions; (iii) provide the investor with a written statement setting forth the basis on which the broker-dealer made the determination in (ii) above; and (iv) receive a signed and dated copy of such statement from the investor, confirming that it accurately reflects the investor s financial situation, investment experience and investment objectives.

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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Our business;

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Our business strategy;

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Our future operating results;

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Our ability to obtain external financing;

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Our understanding of our competition;

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Industry and market trends;

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Future capital expenditures; and

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The impact of technology on our products, operations and businessl

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.

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 March 31, 2011:

Cash and cash equivalents	$ 548,627
Shareholders 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, 43,976,042 shares issued and outstanding	43,976
Additional paid-in-capital	22,213,441
Accumulated deficit	(15,827)
Deficit accumulated during development stage	(21,302,874)
Total shareholders equity	938,716
Total capitalization	$ 938,716

The number of shares of common stock outstanding in the table above excludes, as of March 31, 2011:

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5,604,450 shares of our common stock available for future issuance under our 2007 Employee Stock Plan; and

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3,264,000 shares of our common stock issuable upon the exercise of outstanding warrants, with a weighted-average exercise price of $0.77 per share.

MARKET FOR COMMON EQUITY AND RELATED SHAREHOLDER MATTERS

Market For Common Equity

Our common stock is currently traded under the symbol LWLG on the OTC Bulletin Board.

The following table set forth below lists the range of high and low bids for our common stock for each fiscal quarter for the last two fiscal years. The prices in the table reflect inter-dealer prices, without retail markup, markdown or commission and may not represent actual transactions.

	High		Low	
	Bid	**Ask**	**Bid**	**Ask**
Fiscal Year Ended December 31, 2009				
1st Quarter	$	$	$	$
	0.76	0.85	0.28	0.38
2nd Quarter	$	$	$	$
	1.06	1.20	0.35	0.40
3rd Quarter	$	$	$	$
	0.97	0.99	0.60	0.66
4th Quarter	$	$	$	$
	2.57	2.65	0.96	0.99
Fiscal Year Ended December 31, 2010				
1st Quarter	$	$	$	$
	2.30	2.37	1.30	1.35
2nd Quarter	$	$	$	$
	1.90	2.20	1.28	1.35
3rd Quarter	$	$	$	$
	1.65	1.80	0.80	0.90
4th Quarter	$	$	$	$
	1.77	1.90	0.87	1.14

Fiscal Year Ending December 31, 2011				
1st Quarter	$ 1.48	$ 1.50	$ 1.15	$ 1.20

Holders of Common Equity

As of May 18, 2011, we have a total of 44,126,872 shares of common stock outstanding, held of record by approximately 118 shareholders and we believe we have an additional 2,500 beneficial shareholders who hold their shares in brokerage accounts. 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, 2010

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)	3,897,000	$1.20	1,707,450
Equity compensation plans not approved by security holders (2)	2,704,000	$0.67	0
Total	6,601,000	$0.99	1,707,450

(1)

Reflects our 2007 Employee Stock Plan for the benefit of our directors, officers, employees and consultants. We have reserved 6,500,000 shares of common stock for such persons pursuant to that plan.

(2)

Comprised of common stock purchase warrants we issued for services.

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 March 31, 2011, we had a net tangible book value of $579,408, or approximately $0.01 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. After giving effect to our assumed receipt of $9,702,823 in estimated proceeds from the sale of 9,849,170 shares of common stock issuable under the Purchase Agreement and registered in this offering (assuming a purchase price of $1.00 per share, the issuance of 146,347 additional commitment shares for no additional cash consideration, offering expenses of $70,000, and assuming all such sales and issuances were made on March 31, 2011), our pro forma as adjusted net tangible book value as of March 31, 2011 would have been approximately $10,212,231, or $0.19 per share. This would represent an immediate increase in the net tangible book value of $0.18 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 March 31, 2011	$ 0.01	
Increase in as adjusted net tangible book value per share attributable to this offering	0.18	
Pro forma net tangible book value per share after this offering		0.19
Dilution per share to new investors		$ 0.81

To the extent that we sell more or less than $9,702,823 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 43,976,042 shares of our common stock outstanding as of March 31, 2011, adjusted for the assumed sale of $9,702,823 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 March 31, 2011:

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5,604,450 shares of our common stock available for future issuance under our 2007 Employee Stock Plan;

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3,264,000 shares of our common stock issuable upon the exercise of outstanding warrants, with a weighted-average exercise price of $0.77 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 balance sheet data as of December 31, 2010 and 2009 and the selected statement of operations data for the years ended December 31, 2010 and 2009 from our audited financial statements that are included in this prospectus. We have derived the selected balance sheet data as of December 31, 2008, 2007 and 2006 and the selected statement of operations data for the years ended December 31, 2008, 2007 and 2006 from our audited financial statements that are not included in this prospectus. We have derived the selected statement of operations data for the three months ended March 31, 2011 and 2010 and the selected balance sheet data as of March 31, 2011 from our unaudited financial statements that are included in this prospectus.

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

	Year Ended December 31,					Three Months Ended March 31,	
	2010	**2009**	**2008**	**2007**	**2006**	**2011**	**2010**
Statement of Operations Data:							
NET SALES	$ 3,200	$ -	$ -	$ -	$ -	$ -	$ -
COST AND EXPENSE							
Research and development	1,709,171	1,662,813	1,421,955	1,455,608	1,179,997	466,864	366,432
General and administrative	2,006,900	1,058,071	2,820,398	2,773,140	1,814,752	459,246	644,274
LOSS FROM OPERATIONS	(3,712,871)	(2,720,884)	(4,242,353)	(4,228,748)	(2,994,749)	(926,110)	(1,010,706)
OTHER INCOME (EXPENSE)	(361)	(987)	(98,254)	5,299	60,940	115	54
NET LOSS	$ (3,713,232)	$ (2,721,871)	$ (4,340,607)	$ (4,223,449)	$ (2,933,809)	$ (925,995)	$ (1,010,652)
Basic and Diluted Loss per Share	$ (0.09)	$ (0.07)	$ (0.12)	$ (0.14)	$ (0.11)	$ (0.02)	$ (0.03)

Basic and Diluted Weighted Average Number of Shares	42,253,4500	39,431,766	34,726,411	30,983,663	27,190,449	43,966,153	41,166,542

	As of December 31,					As of March 31,
Balance Sheet Data:	**2010**	**2009**	**2008**	**2007**	**2006**	**2011**
Current assets	$ 1,028,056	$ 513,362	$ 100,423	$ 600,384	$ 596,152	$ 631,728
Property and equipment - net	97,568	104,087	61,726	67,276	42,335	94,849
Other assets	-	-	-	29,190	158,883	
Intangible assets - net	346,009	261,215	212,416	174,421	42,376	359,308
TOTAL ASSETS	$ 1,471,633	$ 878,664	$ 374,565	$ 871,271	$ 839,746	$ 1,085,885
TOTAL LIABILITIES	116,012	131,676	168,027	218,091	264,974	147,169
TOTAL STOCKHOLDERS' EQUITY	1,355,621	746,988	206,538	653,180	574,772	938,716
TOTAL LIABILITIES AND STOCKHOLDERS' EQUITY	$ 1,471,633	$ 878,664	$ 374,565	$ 871,271	$ 839,746	$ 1,085,885

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

You should read the following discussion and analysis of our financial condition and results of our operations together with our financial statements and the related notes to those statements included later in this prospectus. In addition to historical financial information, this discussion contains forward-looking statements reflecting our current plans, estimates, beliefs and expectations that involve risks and uncertainties. As a result of many important factors, particularly those set forth under Special Note Regarding Forward-Looking Statements and Risk Factors . Our actual results and the timing of events may differ materially from those anticipated in these forward-looking statements.

Overview

Lightwave Logic, Inc. (then known as Eastern Idaho Internet Service, Inc.) was organized under the laws of the State of Nevada in 1997, where we engaged in the business of marketing Internet services until June 30, 1998 when our operations were discontinued. We were then inactive until we acquired PSI-TEC Corporation as our wholly-owned subsidiary on July 14, 2004, at which time our name was changed to PSI-TEC Holdings, Inc. On October 20, 2006, we completed a parent-subsidiary merger with PSI-TEC Corporation whereby we were the surviving corporation of the merger, and our name was changed to Third-Order Nanotechnologies, Inc. On March 10, 2008, we changed our name to Lightwave Logic, Inc. to better suit our strategic business plan and to facilitate shareholder recognition of our Company and our business.

We are a development stage research and development company. We have developed and are continuing to develop Application Specific Electro-Optic Polymers (ASEOP) and Non-Linear All-Optical Polymers (NLAOP) which have high electro-optic and optical activity. Both types of materials are thermally and photo-chemically stable, which we believe could have utility across a broad range of applications in devices. We engineer our proprietary electro-optic polymers at the molecular level for superior performance, stability, cost-efficiency and ease of processability. We expect our NLAOP polymers to broadly replace more expensive, lower-performance materials that are currently used in, telecommunication, data communications, computing, photovoltaic cells, wireless and satellite communication networks.

In order to transmit digital information at extremely high-speeds (wide bandwidth) over the Internet, it is necessary to convert the electrical signals produced by a computer into optical signals for transmission over long-distance fiber-optic cable. The actual conversion of electricity to an optical signal may be performed by a molecularly-engineered material known as an electro-optic polymer.

We are currently developing electro-optic polymers that promise performance many times faster than any technology currently available and that have unprecedented thermal stability. High-performance electro-optic materials produced by our Company have demonstrated stability as high as 350 degrees Celsius. Stability above 250 degrees Celsius is necessary for vertical integration into many semi-conductor production lines. Recent results, independently confirmed by the University of Arizona, have demonstrated that the molecular performance of some of our Company's molecular designs perform 650% better than competitive electro-optic compounds.

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

Our revenue model relies substantially on the assumption that we will be able to successfully develop electro-optic products for applications within the industries described 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.

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Satellite Reconnaissance

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Navigational Systems

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Radar Applications

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Telecommunications

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Optical Interconnects

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Optical Computing

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Entertainment

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Medical Applications

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Solar Panels (Photovoltaic cells)

To be successful, we must, among other things:

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Develop and maintain collaborative relationships with strategic partners;

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Continue to expand our research and development efforts for our products;

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Develop and continue to improve on our manufacturing processes and maintain stringent quality controls;

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Produce commercial quantities of our products at commercially acceptable prices;

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Rapidly respond to technological advancements;

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Attract, retain and motivate qualified personnel; and

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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 material products.

Plan of Operation

Since our inception, we have been engaged primarily in the research and development of our polymer materials technologies and potential products. We are devoting significant resources to engineer next-generation electro-optic polymers 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. 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 vendor, 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.

On August 8, 2006, we contracted with Triple Play Communications Corporation, a design and market consulting company, to deliver a comprehensive market opportunity assessment report for high speed 40G (commercial) & 100G+ (military/aerospace) modulators and system applications.

In August, 2006, we entered into a co-location agreement with InPlane Photonics, a New Jersey-based micro-optics company that allowed our scientists to establish a pre-production line in order to test and integrate our organic materials into waveguide devices and system prototypes as a first step toward product commercialization. This agreement was terminated at the end of January 2007 so that we could focus on pursuing a strategic relationship with Photon-X LLC, a Pennsylvania-based firm with extensive experience in polymer waveguide processing. We entered into a non-binding memorandum of understanding with Photon-X, LLC in December 2006 to work towards creating a fee for services agreement with Photon-X, LLC to design, develop, produce and market electro-optic components based upon our polymer technology, which we ultimately finalized in March 2007. This agreement with Photon-X, LLC enables our Company access to a full suite of fabrication facilities capable of producing commercial quantities of precision micro-optic devices such as high-speed (40GHz) telecom modulators, optical filters, and optical interconnects important to military and civilian global information movement and management markets.

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 commercially available high performance electro-optic materials, such as CLD-1 which 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 ™ 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.

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 January 2008, we retained TangibleFuture, Inc., a San Francisco based technology analysis and business development consulting company, to generate an independent assessment of our business opportunities in the fiber-optic telecommunications and optical computing sectors and develop strategies to penetrate those potential markets.

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. As a result of delays caused by engineering setbacks related to our material production, the production of our first prototype photonic chip was temporarily halted, along with the completion of our proof of concept tests that were being administered by Dr. Robert Norwood at the University of Arizona Photonics Department. In order to address this issue, our Chief Technology Officer Dr. David F. Eaton s role and responsibilities with the Company were significantly expanded, and we added two veteran synthetic chemists to our science and technology team. We have since overcome a majority of these engineering setbacks and we are currently in the continual process of extensive testing for material performance, including, among other tests, the (r33) Teng-Man testing protocol.

In June 2009, we released test results conducted by Dr. C.C. Teng that re-confirmed our previous test results, and we intend to deliver completed independent validated material performance test results, including the (r33) Teng-Man

testing protocol, as they become ripe for release.

In August 2009, Photon-X, LLC commenced a compatible study, process sequences and fabricated wafers/chips containing arrays of phase modulators. The first one hundred plus modulators 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 can successfully withstand each step of the fabrication process without damage. We anticipated completing the development and building of functional prototype 40 Gb/s and 100 Gb/s modulators during the second quarter of 2010. However, we have incurred delays with our modulator project due to our focus on current application driven projects and evaluations that we believe will more quickly generate revenue for our Company. The completion of these two modulator designs will most likely occur during the second half of 2011 upon completion of an anticipated updated optical device design. However, we may incur delays in this process due to slower than expected material production within our laboratories and/or delays caused by the production of the modulator and testing procedures.

In August 2009, we retained Perdix, Inc. 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. Our Company continues to work with strategic partners in this development effort and we anticipate prototypes in second half of 2011. However, we may incur delays in this process due to slower than expected material production within our laboratories and/or delays caused by the production of the modulator and testing procedures.

In November 2009, we introduced our new prototype phase modulator to the Gilder/Forbes Telecosm Conference in Tarrytown, New York and discussed how Lightwave s material could be spun onto silicon chips prior to stacking and used for input, output, and interconnect due to the stability of Lightwave s electro-optic polymer and Lightwave s recent demonstration that its proprietary Perkinamine ™ materials can survive all of the rigors of standard commercial manufacturing processes. Other applications discussed with the conference attendees included low cost modulators for fiber optic communications, multi-channel modulators for ultra dense wavelength division multiplex systems, and optical computing.

In December 2009, we filed our sixth patent application. The provisional application covers stable free radical chromophores for use in Non-Linear optical applications. The new polymeric electro-optic material has enormous potential in spatial light modulation and all optical signal processing (light switching light).

In January 2010, we entered into an agreement with the University of Alabama at Tuscaloosa to conduct cooperative development, analytical testing, optimization, and scale-up of our proprietary materials platform, which should help shorten the time to market for our new Polymeric Electro-Optic materials.

In March 2010, we successfully concluded the electrical and optical performance testing stage of our proof of principle 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 Chantilley, Virginia. This project will incorporate one of our Company s advanced electro-optical polymer materials.

In October of 2010, we announced the results of testing performed by Lehigh University which demonstrated the Third-order non-linear properties of our proprietary molecules in the Perkinamine NR ™ 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

raters of 1 THz (terahertz).

In February and April 2011, respectively, the United States Patent Office granted our Company two patents: US Patent No. 7,894,695 covering our Tricyclic Spacer System for Non-Linear Optical Devices and US

Patent No. 7,919,619 for Heterocyclical Chromophore Architectures directed to our Perkinamine ™ chromophores. These composition of matter patents taken together protect the core of our electro-optical materials portfolio.

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. We believe that the combination of LaNMP s device capabilities together with our materials expertise should accelerate the development of all-optical devices.

In March 2011, the City University of New York s Laboratory for Nano Micro Photonics (LaNMP) fabricated our first-ever all optical waveguide using one of our Perkinamine NR ™ chromophores. It is anticipated that LaNMP will use this device architecture to develop various all-optical devices including an all-optical transistor.

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 infra-red into the near ultraviolet. The University intends to explore how to efficiently capture a wide range of solar radiation with our material.

We ultimately intend to use our next-generation electro-optic polymers for future applications vital to the following industries. We expect to create specific materials for each of these applications as appropriate:

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Satellite Reconnaissance

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Navigational Systems

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Radar Applications

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Telecommunications

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Optical Interconnects

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Optical Computing

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Entertainment

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Medical Applications

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Solar Panels (Photovoltaic cells)

In an effort to maximize our future revenue stream from our electro-optic polymer products, we are currently evaluating each of or some combination of the following approaches:

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Licensing our technology for individual specific applications;

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Entering into collaborative or joint venture agreements with one or a number of partners; or

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Selling our products directly to commercial customers.

Additionally, we must create 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.

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 2004 we raised approximately

$529,000 from the issuance of convertible promissory notes, of which $30,000 was converted into common stock of the company during 2004 and the remaining $499,000 converted in 2005. Also, during 2005, we raised an aggregate of $1,000,000 from the private sale of our common stock. During 2006, we raised approximately $425,000 from the private sale of our common stock, of which $200,000 was rescinded during 2007. During 2007, we raised approximately $2,301,524 from the private sale of our common stock. During 2008, we raised approximately $414,000 from the private sale of our common stock and $375,270 from the exercise of outstanding warrants. Through June 30, 2009, we raised approximately $855,000 from the private sale of our common stock. We have also issued shares of our common stock and warrants to purchase shares of our common stock in exchange for services rendered to our Company, including professional services. During October 2009 we obtained proceeds of $455,000 from the exercise of outstanding warrants. During 2010, we raised $1,500,000 from the private sale of our common stock and $539,000 from the exercise of outstanding options and warrants. We also issued shares of our common stock and warrants to purchase shares of our common stock in exchange for services rendered to our Company. During the first quarter of 2011, we issued shares of our common stock and warrants to purchase shares of our common stock in exchange for services rendered to our Company.

Results of Operations of the Three Months Ended March 31, 2011 Compared to Three Months ended March 31, 2010

Revenues

The Company is a development stage company. We had no revenues during the three months ended March 31, 2011 and 2010. The Company s first development revenue project commenced during 2010 resulting in net revenues of $3,200 for the year ended December 31, 2010. The Company expects revenues to increase once the customer s approval and design cycle has been completed.

Operating Expenses

Our operating expenses were $926,110 and $1,010,706 for the three months ended March 31, 2011 and 2010, respectively, for a decrease of $84,596. The decrease is due primarily to decrease in non cash amortization of warrants based on vesting terms as part of the employment agreement entered into in January 2010 with the Company s new Chairman of the Board, offset by increases in primarily research and development costs including non cash research and development amortization of options, research and development wages and salaries, laboratory materials and supplies.

Included in our operating expenses for the three months ended March 31, 2011 was $466,864 for research and development expenses compared to $366,432 for the three months ended March 31, 2010, for an increase of $100,432. This is primarily due to an increase in non cash amortization of options of $62,345 from $174,166 for the three months ended March 31, 2010 to $236,511 for the three months ended March 31, 2011, an increase in wages and salaries of $11,894 from $106,430 for the three months ended March 31, 2010 to $118,324 for the three months ended March 31, 2011 and an increase in laboratory materials and supplies of $10,772, from $5,109 for the three months ended March 31, 2010 to $15,881 for the three months ended March 31, 2011. These additional research and

development activities for the three months ended March 31, 2011 support the expansion of research, development and application engineering activities.

Research and development expenses currently consist primarily of compensation for employees engaged in internal research, product and application development activities; laboratory operations, outsourced prototype electro-optic device development and processing work, customer testing, material testing, fees, 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 electro-optic materials technology; subcontracting work to build prototypes; expanding and equipping in-house laboratories; hiring additional technical and support personnel; pursuing other potential business opportunities; customer testing and evaluation; and incurring related operating expenses.

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 $185,028 to $459,246 for the three months ended March 31, 2011 compared to $644,274 for the three months ended March 31, 2010. The decrease is due primarily to decrease in non cash amortization of warrants based on vesting terms as part of the employment agreement entered into in January 2010 with the Company s new Chairman of the Board, offset by increases in other costs.

Legal fees increased $8,871 to $24,997 for the three months ended March 31, 2011 compared to $16,126 for the three months ended March 31, 2010.

Investor relations expenses decreased by $2,309 from $42,248 for the three months ended March 31, 2010 to $39,939 for the three months ended March 31, 2011 as the Company continues its efforts to expand its exposure to a broader base of investors.

Total expenses for accounting and administrative services decreased by $16,910 for the three months ended March 31, 2011 compared to the three months ended March 31, 2010. Non cash amortization of warrants for accounting and administrative services decreased by $25,910 from $53,365 for the three months ended March 31, 2010 to $27,455 for the three months ended March 31, 2011. Accounting fees increased $9,000 from $10,500 for the three months ended March 31, 2010 to $19,500 for the three months ended March 31, 2011.

Non cash stock compensation decreased by $230,889 from $478,515 for the three months ended March 31, 2010 to $247,626 for the three months ended March 31, 2011. The stock compensation for the three months ended March 31, 2011 included the aforementioned non cash amortization of warrants for accounting and administrative expenses. This total decrease in stock compensation is primarily due to the non cash amortization of warrants as part of the employment agreement entered into with the Company s new Chairman of the Board during 2010. The decrease is due to amortization of the warrants to expense based upon the vesting terms of the warrant agreement.

Auditing fees increased $16,000 from $10,000 for the three months ended March 31, 2010 to $26,000 for the three months ended March 31, 2011 due to the timing of the recognition of the 2009 audit fee.

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.

Net Loss

Net loss was $925,995 and $1,010,652 for the three months ended March 31, 2011 and 2010, respectively, for a decrease of $84,657, primarily resulting from decrease in non cash amortization of warrants based on vesting terms as part of the employment agreement entered into in January 2010 with the Company s new Chairman offset by increases in primarily research and development costs including non cash research and development amortization of options, research and development wages and salaries, laboratory materials and supplies.

Results of Operations of the Fiscal Year December 31, 2010 Compared To the Fiscal Year Ended December 31, 2009

Revenues

The Company is a development stage company that commenced its first development revenue project resulting in net revenues of $3,200 for the year ended December 31, 2010. Revenues are less than projected due to the slower than expected approval cycle of our design concept. There were no revenues during 2009.

Operating Expenses

Our operating expenses were $3,716,071 and $2,720,884 for the years ended December 31, 2010 and 2009, respectively, an increase of $995,187. This increase in operating expenses was due primarily to the non cash amortization of warrants as part of the employment agreement entered into with the Company s new Chairman of the Board, increases in laboratory electro-optic material and device development and testing expenses and investor relations expenses and the current year expenses for the annual meeting of shareholders partially offset by a decrease in management fees and a decrease in accounting fees.

Included in our operating expenses for the year ended December 31, 2010 was $1,709,171 for research and development expenses compared to $1,662,813 for the year ended December 31, 2009, for an increase of $46,358. This is primarily due to an increase in laboratory electro-optic material and device development and testing expenses of $38,411, from $150,737 for the year ended December 31, 2009 to $189,148 for the year ended December 31, 2010 and an increase in non cash research and development depreciation of $12,373 from $16,779 for the year ended December 31, 2009 to $29,152 for the year ended December 31, 2010.

Research and development expenses currently consist primarily of compensation for employees engaged in internal research and product development activities; laboratory operations, outsourced prototype electro-optic device development and processing work; customer testing; material testing; fees; 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 continued development to support commercialization of our electro-optic materials technology; subcontracting work to build prototypes; expanding and equipping in-house laboratories; hiring additional technical and support personnel; pursuing other potential business opportunities; customer testing and evaluation; and incurring related operating expenses.

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. During the current period the Company held an annual meeting of the shareholders.

General and administrative expenses increased $948,829 to $2,006,900 for the year ended December 31, 2010 compared to $1,058,071 for the year ended December 31, 2009. The increase is due primarily to non cash amortization of warrants as part of the employment agreement entered into with the Company s new Chairman of the Board and an increase in investor relations expenditures and the expenses for the annual meeting of the shareholders in the current period partially offset by a decrease in management fees and a decrease in accounting fees.

Management fees decreased $55,330 to $0 for the year ended December 31, 2010 from $55,330 for the year ended December 31, 2009 since the Company decided not to renew its management contract on February 28, 2009. Legal fees decreased $25,695 to $75,743 for the year ended December 31, 2010 compared to $101,438 for the year ended December 31, 2009.

Accounting fees decreased $37,000 to $42,000 for the year ended December 31, 2010 compared to $79,000 for the year ended December 31, 2009 since the operations for the year ended December 31, 2009 included fees

associated with startup, preparation of the 2008 Annual Report on Form 10-K, resolution of prior payroll tax filing issues primarily associated with the October 2006 reorganization and other accounting issues.

Non cash amortization of warrants for accounting and administrative services increased $35,576 from $177,883 for the year ended December 31, 2009 to $213,459 for the year ended December 31, 2010 as a result of the commencement of the agreement for accounting services during the first quarter of 2009.

Non cash stock compensation increased by $888,305 to $1,323,303 for the year ended December 31, 2010 compared to $434,998 for the year ended December 31, 2009. The stock compensation for the year ended December 31, 2010 included the aforementioned non cash amortization of warrants for accounting and administrative expenses. This total increase in stock compensation is primarily due to the non cash amortization of warrants of $580,167 as part of the employment agreement entered into with the Company s new Chairman of the Board during 2010. The stock compensation for the year ended December 31, 2010 also included $214,063 in non cash amortization of warrants for a financial advisory board member.

Travel expenses increased $34,550 to $100,142 in 2010 compared to $65,592 in 2009 primarily for the additional travel to investor conferences as well as for customer development.

Investor relations expenses increased by $80,769 from $64,662 for the year ended December 31, 2009 to $145,431 for the year ended December 31, 2010 to expand the Company s exposure to a broader base of investors.

Included in the results of operations for the year ended December 31, 2010 are expenses totaling $39,858 for the Company s annual meeting of the shareholders.

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.

Net Loss

Net loss was $3,713,232 and $2,721,871 for the years ended December 31, 2010 and 2009, respectively, for an increase of $991,361, due primarily to non cash amortization of warrants as part of the employment agreement entered into with the Company s new Chairman of the Board, increases in laboratory electro-optic material and device prototype, development and testing expenses and investor relations expenses and the current year expenses for the shareholder annual meeting partially offset by a decrease in management fees and a decrease in accounting fees.

Critical Accounting Policies, Estimates and Assumptions

The SEC defines critical accounting policies as those that are, in management s view, most important to the portrayal of our financial condition and results of operations and those that require significant judgments and estimates.

The discussion and analysis of our financial condition and results of operations is based upon our financial statements which have been prepared in accordance with GAAP. The preparation of these financial statements requires us to make estimates and judgments that affect the reported amounts of assets and liabilities. On an on-going basis, we evaluate our estimates including the allowance for doubtful accounts, the salability and recoverability of inventory, income taxes and contingencies. We base our estimates on historical experience and on other assumptions that we believe to be reasonable under the circumstances, the results of which form our basis for making judgments about the carrying values of assets and liabilities that are not readily apparent from other sources. Actual results may differ from these estimates under different assumptions or conditions.

We cannot predict what future laws and regulations might be passed that could have a material effect on our results of operations. We assess the impact of significant changes in laws and regulations on a regular basis and update the assumptions and estimates used to prepare our financial statements when we deem it necessary.

Merger

On July 14, 2004, the Company acquired PSI-TEC. Under the terms of the merger agreement, the stockholders of PSI-TEC received 15,600,000 shares of common stock in exchange for its 2,206,280 shares. Following the merger, the Company changed its name to PSI-TEC Holdings, Inc. Under accounting principles generally accepted in the United States, the share exchange is considered to be a capital transaction in substance rather than a business combination. That is, the share exchange is equivalent to the issuance of stock by PSI-TEC Holdings, Inc. for the net monetary assets of PSI-TEC, accompanied by a recapitalization, and is accounted for as a change of capital structure. Accordingly, the accounting for the share exchange was identical to that resulting from a reverse acquisition, except no goodwill was recorded. Under reverse takeover accounting, the post-reverse acquisition comparative historical financial statements of the legal acquirer, PSI-TEC Holdings, Inc., are those of the legal acquiree, PSI-TEC, which is considered to be the accounting acquirer. On October 20, 2006, PSI-TEC Holdings, Inc. and PSI-TEC merged and changed its name to Third-Order Nanotechnologies, Inc. On March 10, 2008, Third-Order Nanotechnologies, Inc. changed its name to Lightwave Logic, Inc.

Estimates

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 management s best knowledge of current events and actions the Company may undertake in the future, actual results could differ from the estimates.

Cash Equivalents

For the purposes of the statement of cash flows, the Company considers all highly liquid instruments with maturities of three months or less at the time of purchase to be cash equivalents.

Concentration of Credit Risk

Certain financial instruments potentially subject the Company to concentrations of credit risk. These financial instruments consist primarily of cash. At December 31, 2010, the Company had deposits with Wells Fargo Bank, N.A. that exceed the FDIC deposit insurance coverage of $250,000.

Investment

Securities classified as available-for-sale may be sold in response to changes in interest rates, liquidity needs, and for other purposes. Available-for-sale securities are carried at fair value. Unrealized gains and losses on investment securities available for sale are based on the difference between book value and fair value of each security. These gains and losses are credited or charged to other comprehensive income, whereas realized gains and losses are recognized in the Company s net income (loss).

Property and Equipment

Equipment is stated at cost. Depreciation is principally provided by use of straight-line methods for financial and tax reporting purposes over the estimated useful lives of the assets, generally 5 years.

Fair Value of Financial Instruments

The Company s financial instruments consist of cash, accounts payable and accrued expenses. The carrying values of cash, accounts payable and accrued expenses approximate fair value because of their short maturities.

Income Taxes

The Company follows FASB ASC 740, Income Taxes , which requires an asset and liability approach to financial accounting and reporting for income taxes. Deferred income tax assets and liabilities are computed

annually for temporary differences between the financial statement and tax bases of assets and liabilities that will result in taxable or deductible amounts in the future based on enacted tax laws and rates applicable to the periods in which the differences are expected to affect taxable income. Valuation allowances are established when necessary to reduce deferred tax assets to the amount expected to be realized. Income tax expense is the tax payable or refundable for the period plus or minus the change during the period in deferred tax assets and liabilities.

Loss Per Share

The Company follows Financial Accounting Standards Board Accounting Standards Codification (FASB ASC) 260, Earnings per Share , resulting in the presentation of basic and diluted earnings per share. Because the Company reported a net loss in 2010 and 2009, common stock equivalents, including stock options and warrants were anti-dilutive; therefore, the amounts reported for basic and dilutive loss per share were the same.

Recoverability of Long Lived Assets

The Company follows FASB ASC 360 Property, Plant, and Equipment . Long-lived assets to be held and used are reviewed for impairment whenever events or changes in circumstances indicate that the related carrying amount may not be recoverable. When required, impairment losses on assets to be held and used are recognized based on the excess of the asset s carrying amount.

Comprehensive Income

The Company follows FASB ASC 220.10, Reporting Comprehensive Income . Comprehensive income is a more inclusive financial reporting methodology that includes disclosure of certain financial information that historically has not been recognized in the calculation of net income. Since the Company has no items of other comprehensive income, comprehensive income (loss) is equal to net loss.

Reclassifications

Certain reclassifications were made to the 2009 financial statements in order to conform to the 2010 financial statement presentation.

Recently Adopted Accounting Pronouncements

As of December 31, 2010 and for the year then ended, there were no recently adopted accounting pronouncements that had a material effect on the Company s financial statements.

Recently Issued Accounting Pronouncements Not Yet Adopted

As of December 31, 2010, there are no recently issued accounting standards not yet adopted which would have a material effect on the Company s financial statements.

Stock Based Compensation

The Company uses the Black-Scholes option pricing model to calculate the grant-date fair value of an award, with the following assumptions for 2010 and 2009: no dividend yield in both years, expected volatility, based on the Company s historical volatility, between 123% and 134% in 2010 and between 127% and 141% in 2009, risk-free interest rate between 1.64% and 2.55% in 2010 and between 0.03% and 2.81% in 2009 and expected option life of three to five years in 2010 and one month to five years in 2009.

As of December 31, 2010, there was $1,605,156 of unrecognized compensation expense related to non-vested market-based share awards that is expected to be recognized through November 2013.

Liquidity and Capital Resources

During the three months ended March 31, 2011, net cash used in operating activities was $386,946 and net cash used in investing activities was $18,294, 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 three months ended March 31, 2011 was $0. At March 31, 2011, our cash and cash equivalents totaled $548,627, our assets totaled $1,085,885, our liabilities totaled $147,169, and we had stockholders equity of $938,716.

During the year ended December 31, 2010, net cash used in operating activities was $1,436,681 and net cash used in investing activities was $108,441, 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, 2010 was $2,039,000. At December 31, 2010, our cash and cash equivalents totaled $953,867, our assets totaled $1,471,633, our liabilities totaled $116,012, and we had shareholders equity of $1,355,621.

During the year ended December 31, 2009, net cash used in operating activities was $1,107,975 and net cash used in investing activities was $108,132, which was due primarily to the Company s research and development activities and general and administrative expenditures. Net cash provided by financing activities during 2009 was $1,587,872. At December 31, 2009, our cash and cash equivalents totaled $459,989, our assets totaled $878,664, our liabilities totaled $131,676, and we had shareholders equity of $746,988.

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 technology; 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 in excess of $1,500,000 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 the latter portion of 2011.

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 August 2011, 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 were required to file a registration statement with the U.S. Securities and Exchange Commission covering the sale of the shares that may be issued to Lincoln Park. Once the registration statement became effective on June 8, 2011, Lincoln Park became 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 an extended period of time. 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 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. The Purchase Agreement may be terminated by us 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 the Purchase Agreement.

We expect that our cash used in operations will increase during 2011 and beyond as a result of the following planned activities:

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The addition of management, sales, marketing, technical and other staff to our workforce;

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Increased spending for the expansion of our research and development efforts, including purchases of additional laboratory and production equipment;

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Increased spending in marketing as our products are introduced into the marketplace;

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Developing and maintaining collaborative relationships with strategic partners;

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Developing and improving our manufacturing processes and quality controls; and

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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 Three Months Ended March 31, 2011

Net cash used in operating activities was $386,946 for the three months ended March 31, 2011, consisting of payments for research and development, legal, professional and consulting expenses, rent and other expenditures necessary to develop our business infrastructure, offset by $202,256 in warrants issued for services, $292,334 in options issued for services, $14,500 in common stock issued for services, $7,714 in depreciation expense and amortization of patents, $(8,912) in prepaid expenses and other current assets and $31,157 in accounts payable and accrued expenses.

Net cash used by investing activities was $18,294 for the three months ended March 31, 2011, consisting of the purchase of intangibles (patents) for $13,544 and $4,750 in asset additions for the lab facility.

Net cash provided by financing activities was $0 for the three months ended March 31, 2011.

For the Fiscal Year Ended December 31, 2010

Net cash used in operating activities was $1,436,681 for the year ended December 31, 2010, consisting of payments for research and development, legal, professional and consulting expenses, rent and other expenditures necessary to develop our business infrastructure, offset by $1,007,689 in warrants issued for services, $1,252,526 in options issued for services, $22,650 in common stock issued for services, $37,500 in amortization of prepaid expenses, $30,166 in depreciation expense, ($58,316) in prepaid expenses and ($15,664) in accounts payable and accrued expenses.

Net cash used by investing activities was $108,441 for the year ended December 31, 2010, consisting of the purchase of intangibles (patents) for $84,794 and $23,647 in asset additions for the lab facility.

Net cash provided by financing activities was $2,039,000 for the year ended December 31, 2010 and consisted of $1,500,000 from the issuance of common stock under private placement and $539,000 proceeds from the exercise of warrants.

For the Fiscal Year Ended December 31, 2009

Net cash used in operating activities was $1,107,975 for the year ended December 31, 2009, consisting of payments for research and development, legal, professional and consulting expenses, rent and other expenditures necessary to develop our business infrastructure, offset by $55,330 in deferred charges, $177,881 in warrants issued for services, $1,009,051 in options issued for services, $128,000 in common stock issued for services, $132,058 in purchase right agreement amortization, $37,500 in amortization of prepaid expenses, ($3,675) in prepaid expenses, and $60,779 in accounts payable and accrued expenses.

Net cash used by investing activities was $108,132 for the year ended December 31, 2009, consisting of the purchase of intangibles (patents) for $48,799 and for the purchase of equipment in the amount of $59,333.

Net cash provided by financing activities was $1,587,872 for the year ended December 31, 2009 and consisted of $855,000 proceeds from common stock and $675,234 proceeds from the exercise of warrants, $45,138 from the exercise of purchase right agreements and $12,500 of proceeds from subscription receivable.

Inflation and Seasonality

We do not believe that our operations are significantly impacted by inflation. Our business is not seasonal in nature.

BUSINESS

General

Lightwave Logic, Inc. is developing a new generation of advanced electro-optic polymers and non-linear all-optical polymers that convert high-speed electronic signals into optical (light) signals, or in the case of non-linear all-optical polymers, use light waves to switch other light waves.

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

In order to transmit digital information over long or intermediate distances at extremely high-speeds (wide bandwidth), electrical signals, such as those produced by a computer or telephone, must be converted into optical signals for transmission over long-distance fiber-optic cable. Within the infrastructure of the Internet, a device known as an electro-optic modulator performs the electric-to-optic conversion. Within the electro-optic modulator, an electro-optic material performs the actual conversion of electricity to an optical signal. These materials change their optical properties in the presence of an electric field at extremely high frequencies (wide bandwidths).

Currently, the core electro-optic material contained in most modulators is a crystalline material, such as lithium niobate or gallium arsenide, which must be manufactured in strict dust-free conditions since even slight contamination can render them inoperable. As a result, these crystalline materials are expensive to produce. Current electro-optic crystals are limited to telecommunication speeds that are less than 40Gb/s (40 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. Additionally, it is important to note that these crystalline-based electro-optic modulators require 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.

Unlike crystals, electro-optic polymers appear to be capable of being tailored at the molecular level for optimal performance characteristics. Additionally, electro-optic polymers are less expensive to manufacture and demand significantly lower power requirements (modulation voltages). The electro-optic polymers have demonstrated the ability to perform many times faster (>100Gb/s) than existing crystalline technology.

We consider electro-optic polymers 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 existing high-speed fiber-optics components that are used today in many commercial and military applications.

We also believe that the extreme miniaturization provided by advanced electro-optic polymers may allow for the successful fabrication of chip-to-chip (backplane) optical interconnect devices for computers that create the high-speed data transmission necessary for extremely high-speed computations. Further, we believe that additional potential applications for electro-optic polymers may include phased array radar, cable television (CATV), electronic counter measure (ECM) systems, ultra-fast analog-to-digital conversion, land mine detection, radio frequency photonics, spatial light modulation and all-optical (light-switching-light) signal processing.

Our Electro-Optic Technology

For the past two decades, diverse corporate interests, 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 model 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 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 molecular designs rely on the BLA polyene chain design model. Our proposed solution lies in a far 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.

Our research and findings in this area resulted in our Company being the sole recipient of 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. Our Company did not actively elicit consideration or apply to receive this award. Frost & Sullivan independently contacted our Company and conducted several interviews which included chemical and technical experts in the field of electro-optics who were supplied with detailed public information regarding our Company's technological innovations.

Our Intellectual Property

We have been issued the following U.S. Patents:

US 7 919 619 - Heterocyclical Chromophore Architectures (Notification to issue 4/5/2011)
US 7 894 695 - Tricyclic Spacer Systems for Nonlinear Optical Devices (Granted February 22, 2011)

We also have twenty-seven (27) 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:

61/265012	-	Stable Free Radical Chromophores, processes for preparing the same.
PCT/US05/39212	-	Tricyclic Spacer Systems for Nonlinear Optical Devices
PCT/US05/39664	-	Anti-Aromatic Chromophore Architectures
PCT/US05/39213	-	Heterocyclical Anti-Aromatic Chromophore Architectures
PCT/US05/39010	-	Heterocyclical Chromophore Architectures
PCT/US06/11637	-	Heterocyclical Chromophore Architectures with Novel Electronic Acceptor Systems.

Heterocyclical Anti-Aromatic Systems Patent

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 Patent

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 Patent

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.

Our Latest Tests and Results

Prior to our recent experimental results, in 2004, quantum mechanical calculations were independently performed on our novel electro-optic polymer designs at government laboratories located at the Naval Air Warfare Center Weapons Division in China Lake, California. The results of these calculations suggest 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. Logical extensions of this novel molecular design paradigm further suggest even greater performance improvements. Subsequently, top scientists and engineers at Wright-Patterson Air Force Base reviewed these calculations and concluded that our molecular designs show promise of a five to ten times improvement over existing commercial polymeric architectures. Our conclusion is that performance improvements of this magnitude indicate a significant breakthrough in the field of fiber-optic telecommunication.

In May and June of 2006, we initiated performance evaluations of one of our first extremely high-performance electro-optic materials. The initial tests were performed by electro-optic expert, Dr. C.C. Teng, co-inventor of the renowned Teng-Man test, the industry-wide standard method of evaluating the material performance of electro-optic polymers, and subsequently confirmed by the University of Arizona's College of Optical Sciences, one of the most respected and fastest growing optical sciences departments in the world. Under identical laboratory conditions at low molecular loadings, one of our recent molecular designs outperformed one of the industry's highest performance electro-optic systems by a factor as high as 650%.

We believe results of the Teng-Man test have established the validity of our novel, patent pending molecular design paradigm known as CSC (Cyclical Surface Conduction) theory. We believe 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 commercially available high performance electro-optic materials, such as CLD-1 which 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.

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. As a result of delays caused by engineering setbacks related to our material production, the production of our first prototype photonic chip was temporarily halted, along with the completion of our proof of concept tests that were being administered by Dr. Robert Norwood at the University of Arizona Photonics Department. In order to address this issue, our Chief Technology Officer Dr. David F. Eaton s role and responsibilities with the Company were significantly expanded, and we added two veteran synthetic chemists to our science and technology team. We have since overcome a majority of these engineering setbacks and we are currently in the continual process of extensive testing for material performance, including, among other tests, the (r33) Teng-Man testing protocol.

In June 2009, we released test results conducted by Dr. C.C. Teng that re-confirmed our previous test results, and we intend to deliver completed independent validated material performance test results, including the (r33) Teng-Man testing protocol, as they become ripe for release.

In August 2009, Photon-X, LLC commenced a compatible study, process sequences and fabricated wafers/chips containing arrays of phase modulators. The first one hundred plus modulators 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 can successfully withstand each step of the fabrication process without damage. We anticipated completing the development and building of functional prototype 40 Gb/s and 100 Gb/s modulators during the second quarter of 2010. However, we have incurred delays with our modulator project due to our focus on current application driven projects and evaluations that we believe will more quickly generate revenue for our Company. The completion of these two modulator designs will most likely occur during the second half of 2011 upon completion of an anticipated updated optical device design. However, we may incur delays in this process due to slower than expected material production within our laboratories and/or delays caused by the production of the modulator and testing procedures.

In August 2009, we retained Perdix, Inc. 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. Our Company continues to work with strategic partners in this development effort and we anticipate prototypes in second half of 2011. However, we may incur delays in this process due to slower than expected material production within our laboratories and/or delays caused by the production of the modulator and testing procedures.

In November 2009, we introduced our new prototype phase modulator to the Gilder/Forbes Telecosm Conference in Tarrytown, New York and discussed how our material could be spun onto silicon chips prior to stacking and used for input, output, and interconnect due to the stability of our electro-optic polymer and our recent demonstration that our proprietary Perkinamine ™ materials can survive all of the rigors of standard commercial manufacturing processes. Other applications discussed with the conference attendees included low cost modulators

for fiber optic communications, multi-channel modulators for ultra dense wavelength division multiplex systems, and optical computing.

In December 2009, we filed our sixth patent application. The provisional application covers stable free radical chromophores for use in Non-linear optical applications. The new polymeric electro-optic material has enormous potential in spatial light modulation and all optical signal processing (light switching light).

In January 2010, we entered into an agreement with the University of Alabama at Tuscaloosa to conduct cooperative development, analytical testing, optimization, and scale-up of our proprietary materials platform, which should help shorten the time to market for our new Polymeric Electro-Optic materials.

In March 2010, we successfully concluded the electrical and optical performance testing stage of our proof of principle 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 Chantilley, Virginia. This project will incorporate one of our Company s advanced electro-optical polymer materials.

In October of 2010, we announced the results of testing performed by Lehigh University which demonstrated the Third-order non-linear properties of our proprietary molecules in the Perkinamine NR ™ 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 raters of 1 THz (terahertz).

In February and April 2011, respectively, the United States Patent Office granted our Company two patents: US Patent No. 7,894,695 covering our Tricyclic Spacer System for Non-Linear Optical Devices and US Patent No. 7,919,619 for Heterocyclical Chromophore Architectures directed to our Perkinamine ™ chromophores. These composition of matter patents taken together protect the core of our electro-optical materials portfolio.

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.

In March 2011, the United States Patent Office granted our Company 2 patents: US Patent No. 7,919,619 for Heterocyclical Chromophore Architectures directed to our Perkinamine ™ chromophores and US Patent No. 7,894,695 covering our Tricyclic Spacer System for Non-Linear Optical Devices. These composition of matter patents taken together protect the core of our electro-optical materials portfolio.

In March 2011, the City University of New York s Laboratory for Nano Micro Photonics (LaNMP) fabricated our first-ever all optical waveguide using one of our Perkinamine NR ™ chromophores. It is anticipated that LaNMP will use this device architecture to develop various all-optical devices including an all-optical transistor.

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 infra-red into the near ultraviolet. The University intends to explore how to efficiently capture a wide range of solar radiation with our material.

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 up-and-coming technology, 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 modulator component manufacturers hold approximately 85% of the electro-optic modulator component market. They are JDS Uniphase, 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 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:

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Cost

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Size and versatility

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Modulating/switching speed

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Optical transmission properties

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Lower operating voltages

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Generate less heat

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 used in fiber-optic ground, wireless and satellite communication networks. We believe our electro-optic polymers may have broad applications in civilian and military telecommunications and advanced computational systems. Potential future applications may include: (i) telecommunications; (ii) backplane optical

interconnects; (iii) entertainment; (iv) medical applications; (v) satellite reconnaissance; (vi) navigational systems; (vii) radar applications; (viii) all-optical transistors and (ix) photovoltaic cells.

Telecommunications

Telecommunications is one of the primary initial target applications for electro-optic polymers. Electro-optic polymers could not only simplify the device design of key components, such as modulators, significantly reducing packaging costs, but could also provide for higher speed devices with greater system miniaturization. Current crystalline (e.g. lithium niobate) fiber-optic modulators are difficult and expensive to manufacture 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. 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, cheaper, 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

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 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. In the future, all-optical (light switching light) signal processing could become possible using an advanced version of our chemistry.

Entertainment

Entertainment applications, including CATV and Internet, are a highly important potential application subdivision of the telecommunication market. The ever-increasing number of entertainment services such as VOD (video on demand) and digital cable, as well as the future ability to download television and movies real-time from the Internet, drives the demand for ever-increasing bandwidth. Flexible displays utilizing organic light emitting diodes are inherently compatible with our polymer waveguides.

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 bandwidths.

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.

Navigational Systems

Navigational 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, land mine detection, radio frequency photonics and spatial light modulation.

All-Optical Transistors

All-optical transistors are expected to be included in the future market of all-optic devices. All-optical devices convert data in the form of input light signals to a secondary light data stream. Some experts anticipate that all-optical transistors will replace traditional transistors used today in microprocessors. All-optical transistors are expected to enable the fabrication of an entirely new high-speed generation of "polymer" computers that operate on light instead of electricity, which in turn should significantly improve computation speeds.

Our Business Strategy

General

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

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Develop electro-optic product devices.

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Continue to develop proprietary intellectual property.

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Streamline our product development process.

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Develop a comprehensive marketing plan.

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Maintain/develop strategic relationships with government agencies, private firms, and academic institutions.

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Attract seasoned executives and science and technology personnel to our Company.

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Expand into a state-of-the-art development, testing and manufacturing facility.

Develop Electro-Optic Product Devices

We intend to utilize our proprietary technology to create an initial portfolio of commercially feasible electro-optic polymer product devices and applications for various markets, including telecommunications and government. We expect our initial product device line to include high speed 40Gb/s and 100Gb/s modulators and system applications.

Continue to Develop Proprietary Intellectual Property

We plan to advance our core competence in electro-optic polymer technology by continuing to develop proprietary materials, processes, designs and devices. We also plan to protect our technology by filing patent applications where appropriate, obtaining exclusive technology rights where available, and taking other appropriate steps to secure and protect our intellectual property.

Streamline Our Product Development Process

We intend to streamline our development process and to design, fabricate and test proprietary materials and potential electro-optic polymer devices in order to position our Company to take advantage of emerging market opportunities.

Develop a Comprehensive Marketing Plan

We intend to build a sales and marketing organization dedicated to developing customers and multiple distribution channels for our products. We plan to aggressively pursue sales of our potential products through the use of industry-specific sales organizations, such as electro-optic component representatives and distributors. In addition, we plan to target market leaders as initial customers and to leverage relationships with these market leaders to obtain future contracts and sales references.

In 2008 we retained TangibleFuture, Inc., a San Francisco based technology analysis and business development consulting company, to generate an independent assessment of our business opportunities in the fiber-optic telecommunications and optical computing sectors and develop strategies to penetrate those potential markets.

Maintain/Develop Strategic Relationships with Government Agencies, Private Firms and Academic Institutions

Almost since our inception, we have had beneficial strategic relationships with various government agencies that have provided us with funding and access to important technology. We intend to re-establish our relationship with DARPA, the Defense Advance Research Project Agency (the agency in the Intelligence Community credited with the origination of the Internet), by sharing the technical data and test results on our aromatic molecular materials. DARPA previously provided our Company with funding in order to advance of our technologies and to bring them to the public market, but due to a change in focus at DARPA our funding was not renewed.

As we advanced towards the commercialization phase of our strategic plan, we commenced discussions with several potential strategic alliance partners ranging from micro-electronic component firms to large-scale computer companies, as well as petrochemical companies having very large volume production capabilities. We believe strategic alliances and/or technology licensing will be a crucial step in commercializing our novel technologies and achieving competitive advantages. We entered into a strategic relationship with Photon-X, LLC, a technology solutions provider for polymer waveguides that works in conjunction with various government agencies.

We have also developed an excellent relationship with the University of Delaware, an institution well known for excellence in chemical engineering, which we intend to maintain and strengthen.

Attract Seasoned Executives and Science and Technology Personnel to our Company

In May 2007, we retained Dr. David F. Eaton as our Interim Chief Technology Officer and in January 2008, Dr. Eaton became our permanent Chief Technology Officer. Previously, Dr. Eaton spent thirty years with DuPont where he worked in research & development, research & development management and business leadership positions. Dr. Eaton spearheaded DuPont s entry into polymer-based components for fiber optic telecommunication by founding DuPont Photonics Technology, a wholly owned subsidiary of DuPont.

In March 2008, we hired Terry Turpin to our technology team. Mr. Turpin began his engineering career developing computing engines for the National Security Agency (NSA) where he served as Chief of the Advanced Processing Technologies Division, representing the NSA on the Tri-Service Optical Processing Committee organized by the Under Secretary of Defense for Research and Engineering.

In August 2008, we retained Mr. James S. Marcelli as our Chief Executive Officer. Mr. Marcelli has served as the president and/or chief executive officer of multiple start-up and growth companies in high tech development and manufacturing businesses with a core focus on business and market development and building strong management teams.

In November 2008, we added Howard E. Simmons, III, PhD to our technology team. Dr. Simmons is a graduate of MIT and Harvard, who spent 25 years with DuPont engaged in research & development at the corporate and business unit level. Mr. Simmons has contributed to programs in organic light emitting diodes (OLEDS), printable electronics, graphic arts, optical recording materials and fundamental polymer research and holds 26 patents.

In February 2009, we added Anthony J. Cocuzza, PhD to our technology team. Dr. Cocuzza worked for 30 years in medicinal chemistry and brings a highly developed set of synthetic and analytical skills to our Company. A graduate of Princeton, Dr. Cocuzza spent 24 years with DuPont engaged in corporate research & development and with DuPont s joint venture with Merck.

Expand Into A State-Of-The-Art Development, Testing and Manufacturing Facility

We plan to expand into a state-of-the-art development, testing and manufacturing facility in order to advance our technology platforms, attract additional key industry talent, streamline our product development processes and minimize our time to market. We have already begun to integrate our operations with respect to streamlining our product development process and minimizing the time to market for our potential products through a multifaceted approach to material development. We are able to accomplish this because our technology provides us with the flexibility to create tailored material properties for a multitude of specific applications, and also to allow for the specific tailoring of materials for compatibility with silicon, glass, metals or many polymers.

In August 2006, we executed a co-location agreement with a New Jersey-based micro-optics company, InPlane Photonics that allowed our scientists to advance our organic material development. The agreement with InPlane was terminated in early 2007 in favor of a strategic alliance formed in December, 2006 with Photon-X, LLC, a Pennsylvania-based company that has significant experience in polymer waveguide production. Photon-X is working as a strategic ally with our Company to establish a pre-production line in order to test and integrate our organic materials into waveguide devices and system prototypes as a first step toward product commercialization. The agreement affords our Company access to a full suite of fabrication facilities capable of producing commercial quantities of precision micro-optic devices such as high-speed 40Gb/s telecom modulators, optical filters, and optical interconnects important to military and civilian global information movement and management markets.

Our Research and Development

During the fiscal year ended December 31, 2010, our company-sponsored research and development activities expenses were $1,709,171 as compared to $1,662,813 for the fiscal year ended December 31, 2009. Research and development expenses currently consist primarily of compensation for employees engaged in internal research and product development activities; laboratory operations, outsourced prototype electro-optic device development and processing work; customer testing; material testing; fees; 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 continued development to support commercialization of our electro-optic materials technology; subcontracting work to build prototypes; expanding and

equipping in-house laboratories; hiring additional technical and support personnel; pursuing other potential business opportunities; customer testing and evaluation; and incurring related operating expenses. For the three months ended March 31, 2011, we spent approximately $466,864 on company-sponsored research and development activities.

Our research and development process consists of the following steps:

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We develop novel polymer materials utilizing our patent pending technology to meet certain performance specifications. We then develop methods to synthesize larger quantities of such material.

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We conduct a full battery of tests at the completion of the synthesis of each new polymer material to evaluate its characteristics. We also create development strategies to optimize materials to meet specifications for specific applications.

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We integrate data from the material characterization and test results to fabricate devices. We analyze device-testing results to refine and improve fabrication processes and methods. In addition, we investigate alternative material and design variations to possibly create more efficient fabrication processes.

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We create an initial device design using simulation software. Following device fabrication, we run a series of optical and electronic tests on the device.

Our Current Strategic Partners

Photon-X, LCC

Photon-X, LLC, is a technology solutions provider for polymer waveguides that works in conjunction with various government agencies. In connection therewith, we will provide Photon-X with our unique polymeric material to be tested and used on certain niche devices for anticipated military and commercial applications. If the tests are successful, our management believes that our alliance with Photon-X will serve to simultaneously lead its commercialization as well as publicly validate its scientific findings, creating a new standard in electro-optic polymers.

The University of Alabama

The University of Alabama, Department of Chemistry specializes in novel approaches to solving complex chemical problems with a focus on new or unusual bonding arrangements. The research group couples extraordinary synthetic skills with novel structures using of a variety of physical techniques as well as theoretical/computational methods. The Department of Chemistry is well equipped for modern research.

The City University of New York (CUNY)

The City University of New York (CUNY) Laboratory for Nano and Micro Photonics (LaNMP) has developed technology to fabricate high index contrast slot waveguides using organic composites of inorganic nanoparticles. These devices take advantage of the high index contrast to concentrate optical power into the composite materials of the waveguide itself, thus enhancing the non-linear optical response. The group has exploited this effect to build optical devices with specific optical responses such as lasing, optical switching, optical amplification and others.

Lehigh University

Lehigh University Center for Optical Technologies is a multi-institutional initiative with a charter to advance research and applications of optical and optoelectronic technologies. Currently, the three primary research focus areas are optoelectronics, all-optical functionalities, and biophotonics involving applications of nonlinear optics for material characterization involving second and third order nonlinear optical effects.

Perdix

In August 2009, we retained Perdix, Inc. located in Boulder, Colorado to help us identify and build prototype products for high growth potential target markets in fiber optic telecommunications systems. Perdix, Inc. provides engineering, research, and development services for government and industry in the optics and optics related industries. In addition to optical design, science, and technology, its specific strength is materials science as applied toward novel optical device design and development. They have significant expertise in the liquid crystal, polymer, nanocomposite, and nonlinear optical materials field. 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.

Our Past Government Program Participation

General

Our Company has been a participant in several vital government sponsored research and development programs with various government agencies that protect the interests of our country. The following is a list of some of the various divisions of government agencies that have provided us with advisory, financial and/or materials support in the pursuit of high-speed electro-optic materials. We are not partnered with, strategically related to, or financially supported by any governmental agency at this time.

National Reconnaissance Office (NRO)

During 1998 and 1999, we worked with the NRO to advance the development of extremely high performance electro-optic polymers pursuant to an unclassified Director's Innovative Initiative. The NRO is a member of the Department of Defense Agency and plays a primary role in achieving information superiority for the U.S. Government and Armed Forces. The NRO designs, builds, and operates reconnaissance satellites, assists in military operation preparedness, and monitors the environment. NRO products are paramount to national security and are provided to an expanding list of users including the Central Intelligence Agency and the Department of Defense.

Army Research Laboratory (ARL)

During 1998 through 2000, we were provided strong support for our electro-optic materials development by the Process and Properties Branch of the Army Research Laboratory on the Aberdeen Proving Grounds in Aberdeen, Maryland. This support was in cooperation with other government agencies and included the advisory support of the Army Missile Command at Redstone Arsenal. The Army Research Laboratory provided us with access to its highly advanced organic chemical development laboratories and state-of-the-art analytic equipment. PSI- TEC operated out of more than five laboratories at the Army Research Laboratory. During the nascent stages of our technological development, this support provided us with the strong foundations we needed to progress electro-optic technology into its second generation. The technically skilled members at Army Missile Command provided our engineers instruction on the latest advancements of the military's research and development in the area of polymeric materials and device fabrication. Much of our initial work at the Army Research Laboratory was based upon revolutionary advancements of our Chief Technical Officer's highly unique electro-optic polymeric design as exhibited in our U.S. Patent #6,041,157: "Environmentally sensitive compositions of matter based on 3H-fluoren-3-ylidenes and process for making same."

Defense Advance Research Project Agency (DARPA)

DARPA, the agency in the Intelligence Community credited with the origination of the Internet, provided our Company with funding for the advancement of our technologies and bridging these technologies to the public market. Under the auspices of DARPA initiatives, the MORPH (Molecular Photonics) and C2OI (Chip-to-Chip Optical Interconnects) programs, our advanced technologies were reviewed by the Naval Air Warfare Center Weapons Division (NAVAIR) and the Air Force Research Laboratory (AFRL). DARPA works to maintain the technological superiority of the U.S. military and to prevent technological surprise from harming our national security by sponsoring revolutionary, high-payoff research that bridges the gap between fundamental discoveries and their military use.

Naval Air Warfare Center Weapons Division (NAVAIR)

Under the auspices of the Defense Advance Research Projects Agency (DARPA), high-level scientists at the Naval Air Warfare Center Weapons Division in China Lake, California reviewed our electro-optic molecular design paradigms in 2004. Computer calculations regarding the quantum mechanical performance of our electro-optic molecular designs were repeated and verified by NAVAIR staff. These calculations suggest an improvement in electro-optic performance over the current state-of-the-art.

Our unique, proprietary technology was demonstrated through detailed computer calculations to improve existing approaches in the production of ultra fast frequencies (wide bandwidths). Calculations performed at NAVAIR regarding our preliminary, first-stage next-generation molecular architectures indicate an improvement of hyperpolarizability (electro-optic character) of several times existing state-of-the-art molecular designs.

These computer calculations have been validated by independent tests performed on our recently developed electro-optic materials at the University of Arizona.

Air Force Research Laboratory (AFRL)

In cooperation with the Defense Advance Research Projects Agency (DARPA), our molecular design technologies were reviewed by top-level and senior engineers and scientists at the Air Force Research Laboratory at Wright-Patterson Air Force Base in Dayton, Ohio. An Air Force Research Laboratory senior scientist and engineer, in connection with a National Science Foundation proposal and as a result of reviews conducted under the Defense Advance Research Projects Agency's C2OI (Chip-to-Chip Optical Interconnects) and MORPH (Molecular Photonics), concluded that, "[our] molecular designs show promise of a five to ten times improvement over existing commercial polymeric architectures." In review of detailed calculations performed on our future material designs, Air Force Research Laboratory personnel further note, "Computer simulations and modeling indicate that [our] approach to materials synthesis has the potential for realizing high nonlinearity (i.e., high electro-optic performance). This, in turn, could result in five to ten times lower drive voltages for devices." "Synthesis of [our] materials to verify the properties predicted by the computer models is essential for new NLO (electro-optic) polymer material development.... This is a very novel and promising approach that has the potential for high payoff."

These predictions were validated in 2006 by independent tests performed on our patented and patent-pending electro-optic materials at the University of Arizona, which performed approximately seven times better than other competitive technologies.

In regards to applications of our materials, an Air Force Research Laboratory senior scientist states, "Highly active NLO (electro-optic) polymer materials are key for the realization of next generation electro-optic devices and render high application potential for high-speed fiber-optic telecommunication (i.e., Internet, HDTV), satellite reconnaissance (i.e., homeland security), and navigation and guidance systems."

Our Competition

The markets we are targeting for our electro-optic polymer technology are intensely competitive. Among the largest fiber-optic component manufactures are Finisar, NeoPhotonics, OpLink, CyOptics, FiBest and Multiplex. Additional the five largest inorganic modulator component manufacturers hold approximately 85% of the electro-optic modulator

component market. They are JDS Uniphase, 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 modulator designs.

Other than our own Company, we are aware of only one other company, Gigoptix, Inc. that reorganized with Lumera Corporation in December 2008 that competes directly with us. They have designed and patented potentially commercially feasible electro-optic polymers and hold an exclusive license to all electro-optic polymeric technology developed within the University of Washington.

As a result, no significant commercial market developments have occurred with electro-optic polymer devices. This is because all previously known electro-optic polymer design strategies incorporate molecular structures that adversely react to the requisite polymerization processes that thermally-stabilize the material matrix. This inherent design flaw causes the polymer to melt at unreasonably low temperatures, which corrupts the polymer's electro-optic performance.

As one of only two companies known to us that are actively pursuing the development of high-performance electro-optic materials for application and development in the high-speed telecommunication markets, we believe that upon the commercialization of our technology, that we will be poised to obtain a significant portion of the component manufacturing market. Electro-optic polymers demonstrate several advantages over other technologies,

such as crystalline-based technologies, due to their reduced manufacturing and processing costs, higher performance and lower power requirements. Our electro-optic polymers are CSC model molecules that have demonstrated significant stability advantages over our sole known competitor's materials. In the expectation of becoming the sole producer of high-performance, high-stability electro-optic materials, we hope to capture all or some of this potential electro-optic component market.

We believe the principal competitive factors in our target markets are:

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The ability to develop and commercialize highly stable polymer-based products, including obtaining appropriate patent and proprietary rights protection.

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Lower cost, high production yield for these products.

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The ability to enable integration and implement advanced technologies.

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Strong sales and marketing channels for access to products.

We believe that our current business planning will position our Company to compete adequately with respect to these factors. Our future success is difficult to predict because we are an early stage company with all of our potential products still in development.

Many of our existing and potential competitors have substantially greater research and product development capabilities and financial, scientific, marketing and human resources than we do. 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 achieve greater market acceptance than our potential products.

.

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

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Respond 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.

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Take advantage of acquisition or other opportunities more readily than we can.

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 Laboratory Facilities and Office Property Lease

We lease 1,400 square feet of laboratory space at 41A Germay Drive, Wilmington, Delaware 19804-1100. Our Company operates an organic synthesis and thin-films laboratory at this space, and our annual rent is $9,393.60. These facilities include equipment such as NMR, IR, UV/VIS and HPLC analytical systems, profilometry evaluation and electro-optic (r33) materials characterization necessary to produce next generation fiber-optic organic materials. We also utilize an electro-optic test facility in conjunction with local universities to perform critical evaluation tests (e.g., R33) on our polymer material films and future electro-optic devices, such as our waveguides, modulators and all-optical transistors.

Our executive and business office headquarters are located at 121 Continental Drive, Suite 110, Newark, Delaware 19713. We coordinate our operations and market our services from this space. Our annual rent for this space is $9,142.

Employees

We currently have 4 full-time employees and 4 part-time employees, and we retain several independent contractors on an as-needed basis. We believe that we have good relations with our employees.

Legal Proceedings

We are not currently a party to or engaged in any material legal proceedings. However, we may be subject to various claims and legal actions arising in the ordinary course of business from time to time.

Corporate Information

Our principal executive office is located at 121 Continental Drive, Suite 110, Newark, Delaware 19713, and our telephone number is (302)-356-2717. Our website address is www.lightwavelogic.com. Information contained in, or accessible through, our website does not constitute a part of, and is not incorporated into, 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.

MANAGEMENT

Executive Officers and Directors

The following table sets forth as of the date of this prospectus the name, age and position of each person who serves as an executive officer, director and significant employee of our Company. There are no family relationships among any of our executive officers or directors.

Name	Age	Position(s)
James S. Marcelli	63	Chief Executive Officer, President, Principal Executive Officer and Director
Andrew J. Ashton	37	Senior Vice President, Treasurer, Secretary, Principal Financial and Accounting Officer and Director
David F. Eaton	64	Chief Technology Officer
Frederick J. Goetz, Jr.	38	Senior Vice President
Philips W. Smith	73	Chairman of the Board of Directors
Ross Fasick	78	Director
William C. Pickett, III	67	Director
Thomas E. Zelibor	57	Director
Joseph A. Miller	69	Director
Terry Turpin	68	Significant Employee

Business Experience of Executive Officers and Directors

***Mr. James S. Marcelli*.** Mr. Marcelli has served as an officer and director of our Company since August 2008. Mr. Marcelli is in charge of the day-to-day operations of our Company and its movement to a fully functioning commercial corporation. Since 2000, Mr. Marcelli has served as the president and chief executive officer of Marcelli Associates, a consulting company that offers senior management consulting, mentoring, and business development services to start-up and growth companies. Business segments Mr. Marcelli has worked with included an Internet networking gaming center, high speed custom gaming computers, high tech manufacturing businesses and business service companies.

***Mr. Andrew J. Ashton*.** Mr. Ashton has served as an officer and director of our Company since July 2004. Since that time his assistance in the creation of the synthetic chemistry of our novel molecular architecture has been fundamental to our Company's success. His current duties include the development of chemical synthesis, providing extensive analytical support and assisting with our Company's management goals. Mr. Ashton is a skilled computer scientist and organic chemist who began his career in 1998 at the Army Research Laboratory on the Aberdeen Proving Grounds where he helped to design and implement computer interfaces for fiberglass composite analysis.

Dr. David F. Eaton. Mr. Eaton has served as an officer of our Company since May 2007. For over 30 years, Mr. Eaton was employed in DuPont's chemical division, with his most recent appointment being its technology director. Most recently, from September 2003 to present, Mr. Eaton founded and is the principal of Light Insights, LLC, a consulting firm, and from March 2005 to present, Mr. Eaton has served as vice president of technology for software company Precision Cure, LLC. Mr. Eaton has a bachelor's degree in chemistry from Wesleyan University and a Ph.D. in chemistry from the California Institute of Technology.

Mr. Frederick J. Goetz, Jr. Mr. Goetz has served as an officer and director of our Company since July 2004 and resigned as a director effective as of May 10, 2011. He is a leader in the corporate coding and operation of electrostatic simulation software for nonlinear optic materials development and aids in the development of novel molecular designs and quantum mechanical interpretation at our Company. Prior to joining our Company, Mr. Goetz began his career at Lawrence Berkeley Laboratory and the Army Research Laboratory on Aberdeen Proving Grounds after graduating first in his class in physics from the University of Delaware in 1997. He holds a degree in physics.

Dr. Philips W. Smith. Dr. Smith has served as Non-Executive Chairman of the Board of Directors of our Company since January 2010. Dr. Smith is the father of Thomas P. Smith, who in January 2010, resigned as board member. In 2001, Dr. Smith brought TASER International, Inc. public through an IPO and most recently served as Chairman of TASER International, Inc. (NasdaqGS: TASR) until his retirement from that position in December 2004. Dr. Smith subsequently resigned his TASER board seat in October 2006. Since then, Dr. Smith has been actively involved as an investor in start-up companies. Dr. Smith s educational experience includes a B.S. from West Point, an M.B.A. from Michigan State University and a PhD from St. Louis University.

Dr. Ross Fasick. Dr. Ross Fasick has served as a director of our Company since July 2008. Dr. Fasick has a broad spectrum of global business and chemistry experience that spans over thirty years. Dr. Fasick spent the early years of his career with DuPont as a research chemist primarily working with polymers and dyes. During his thirty year tenure at Dupont, Dr. Fasick held diverse positions ranging from manufacturing and business development to making divestitures and acquisitions. He served as both President of DuPont s Brazil division and Director of worldwide paint operations. He completed his DuPont career as Senior VP of Polymers and Automotive, a division that generates multi-billion dollar annual revenues. Since his retirement, Dr. Fasick has remained an active board and committee member for private college and pre-college level institutions. Dr Fasick earned his Ph.D in organic chemistry at the University of Delaware.

Mr. William C. Pickett, III. Mr. Pickett has served as a director of our Company since January 2008. Mr. Pickett enjoyed a 32 year career with E.I. DuPont de Nemours & Co., where he worked in numerous financial leadership positions, including serving from February 2002 to April 2004 as Chief Financial Officer of Invista, DuPont's $7 billion man-made fibers company, which was ultimately sold to Koch Industries, Inc. Since February 2005 Mr. Pickett has served as a member of the Board of Directors, Executive Committee, Treasurer and Chair of the Finance Committee of the Ronald McDonald House of Delaware; and since December 2004, Mr. Pickett has been serving as a Trustee, Chair of Audit Committee and Chief Compliance Officer of Operation Warm. Mr. Pickett received his MBA from Harvard Business School and a BA from Trinity College.

Thomas E. Zelibor, Rear Admiral, USN (Ret). RADM Zelibor has served as a director of our Company since July 2008. RADM Zelibor has over twenty years of strategic planning and senior leadership experience. Currently, RADM Zelibor serves as the Chief Executive Officer and President of Flatirons Solutions Corp. a professional services firm that provides consulting, systems integration, systems & software engineering, and program management expertise to corporate and government clients. Previously, from July 2006 RADM Zelibor, served as the Dean of the College of Operational and Strategic Leadership at the United States Naval War College where he was responsible for the adoption of a corporate approach to leadership development. Prior to that time,, RADM Zelibor served in a number of positions, including as Director of Global Operations, United States Strategic Command; Director, Space, Information Warfare, Command and Control on the Navy staff; Department of the Navy, Deputy Chief Information Officer (CIO), Navy; Commander, Carrier Group Three and Commander, Naval Space Command.

Dr. Joseph A. Miller. Dr. Miller has served as a director of our Company since May 10, 2011. Dr. Miller currently serves as Executive Vice President and Chief Technology Officer of Corning Incorporated, having joined Corning Incorporated in 2001 as Senior Vice President and Chief Technology Officer. Dr. Miller was elected to his current position in 2002. Prior to joining Corning Incorporated, Dr. Miller was with E.I. DuPont de Nemours, Inc., where he served as Chief Technology Officer and Senior Vice President for Research and Development since 1994. Dr. Miller

began his career with DuPont in 1966. Dr. Miller is a director of Greatbatch, Inc. and Dow Corning Corporation and holds a doctorate degree in Chemistry from Penn State University.

***Mr. Terry Turpin*.** Mr. Turpin has served as our Optical Computing Guru since March 2008. Since October 2006, Mr. Turpin has been a member of the UMBC College of Natural Science and Mathematics Advisory Board. Until January 2007, when Essex Corporation was acquired by Northrop Grumman Space & Mission Systems Corp., Mr. Turpin was a director of Essex Corporation. Mr. Turpin remained Senior Vice President and Chief Scientist for Essex Corporation after its acquisition until April 2007. Mr. Turpin was appointed as a director of Essex Corporation in January 1997 and became its Senior Vice President and Chief Scientist in 1996. He joined Essex Corporation through a merger with SEDC where he was Vice President and Chief Scientist from September 1984 through June 1989. From December 1983 to September 1984 he was an independent consultant. From 1963 through December 1983, Mr. Turpin was employed by the National Securities Agency (NSA). He was Chief of the

Advanced Processing Technologies Division for ten years. He holds patents for optical computers and adaptive optical components. Mr. Turpin represented NSA on the Tri-Service Optical Processing Committee organized by the Under Secretary of Defense for Research and Engineering. He received a Bachelor of Science degree in Electrical Engineering from the University of Akron in 1966 and a Master of Science degree in Electrical Engineering from Catholic University in Washington, D.C. in 1970.

Each Director of the Company holds such position until the next annual meeting of shareholders and until his successor is duly elected and qualified. The officers hold office until the first meeting of the board of directors following the annual meeting of shareholders and until their successors are chosen and qualified, subject to early removal by the board of directors.

Section 16(a) Beneficial Ownership Reporting Compliance

To the best of our knowledge, based solely upon a review of Forms 3, 4 and 5 and amendments thereto furnished to our Company, and any written representation referred to in paragraph (b)(1) of Item 405 of Regulation S-K, no officer, director and/or beneficial owner of more than 10% of our common stock, failed to file on a timely basis reports as required by Section 16(a) of the Exchange Act.

Code of Ethics

The Company has not yet adopted a code of ethics for its principal executive officer, principal financial officer, principal accounting officer or controller, or persons performing similar functions or any other position due to its development stage, the small number of executive officers involved with the Company, and the fact that the Company operates with few employees. However, the Company intends to adopt a code of ethics in the near future.

Audit Committee

The Company does not have a separately designated standing audit committee in place; the Company s entire board of directors served, and currently serves, in that capacity. This is due to the Company s development stage, lack of business operations, the small number of executive officers involved with the Company, and the fact that the Company operates with few employees. Our board of directors will continue to evaluate, from time to time, whether a separately designated standing audit committee should be put in place.

Compensation Committee

Our Board of Directors currently has no standing compensation committee or committee performing similar functions. This is due to the Company s development stage, lack of business operations, the small number of executive officers involved with the Company, and the fact that the Company operates with few employees. The Company s entire board of directors currently participates in the consideration of executive officer and director compensation. Our board of directors will continue to evaluate, from time to time, whether it should appoint standing compensation committee.

Executive officers who are also directors participate in determining or recommending the amount or form of executive and director compensation, but the ultimate determination of executive compensation is determined by the independent directors. Neither the board nor management utilizes compensation consultants in determining or recommending the amount or form of executive and director compensation.

Nominating Committee

Our Board of Directors does not have a nominating committee. This is due to our development stage and lack of business operations. Instead of having such a committee, our Board of Directors historically has searched for and evaluated qualified individuals to become nominees for membership on our Board of Directors. The directors recommend candidates for nomination for election or reelection for each annual meeting of shareholders and, as necessary, to fill vacancies and newly created directorships.

Board Leadership Structure

Our bylaws provide the Board of Directors with flexibility to combine or separate the positions of chairman of the Board of Directors and Chief Executive Officer in accordance with its determination that utilizing one or the other structure is in the best interests of our Company. Our current structure is that of separate Chief Executive Officer and Chairman of the Board. Mr. James S. Marcelli serves as our Chief Executive Officer and is responsible for the day-to-day leadership of the Company. Dr. Philips W. Smith serves as our full-time non-executive Chair of the Board of Directors. Dr. Smith is considered an independent director. From time to time, each of the other independent directors works with Dr. Smith to perform a variety of functions related to our corporate governance, including coordinating board activities, setting relevant items on the agenda (in consultation with our Chief Executive Officer, as necessary or appropriate) and ensuring adequate communication between the Board of Directors and management. In addition, our Board of Directors has determined that maintaining the independence of a majority of our directors helps maintain its independent oversight of management.

Risk Oversight

The Board of Directors is actively involved in the oversight of risks, including strategic, operational and other risks, which could affect our business. The Board of Directors does not have a standing risk management committee, but administers this oversight function directly through the Board of Directors as a whole, which oversee risks relevant to their respective functions. The Board of Directors considers strategic risks and opportunities and administers its respective risk oversight function by evaluating management s monitoring, assessment and management of risks, including steps taken to limit our exposure to known risks, through regular interaction with our senior management and in board and committee deliberations that are closed to members of management. The interaction with management occurs not only at formal board and committee meetings but also through periodic and other written and oral communications.

Meetings of the Board and Committees

During 2010, there were 4 meetings of the Board of Directors. Each current director attended at least 75% of the total number of meetings of the board held in 2010. The Board of Directors also acted at times by unanimous written consent, as authorized by our bylaws and the Nevada Revised Statutes.

EXECUTIVE COMPENSATION

The table below summarizes all compensation awarded to, earned by, or paid to our named executive officers for the fiscal years ended December 31, 2010 and 2009:

Summary Compensation Table

Name and Principal Position	Year	Salary ($)	Bonus ($)	Stock Awards ($)	Option Awards ($)	All Other Compensation ($)	Total ($)
(a)	(b)	(c)	(d)	(e)	(f)	(i)	(j)
James S. Marcelli	2010	184,833	0	0	541,667	1,200	727,700
Chief Executive Officer, President, Principal Executive Officer (1)(2)	2009	174,000	14,500	0	516,233	7,200	711,933
Andrew J. Ashton,							
Senior Vice President, Treasurer, Secretary, Principal Financial and	2010	96,000	0	0	0	0	96,000
Accounting Officer (2)(3)	2009	96,000	0	0	13,206	0	109,206
David F. Eaton,	2010	57,000	0	0	181,457	0	238,457
Chief Technology Officer (4)	2009	48,250	0	58,000	99,617	13,206	219,073
	2010	96,000	0	0	0	0	96,000
Frederick J. Goetz, Jr.,							
Senior Vice President (5)	2009	96,000	0	0	13,206	0	109,206

(1)

Pursuant to an employment agreement, effective August 1, 2010, Mr. Marcelli receives a salary of $16,667 per month and an option to purchase up to 100,000 shares of common stock at an exercise price of $1.50 per share. Pursuant to a previous employment agreement, Mr. Marcelli received a salary of $14,500 per month, a $600 per month offsite car allowance which terminated February 28, 2010, 200,000 shares of restricted stock in 2008, and an option to purchase up to 1,050,000 shares of common stock at an exercise price of $1.75 per share. In 2009, Mr. Marcelli received a bonus of $14,500 and the right to purchase 40,000 shares of restricted stock at an exercise price of $0.25 per share. Additionally, in the event Mr. Marcelli s employment terminates upon his death and the key man life insurance is in place for Mr. Marcelli, our Company will continue to pay the base cash compensation described in Mr. Marcelli s employment agreement to his estate through the remainder of term of his employment agreement, or 90 days, whichever is longer. The values described in column (f) reflect vested Options.

(2)

The compensation includes the amount for services rendered to the Company in his capacity as both an officer and a director. At no time during the last fiscal year was any outstanding option otherwise modified or re-priced, and there was no tandem feature, reload feature, or tax-reimbursement feature associated with any of the stock options we granted to our executive officers or otherwise. We grant stock awards and stock options to our executive officers based on their level of experience and contributions to our Company. The aggregate fair value of awards and options are computed in accordance with FASB ASC 718 and are reported in the Summary Compensation Table above in the columns (e) and (f). At no time during the last fiscal year was any outstanding option otherwise modified or re-priced, and there was no tandem feature, reload feature, or tax-reimbursement feature associated with any of the stock options we granted to our executive officers or otherwise.

(3)

Mr. Ashton receives an annual salary of $96,000. In January 2009, Mr. Ashton received a right to purchase 40,000 shares of restricted common stock at an exercise price of $0.25 per share.

(4)

Pursuant to an employment agreement, as amended, Dr. Eaton receives $500 per day. In January 2009 Dr. Eaton received a right to purchase 40,000 shares of restricted common stock at an exercise price of $0.25 per share and 100,000 shares of restricted common stock. The values described in column (f) and (i) reflect vested options

and warrants. On December 13, 2010, Dr. Eaton was awarded an option to purchase up to 150,000 shares of common stock at an exercise price of $1.00 per share.

(5)

Mr. Goetz receives an annual salary of $96,000. In January 2009 Mr. Goetz received a right to purchase 40,000 shares of restricted common stock at an exercise price of $0.25 per share.

The table below summarizes all of the outstanding equity awards for our named executive officers as of December 31, 2010, our latest fiscal year end:

Outstanding Equity Awards At Fiscal Year-End

	Option Awards					Stock Awards			
Name	Number of Securities Underlying Unexercised Options (#) Exercisable (b)	Number of Securities Underlying Unexercised Unearned Options (#) Unexercisable (c)	Equity Incentive Plan Awards: Number Of Securities Underlying Unexercised Unearned Options (#) (d)	Option Exercise Price ($) (e)	Option Expiration Date (f)	Number Of Shares Or Units Of Stock That Have Not Vested (#) (g)	Market Value Of Shares Of Units Of Stock That Have Not Vested ($) (h)	Equity Incentive Plan Awards: Number Of Unearned Shares, Units Or Other Rights That Have Not Vested (#) (i)	Equity Incentive Plan Awards: Market Or Payout Value Of Unearned Shares, Units Or Other Rights That Have Not Vested ($) (j)
James S. Marcelli Chief Executive Officer, President, Principal Executive Officer (1)	25.000	75,000		1.50	7/31/15				
	787,500	262,500	---	1.75	07/31/2013	---	---	---	---

Andrew J. Ashton, Senior Vice President, Treasurer, Secretary, Principal Financial and Accounting Officer	---	---	---	---	---	---	---	---	---
David F. Eaton, Chief Technology Officer (2)	75,000 501,000	75,000 ---	--- ---	1.00 0.72	12/12/15 11/17/2012	--- ---	--- ---	--- ---	--- ---
Frederick J. Goetz, Jr., Senior Vice President	---	---	---	---	---	---	---	---	---

(1)

On August 1, 2008 Mr. Marcelli received an option to purchase up to 1,050,000 shares of our common common stock at an exercise price of $1.75 per share. The options vest quarterly over three years in equal installments of 87,500 shares per quarter beginning November 1, 2008. On August 1, 2010, Mr. Marcelli received an option to purchase up to 100,000 shares of our common stock at an exercise price of $1.50 per share. The options vest quarterly over two years in equal installments of 12,500 shares per quarter beginning August 1, 2010.

(2)

On November 17, 2007 Dr. Eaton was awarded an option to purchase up to 501,000 shares of our common stock at an exercise price of $.72 per share. On December 13, 2010, Dr. Eaton was awarded an option to purchase up to 150,000 shares of our common stock at an exercise price of $1.00 per share which vest as follows: 75,000 shares vest immediately and 75,000 shares vest six months from December 13, 2010.

Compensation of Directors

Set forth below is a summary of the compensation of our directors during our December 31, 2010 fiscal year:

Name	Fees Earned or Paid in Cash ($)	Stock Awards ($)	Option Awards ($)(8)	Non-Equity Incentive Plan Compensation ($)	Non-Qualified Deferred Compensation Earnings ($)	All Other Compensation ($)(9)	Total ($)
Philips W. Smith (1)	--	--	--	--	--	580,167	580,167
Ross Fasick (2)	--	--	112,155	--	--	--	112,155
William C. Pickett, III (3)	--	--	87,921	--	--	--	87,921
Thomas E. Zelibor (4)	--	--	108,002	--	--	--	108,002
James S. Marcelli							