

NANOPHASE TECHNOLOGIES Corp
Form 10-K
March 29, 2017

United States

SECURITIES AND EXCHANGE COMMISSION

Washington, D.C. 20549

FORM 10-K

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

For the fiscal year ended December 31, 2016

or

TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) of the Securities Exchange Act of 1934

FOR THE TRANSITION PERIOD FROM _____ TO _____

Commission File Number 000-22333

NANOPHASE TECHNOLOGIES CORPORATION

(Exact name of registrant as specified in its charter)

Delaware

36-3687863

(State or other jurisdiction

(I.R.S. Employer Identification No.)

of incorporation or organization)

1319 Marquette Drive, Romeoville, Illinois 60446

(Address of principal executive offices) (zip code)

Registrant's telephone number, including area code: **(630) 771-6708**

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

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

Common Stock, par value \$.01 per share

Indicate by check mark whether the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes No

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Act. Yes No

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

Indicate by check mark whether the registrant has submitted electronically and posted on its corporate Web site, if any, every Interactive Data File required to be submitted and posted pursuant to Rule 405 of Regulation S-T (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit and post such files). Yes No

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K is not contained herein, and will not be contained, to the best of registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K.

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

company” in Rule 12b-2 of the Exchange Act. (Check one):

Large accelerated filer Accelerated filer

Non-accelerated filer Smaller reporting company

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

The aggregate market value of the registrant’s voting stock held by non-affiliates of the registrant based upon the last reported sale price of the registrant’s common stock on June 30, 2016 was \$10,265,000 as of such date.

The number of shares outstanding of the registrant’s common stock, par value \$.01, as of March 14, 2017 was 31,229,996.

DOCUMENTS INCORPORATED BY REFERENCE

None.

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PART I

Item 1. Business

General

Nanophase Technologies Corporation (“Nanophase” or the “Company”, including “we”, “our” or “us”) is an advanced materials and applications developer and commercial manufacturer with an integrated family of materials technologies. We produce engineered nano and sub-micron materials for use in a variety of diverse markets: personal care including sunscreens, architectural coatings, industrial coating applications, abrasion-resistant additives, plastics additives, medical diagnostics, energy and a variety of surface finishing technologies (polishing) applications, including optics.

While our origin is based on the creation of nanoscale metal oxide products, we have expanded our offerings to include larger but still sub-micron materials. We have developed techniques for managing attributes including particle size, shape, surface coatings, and other valuable aspects of the material. Our focus is on customer need where we believe we have an advantage, as opposed to finding uses for one particular technology. Additionally, as the format of delivery is important to customers, we have developed proprietary capabilities for dispersing our materials into both aqueous (water-based) and solvent-based liquid media. These capabilities allow us to better integrate with the customer’s need and application. Finally, we have expanded our offerings beyond active ingredients to include targeted full formulations of skin care products, marketed and sold by our wholly-owned subsidiary, Solésence™ LLC.

We target markets in which we believe practical solutions may be found using our products. We work closely with current and potential customers in these target markets to identify their material and performance requirements. We market our materials to various end-use applications manufacturers and our Solésence™ solutions to cosmetic and skin care brands. Recently developed technologies have made certain new products possible and opened potential new markets. We expect growth in end-user (manufacturing customers, including customers of our customers) adoption in 2017 and beyond. Our initiatives in targeted market areas are progressing at differing rates of speed, but we have been broadly moving through testing and development cycles, and in a number of cases believe we are approaching first revenue or next stage revenue with particular customers in the industries referenced above. During 2015 we were granted a patent on a new type of particle surface treatment (coating), which became the cornerstone of our new product development in personal care, with first revenue recognized during 2016 and the creation of our Solésence™ LLC subsidiary to manufacture and sell fully developed solutions to targeted customers in the skin care industry, in addition to the additives we have traditionally sold in the personal care area. During 2015 and 2016 we developed and began to sell solutions in the energy management (particularly solar control) industry. We believe that successful introduction of our materials with manufacturers may lead to follow-on orders for other materials in their applications. Although our primary strategic focus has been the North American market, we currently sell material to customers overseas and have been working to expand our reach within foreign markets. The Company was incorporated in

Illinois on November 25, 1989, and became a Delaware corporation during November 1997. Our common stock trades on the OTCQB marketplace under the symbol NANX.

We have created a leading commercial approach to the application of our integrated materials technologies designed to deliver an optimal engineered solution for a target market or specific customer application. With respect to our products, we have complete capability from application development and laboratory samples through pilot production and, finally, commercial production currently at rates as high as hundreds of metric tons per year for individual products. We have development and application laboratories and manufacturing capacity in two locations in the Chicago area. Our manufacturing is based on Lean Six Sigma discipline and is certified to ISO 9001, American National Standard, Quality Management System Requirements; ISO 14001, American National Standard, Environmental Management System Requirements; and is compliant with current Good Manufacturing Practices (“cGMP”) for products under U.S. Food and Drug Administration (“FDA”) regulation.

We have undergone a strategic shift during recent years toward penetrating key markets via interactive applications development with end-use customers in these markets. We also supply both nanoscale and larger materials, based on market requirement. We believe this strategy leverages the applications development expertise we have cultivated over the last several years and best positions us to build direct sales to end-use customers, in addition to translating these advantages through our market partners.

Nanomaterials

Nanomaterials are generally comprised of particles (nanoparticles) that are less than 100 nanometers in diameter and these nanoparticles have a wide range of unique properties owing to their very small size. A nanometer is one-billionth of a meter, or about 100,000 times smaller in size than the width of a human hair.

Nanotechnology involves manipulating the properties of materials, made up of basic elements or combinations thereof, at the 100-nanometer level or below. At this scale, the relatively small number of constituent atoms, the large proportion of these atoms on surfaces, and their confined dimensions lead materials to exhibit unique properties that can be used in many applications to benefit performance.

Nanomaterials are an important and enabling part of the diverse field of nanotechnology and are the building blocks of our nanotechnology products. The ultimate performance and value of Nanophase's products in a given application is a function of nanoparticle composition, size, shape, structure, surface chemistry and coating and dispersion potential. Our technologies for engineering and manufacturing nanomaterials, and our understanding of how to make nanomaterials exhibit desirable performance characteristics in various media, result in commercial nanomaterials solutions that we believe offer superior performance in many applications.

Nanomaterials have applications in diverse global markets where they are incorporated into a process, such as optics polishing, or a product, such as an industrial coating to prevent degradation or aid in application, or significantly improve wear resistance, or promote/hamper particular chemical reactions within respective systems. Multiple markets exist for our products since nanomaterials offer advantages in many applications, such as improved properties and performance, longer wear or product life, lower overall product cost, or in the development of new products or processes.

Most of the raw materials we use are commercially available. In some cases, we rely on sole-source processors of materials that utilize an array of worldwide sources for the raw materials that they process to our specifications. However, in certain cases we deal with very limited supply of certain elements, such as those classified as "Rare Earth" elements- specifically cerium oxide for use in surface finishing technologies (polishing) applications, as well as the

very high purity zinc that we use in personal care applications.

Our Technologies

We have created an integrated platform of commercial nanomaterial technologies that are patented, patent-pending or proprietary. These technologies are designed to deliver a nanomaterial solution for a targeted market or a specific customer application. Our platform provides flexibility and capability to engineer nanomaterials that meet a customer's performance requirements and delivers our nanomaterial solutions in a readily usable format. Our technologies are scalable and robust, having produced several hundred metric tons annually.

Our nanomaterials platform includes two distinct manufacturing processes (PVS – Plasma Vapor Synthesis and NAS - NanoArc® Synthesis) to make nanomaterials or nanoparticles. These technologies allow us to control critical nanomaterial properties (composition, size, shape, structure, surface chemistry) and engineer these attributes to meet specific application performance. Compared to other well-developed known nanoparticle processes, our plasma-produced particles are produced as nonporous, dense, discrete single crystals, which we believe possess a unique set of bulk and surface properties.

Perhaps of greater importance, we have developed proprietary technology to disperse nanoparticles in both aqueous (water-based) and several organic solvent systems. These dispersions are stable at high weight loading (typically 18-55% by weight). These aspects provide distinct market advantages. Dispersed nanomaterials are desired by many customers for use in their processes or products because of the ease of incorporation. As examples, dispersed nanomaterials are used in industrial coatings, plastic additives and optical and semiconductor polishing. This integration flexibility allows us to serve more customers and serve them better, and is critical to our role as a solutions provider, not simply that of a materials provider.

We have also developed patented and proprietary technology to coat or surface treat nanoparticles to further engineer surface chemistry by two main processes. In many applications, such as sunscreens, this technology is vital to ensure formulation compatibility and, in some cases, optimal application performance. We deliver hundreds of metric tons of surface engineered nanoparticles to our customers annually, including coated nanomaterials that are used by major global consumer products companies for sunscreens and personal care products.

As markets continue to develop and grow, we believe that customers' preferred delivery formats will often be dispersed and/or coated nanomaterials. We believe we are well-positioned with our platform of integrated commercial nanomaterial technologies to respond to this demand. We plan to maintain and advance our intellectual property and technologies to remain competitive in the fields of nanomaterials development, applications development and commercialization.

We have used our expertise in nanoscale materials to develop larger sub-micron particle-based products that are not considered "nano" in various applications. Controlling aspects including particle size and shape, as well as surface chemistries, allow us to provide superior materials to the marketplace in various formats, both at the nano level and above.

We have steadily expanded our ability to commercially utilize and deliver our technologies. Through large-scale manufacturing of nanomaterials utilized in the manufacture of consumer sunscreen and personal care products and architectural coatings, we have developed production expertise that has allowed us to improve processes relating to those nanomaterials as well as processes relating to other nanomaterials. This experience has translated into additional know-how, intellectual property and advances in the technologies and manufacturing processes that reduce variable

manufacturing costs and improve gross margins.

Marketing and Distribution Methods

We focus our marketing strategy on differentiated solutions that create superior value for our customers. This customer-focused strategy means we are not solely dependent upon the efforts of a distributor for future sales growth. We have found many cases where our ability to effectively integrate nanomaterials into a customer's specific chemistry is critical to presenting an effective solution. Given this reality, we launched a "customer direct" business model during 2009 for those markets that are not conducive to an intermediary. In these markets, we interact with customers directly rather than through intermediaries, demonstrating the benefits of our solutions in their products. Our deep market knowledge of certain markets and applications has allowed us to understand customer needs and our products' value proposition, and adapt our offerings accordingly. This knowledge, combined with our applications development expertise, supports leveraging our development efforts by marketing and selling our solutions to multiple customers within each market. We work closely with each customer to develop a material solution for that entity's specific application(s), but we find that as we develop greater applications development expertise in a given area, specific applications development often becomes a routine process within Nanophase. This is where we believe our future customers will perceive the greatest value in working with us, and where we will be able to leverage our product development efforts into multiple revenue generating customer solutions.

We see this customer-focused marketing approach increasing our probability of success in many markets, allowing us to use an integrated platform of material technologies and typically reducing the total time-to-market. The more our applications development scientists and sales team work directly with customers to develop nanomaterial solutions, the more quickly and successfully we believe we will be able to grow sales.

In addition to serving customers in diverse markets and geographic locations, we will continue to devote significant resources to maintaining and growing our relationship with BASF Corporation (“BASF”), our largest customer in the personal care market. This has been a successful relationship that we expect will contribute to our future growth. BASF, which describes itself as the world’s leading chemical company with revenue of approximately \$100 billion, is a global leader in the personal care market with recognized brands, significant revenues and sales reach. We have a long-term exclusive relationship with BASF, primarily to provide zinc oxide-based products to be used in personal care with sunscreens and daily wear products being the dominant applications.

In addition to the personal care applications described above, our products are used in a variety of other applications, including architectural coatings, polishing applications (including optical glass and CMP), plastics additives, medical diagnostics, textiles and graphic arts, energy control applications, and others. Recent activities have expanded our presence in the personal care space, with a new particle surface treatment process (coating) providing the basis for new product offerings. 2016 saw our first revenue from products using our proprietary particle coating, which we look to expand under our new Solésence™ brand.

Because our technology can be applied to a wide variety of applications, we focus our efforts on only a handful of applications to gain a depth of knowledge and leverage our learning curve. If we find a unique application outside of our core markets that does not require significant development resources then we may pursue it as “opportunistic” business. We believe this focused approach will contribute to a higher success rate for related opportunities than we would experience by pursuing more opportunities simultaneously.

Technology and Engineering

Our efforts in research and development, process engineering and advanced engineering groups are focused in three major areas: 1) application development for our products; 2) creating or obtaining additional core material technologies and/or materials that have the capability to serve multiple markets; and 3) continuing to improve our core technologies to improve manufacturing operations and reduce costs.

Most of our research and development is directly related to applications development. We endeavor to either meet specific customer needs or to develop applications solutions to address unmet needs in a particular market where we

believe our materials will offer a distinct performance advantage. We believe that aggressively pursuing applications in targeted areas will help us compete as a technical and commercial innovator using our materials expertise, and more importantly, become perceived as a solutions provider by our customers and not simply as another materials supplier.

Our total research and development expense, which includes all expenses relating to our technology and advanced engineering groups, during the years ended December 31, 2016 and 2015, was \$1.6 million and \$1.3 million, respectively. This represents our share of these expenses only and does not take into account amounts spent by any of our customers in support of new product development. Our future success will depend in large part upon our ability to develop products which bring a high degree of value to our customers' products. Through the three-year period ended December 31, 2016, we had cumulative research and development expenses of approximately \$4 million and cumulative expenditures on equipment and leasehold improvements of approximately \$0.7 million.

Manufacturing Operations

We have manufacturing capacity based in two locations in the Chicago area. At each of these facilities, we are able to develop and supply nanomaterials in quantities ranging from grams to metric tons. Our facilities are certified to ISO 9001:2008 international standards and are cGMP compliant for applicable bulk pharmaceutical manufacturing. We are also in the process of registering some of the chemicals we ship to customers in Europe pursuant to the European Chemical Agency's regulations issued to date pertaining to Registration Evaluation and Authorization of Chemicals ("REACH"). We have registered Zinc Oxide and Aluminum Oxide under REACH and filed preliminary registrations for other materials. Our facilities are also certified to the international standard for environmental management, ISO 14001:2004.

Our operations employ a cellular, team-based manufacturing approach, where workers operate in work "cells," under a lean manufacturing environment to continuously advance and improve production capabilities. We have also developed a highly flexible workforce that has been cross-trained to allow it to be employed broadly across our manufacturing processes. Our manufacturing approach and targeted engineering actions have resulted in continuing process innovations and improvements that have reduced the variable manufacturing cost significantly over the past several years.

We are committed to a lean manufacturing approach, to the extent possible given a certain measure of irregular demand, where we are able to reduce excess labor and manage the lowest practical inventory and supply levels in order to minimize working capital demands. This approach complements two of our major operational goals - (1) to increase output without adding unnecessarily to existing equipment and (2) to continually reduce production costs while consistently producing high quality products.

Intellectual Property and Proprietary Rights

We rely on a combination of patent, trademark, copyright, trade secret and other intellectual property laws, nondisclosure agreements and other protective measures to protect our intellectual property. In addition to obtaining patent and trademarks based on our inventions and products, we may also license certain third-party patents from time-to-time to expand our technology base.

As of the date of this filing, we own 11 U.S. patents and 1 pending U.S. patent application. We also own 34 foreign patents and patent applications consisting of 26 issued or allowed foreign patents and 8 pending foreign patent applications. All of the pending and owned foreign patents are counterparts to domestic filings covering our platform of nanotechnologies. Our oldest issued patents began to expire during 2013. We do not believe that the expiration of

these patents will have a material impact on our business or financial condition.

Competition

Within each of our targeted markets and product applications, we face potential competition from advanced materials and chemical companies, and suppliers of traditional materials. In many markets, the actual or potential competitors are larger and more diversified than we are; however, we believe we focus in market segments and opportunities where our materials and related technologies are superior to those of our competitors, often due to our ability to produce highly engineered products to meet specific performance requirements and develop nanomaterial solutions for customers' specific applications.

With respect to traditional suppliers, we may compete against lower priced traditional materials for certain customer applications. In some product or process applications the benefits of using nanomaterials do not always justify a process change or outweigh their frequently higher costs.

With respect to larger producers of nanomaterials, while many of these producers do not currently offer directly competitive products, these companies may have greater financial and technical resources, larger research and development staffs, and greater manufacturing and marketing capabilities, and could compete directly against us. In addition, the number of development-stage companies involved in nanocrystalline materials continues to grow on a global basis, posing increasing competitive risks. Many of these companies are associated with university or national laboratories and use chemical and physical methods to produce nanocrystalline materials. We believe that most of these companies are engaged primarily in funded research and not commercial production; however, they may represent competitive risks in the future. Some development-stage companies, especially in other countries, receive significant government assistance or enjoy other benefits due to their location. We anticipate that foreign competition will play a greater role in the nanomaterials arena in the future, something we are increasingly seeing today, albeit indirectly.

In addition to competition in the advanced materials and related markets, our Solésence™ LLC subsidiary faces competition from a wide variety of offerings in the field of skin care. Solésence™ competes with existing solutions as well as new solutions from a wide variety of sources, and must differentiate its value proposition in order to gain traction in this marketplace.

We believe that our nanomaterial technologies and manufacturing platforms are strong. We believe we are well-positioned with our platform of integrated commercial nanomaterial technologies and track record of technology improvement and evolution.

Governmental Regulations, Including Climate Change

The manufacture and use of certain of the products that contain our nanocrystalline materials are subject to governmental regulations. As a result, we are required to adhere to the cGMP requirements of the FDA and similar regulations that include testing, control and documentation requirements enforced by periodic inspections. We are also in the process of registering some of the chemicals we ship to customers in Europe in compliance with the European Chemical Agency's regulations issued to date pertaining to REACH (to date, we have registered Zinc Oxide and Aluminum Oxide under REACH and filed preliminary registrations for other materials).

We are committed to environmental health and safety ("EH&S"). We believe we comply with all applicable exposure limit standards issued by OSHA. Because nanotechnology remains an emerging and evolving science, there are no currently accepted standards, measurements or personal protective equipment available that are specific to nanoparticle safety. Accordingly, we rely on general chemical safety and process safety practices to identify safe personal protective equipment and appropriate handling protocols. We believe that we have taken a leadership position on EH&S in our operations and have internal and external review and monitoring of our practices.

In addition, our facilities and operations are subject to the plant and laboratory safety requirements of various environmental and occupational safety and health laws. We believe we are in compliance with all such laws and regulations, and to date, those regulations have not materially restricted or impeded operations. Further, we believe our processes to be highly efficient, generating very low levels of waste and emissions. For this reason, we do not view issues surrounding climate change and any currently foreseeable related regulations as materially impacting our business and financial statements, beyond any inestimable impact on the macro-economic environment.

We have taken a responsible, proactive approach to EH&S by implementing appropriate procedures and processes to have our facilities certified to ISO 14001, American National Standard, Environmental Management System Requirements. We are also involved with leading industry groups that are defining nanomaterial standards and protocols. These currently include the ASTM International Committee on Nanotechnology, Nanoscale Materials Stewardship Program under the Toxic Substances Control Act, and the US TAG to ISO TC 229 Nanotechnology committee managed by the American National Standards Institute committee (ANSI). We also participate in FDA reviews relative to cosmetic applications. We have a full-time, advanced degreed professional who spends a significant amount of time managing governmental regulation compliance and EH&S. We believe that our Company has an exemplary safety record.

Employees

On December 31, 2016, we had a total of 46 full-time employees, 6 of whom hold advanced degrees. We have no collective bargaining agreements and believe that we have a strong relationship with our employees.

Backlog

We do not believe that a backlog as of any particular date is indicative of future results. Our sales are primarily pursuant to purchase orders for delivery of our nanomaterials. We have some agreements that give customers the right to purchase a specific quantity of nanomaterials during a specified time period. These agreements, however, do not obligate the customers to purchase any minimum quantity of such nanomaterials. The quantities actually purchased by the customer, as well as the shipment schedules, are frequently revised during the agreement term to reflect changes in the customer's needs. For these reasons we do not believe that such agreements are meaningful for determining backlog amounts.

Business Segment and Geographical Information

Our operations comprise a single business segment and all of our long-lived assets are located within the United States. See Note 13 to the accompanying Financial Statements for additional information.

Key Customers

A limited number of key customers account for a substantial portion of our commercial revenue. In particular, revenue from three customers - our largest customer in personal care applications (BASF), our largest coatings customer, and our medical diagnostics application customer - constituted approximately 69%, 5% and 4%, respectively, of our 2016 total revenue. Many of our customers are significantly larger than we are and, therefore, may be able to exert a high degree of influence over us. While our agreements with BASF are long-term agreements, they may be terminated by BASF under certain circumstances with reasonable notice and do not provide any guarantees that BASF will buy our products. The loss of one of our largest customers or the failure to attract new customers could have a material adverse effect on our business, results of operations and financial condition. Due to the high concentration of sales to a limited number of customers, we have aggressively pursued new customers through our customer direct business model. To the extent we are successful in adding a large number of customers through this model and maintaining or expanding our existing partners, we believe we will be able to best manage the risks associated with customer concentration.

Forward-Looking Statements

We want to provide investors with more meaningful and useful information. As a result, this Annual Report on Form 10-K (the “Form 10-K”) contains certain “forward-looking statements”, as defined in Section 21E of the Securities Exchange Act of 1934, as amended (the “Exchange Act”). These statements reflect our current expectations of the future results of our operations, performance and achievements. Forward-looking statements are covered under the safe harbor provisions of the Private Securities Litigation Reform Act of 1995. We have tried, wherever possible, to identify these statements by using words such as “anticipates”, “believes”, “estimates”, “expects”, “plans”, “intends” and similar expressions. These statements reflect management’s current beliefs and are based on information now available to it. Accordingly, these statements are subject to certain risks, uncertainties and contingencies that could cause our actual results, performance or achievements in 2017 and beyond to differ materially from those expressed in, or implied by, such statements. These risks, uncertainties and factors include, without limitation: our ability to be consistently profitable despite the losses we have incurred since our incorporation; a decision by a customer to cancel a purchase order or supply agreement in light of our dependence on a limited number of key customers; the terms of our supply agreements with BASF which could trigger a requirement to transfer technology and/or sell equipment to that customer; our potential inability to obtain working capital when needed on acceptable terms or at all; our ability to obtain materials at costs we can pass through to our customers, including Rare Earth elements, specifically cerium oxide, as well as high purity zinc; uncertain demand for, and acceptance of, our nanocrystalline materials; our manufacturing capacity and product mix flexibility in light of customer demand; our limited marketing experience; changes in development and distribution relationships; the impact of competitive products and technologies; our dependence on patents and protection of proprietary information; our ability to maintain an appropriate electronic trading venue for our securities; the impact of any potential new governmental regulations that could be difficult to respond to or costly to comply with; and the resolution of litigation or other legal proceedings in which we may become involved. In addition, our forward-looking statements could be affected by general industry and market conditions and growth rates. Readers of this Form 10-K should not place undue reliance on any forward-looking statements. Except as required by federal securities laws, we undertake no obligation to update or revise these forward-looking statements to reflect new events or uncertainties.

Investor Information

We are subject to the informational requirements of the Exchange Act and, accordingly, file periodic reports, proxy statements and other information with the Securities and Exchange Commission (the “SEC”). Such reports, proxy statements and other information may be obtained by visiting the Public Reference Room of the SEC at 100 F Street, N.E., Washington, DC 20549 or by calling the SEC at 1-800-SEC-0330. In addition, the SEC maintains an Internet site (<http://www.sec.gov>) that contains reports, proxy and information statements and other information regarding issuers that file electronically.

Financial and other information may also be accessed at our website. The address is www.nanophase.com. We make available, free of charge, copies of our annual report on Form 10-K, quarterly reports on Form 10-Q, current reports

on Form 8-K and amendments to those reports filed or furnished pursuant to Section 13(a) or 15(d) of the Exchange Act as soon as reasonably practicable after filing such material electronically with, or otherwise furnishing it to, the SEC, and intend to make all such reports and amendments to reports available free of charge on our website. We have included our website address throughout this Form 10-K as textual references only. The information contained on, or accessible through, our website is not incorporated into this Form 10-K.

Item 1A. Risk Factors

The following factors, among others, could cause actual results to differ materially from those contained in forward-looking statements made in this Annual Report on Form 10-K and presented elsewhere by management from time to time. Such factors may have a material adverse effect on our business, financial condition, and results of operations, and you should carefully consider them before deciding to invest in, or retain, shares of our common stock. Additional risks and uncertainties not presently known to us or which are currently not believed to be material or which we have not predicted may also harm our business operations or affect our actual results. Because of these and other factors, past performance should not be considered an indication of future performance.

We have a history of losses that may continue in the future.

We have incurred net losses in each year since our inception, with net losses of \$1.3 million in 2016 and \$1.2 million in 2015. As of December 31, 2016, we had an accumulated deficit of approximately \$95 million and may incur a loss on an annual basis during 2017. We believe that our business depends, among other things, on our ability to significantly increase revenue. If revenue fails to grow at anticipated rates or if operating expenses increase without a commensurate increase in revenue, or if we fail to adjust operating expense levels accordingly, then the imbalance between revenue and operating expenses will negatively impact our cash balances and our ability to achieve profitability in future periods.

We depend on a few major customers for a high percentage of our sales, and the loss of orders from a significant customer could cause a decline in revenue and/or increases in the level of losses incurred.

Sales to our customers are executed pursuant to purchase orders and long-term supply contracts; however, customers can cease doing business with us at any time with limited advance notice. It is possible that a significant portion of our future sales may remain concentrated within a limited number of strategic customers. We may not be able to retain our strategic customers, such customers may cancel or reschedule orders, or in the event of canceled orders, such orders may not be replaced by other sales or by sales that are on as favorable terms. In addition, sales to any particular customer may fluctuate significantly from quarter to quarter, which could affect our ability to achieve anticipated revenues on a quarterly basis.

Sales to our three largest customers accounted for 69%, 5% and 4%, respectively, of our total revenue in 2016 and sales to these same customers accounted for 63%, 4% and 7%, respectively, of our total revenue in 2015.

We plan to expand both our marketing and business development efforts and our production efficiency in order to address the issues of our dependence upon a limited amount of customers, enhancement of gross profit and operating cash flows, and the achievement of profitability. Given the nature of our products, and the fact that markets for them are not yet fully developed, it is difficult to accurately predict when additional large customers will materialize. Going forward, our margins, as a percentage of revenue, will be dependent upon revenue mix, revenue volume, raw materials pricing, and our ability to effectively manage costs. The extent of the growth in revenue volume and the related gross profit that this revenue generates will be the main drivers in generating positive operating cash flows and, ultimately, net income.

Any downturn in the product markets served by us would harm our business.

A majority of our products are incorporated into products such as personal care applications including sunscreens. Additional product areas include architectural coatings, surface finishing technologies (polishing), medical diagnostics, solar control applications/energy management, abrasion-resistant coatings and other products. These markets have from time to time experienced cyclical, depressed business conditions, often in connection with, or in anticipation of, a decline in general economic conditions. These industry downturns often result in reduced product demand and declining average selling prices. Our business would be harmed by a continuation of any downturn and/or any future downturns in the markets that we serve.

Our products often have long adoption cycles, which could make it difficult to achieve market acceptance and makes it difficult to forecast revenues.

Due to their often novel characteristics and potential unfamiliarity with them that exists in the marketplace, our nanomaterials may require longer adoption cycles than existing materials technologies, to the point that adoption cycles typically require one to five years. Our nanomaterials have to receive appropriate attention within any potential customer's organization, and then they must be tested to prove a performance advantage over existing materials, typically on a systems-cost basis. Once we have proven initial commercial viability, pilot scale production runs are typically required and completed by the customer, followed by further testing. Once production-level commercial viability is established, then our nanomaterials can be introduced, often to a downstream marketplace that needs to be familiarized with them. If we are unable to demonstrate to our potential customers the performance advantages and economic value of our nanomaterials over existing and competing materials and technologies, we will be unable to generate significant sales. Our long adoption cycle makes it difficult to predict when sales will occur.

We frequently depend on collaborative development relationships with our customers. If we are unable to initiate or sustain such collaborative relationships or if the terms of these relationships limit the distribution of our products, then we may be unable to successfully develop, manufacture or market our current and future nanomaterials or applications.

We have established, and will continue to pursue, strategic relationships with many of our customers and do not have a substantial direct sales force or an established distribution network (other than distribution arrangements for research samples). Through these relationships, we seek to develop new applications for our nanomaterials and share development and manufacturing resources. We also seek to coordinate the development, manufacture and marketing of our nanomaterials products, particularly as a result of our selling additives that must be integrated into complete formulations by the customer. Future success will depend, in part, on our continued relationships with these customers and our ability to enter into similar strategic relationships with other customers. Our customers may not continue in these collaborative development relationships, may not devote sufficient resources to the development or sale of our materials or may enter into strategic development relationships with our competitors. These customers may also require a share of control of these collaborative programs. While less prevalent than in the past, some of our agreements with these customers limit our ability to license our technology to others and/or limit our ability to engage in certain product development or marketing activities with others. These relationships generally can be terminated unilaterally by customers.

If we are unable to initiate or sustain such collaborative relationships or if the terms of these relationships materially limit our access to distribution channels for our products, then we may be unable to successfully develop, manufacture or market our current and future nanomaterials or applications.

If commodity metal prices increase at such a rate that we are unable to recover lost margins on a timely basis or that our products became uncompetitive in their current marketplaces, our financial and liquidity position and results of operations would be substantially harmed.

Many of our significant raw materials come from commodity metal markets that may be subject to rapid price increases. While we generally have been able to pass a significant portion of commodity “price-related” increases on to our customers, it is possible that, given our limited customer base and the limited control we have over it, commodity metal prices could increase at such a rate that could hinder our ability to recover lost margins from our customers. Such a potential challenge could be exacerbated as our specifications often require particular grades/types of these materials, including certain materials that are classified as “Rare Earth” elements and very high purity zinc, that are available in limited supply. It is also possible that such drastic cost increases could render some of our materials uncompetitive in their current marketplaces when considered relative to other materials on a cost benefit basis. If either of these potential results occurred, our financial and liquidity position and results of operations would be substantially harmed.

Protection of our intellectual property is limited and uncertain.

Our intellectual property is important to our business. We seek to protect our intellectual property through patent, trademark, copyright, and trade secret protection and confidentiality or license agreements with our employees, customers, suppliers and others. Our means of protecting our intellectual property rights in the United States or abroad may not be adequate and others, including our competitors, may use our proprietary technology without our consent. We may not receive the necessary patent protection for any applications pending with the U.S. Patent and Trademark Office (“USPTO”) and any of the patents that we currently own or license may not be sufficient to keep competitors from using our materials or processes. In addition, patents that we currently own or license may not be held valid if subsequently challenged by others and others may claim rights in the patents and other proprietary technology that we own or license. Additionally, others may have already developed or may subsequently develop similar products or technologies without violating any of our proprietary rights. If we fail to obtain or maintain patent protection or preserve our trade secrets, we may be unable to effectively compete against others offering similar products and services. In addition, if we fail to operate without infringing the proprietary rights of others or lose any license to technology that we currently have or will acquire in the future, we may be unable to continue making the products that we currently make.

Moreover, at times, attempts may be made to challenge the prior issuance of our patents. Furthermore, litigation may be necessary to enforce our intellectual property rights, to protect our trade secrets, to determine the validity and scope of the proprietary rights of others, or to defend against claims of infringement or invalidity. Such litigation could result in substantial costs and diversion of resources and could harm our business, operating results and financial condition. Such litigation might occur with parties that have substantially greater resources, and thus more capability to engage and continue litigation. In addition, if others assert that our technology infringes their intellectual property rights, resolving the dispute could divert our management team and financial resources.

Due to the expanding length of time required in order to obtain a patent, and the inherent ongoing risks of the protections truly provided by any patent, we made a decision during 2008 that we could no longer place a value on these intangible assets. In the future, we may license certain of our intellectual property, such as trademarks, to third parties. While we would attempt to ensure that any licensees maintain the quality and value of our brand, these licenses might diminish this quality and value.

If a catastrophe strikes either of our manufacturing facilities or if we were to lose our lease for either facility due to non-renewal or other unforeseen events, we may be unable to manufacture our materials to meet customers' demands.

Our manufacturing facilities are located near Chicago - in Romeoville and Burr Ridge, Illinois. These facilities and some of our manufacturing and testing equipment would be difficult to replace in a timely manner. Therefore, any material disruption at one of our facilities due to a natural or man-made disaster or a loss of lease due to non-renewal or other unforeseen events could have a material adverse effect on our ability to manufacture products to meet customers' demands. While we maintain property insurance, this insurance may not adequately compensate us for all losses that we may incur in the event of a material interruption in our business.

If we are unable to expand our production capabilities to meet unexpected demand, we may be unable to manage our growth and our business would suffer.

Our success will depend, in part, on our ability to manufacture nanomaterials in significant quantities, with consistent quality and in an efficient and timely manner. We expect to be able to expand our current facilities or obtain additional facilities in the future, and outsource production aspects as necessary, available and appropriate, in order to respond to unexpected demand for existing materials or for new materials that we do not currently make in quantity. Such unplanned demand, if it resulted in rapid expansion, could create a situation where growth could become difficult to manage, which could cause us to lose potential revenue.

Our industry is experiencing rapid changes in technology. If we are unable to keep pace with these changes, our business may not grow.

Rapid changes have occurred, and are likely to continue to occur, in the development of advanced materials and processes. Our success will depend, in large part, upon our ability to keep pace with advanced materials technologies, industry standards and market trends and to develop and introduce new and improved products on a timely basis. We expect to commit substantial resources to develop our technologies and product applications and, in the future, to expand our commercial manufacturing capacity as volume grows. Our development efforts may be rendered obsolete by the research efforts and technological advances of others and other advanced materials may prove more advantageous than those we produce.

The markets we serve are highly competitive, and if we are unable to compete effectively, then our business will not grow.

The advanced materials industry is new, rapidly evolving and intensely competitive, and we expect competition to intensify in the future. The market for materials having the characteristics and potential uses of our nanomaterials is the subject of intensive research and development efforts by both governmental entities and private enterprises around the world. We believe that the level of competition will increase further as more product applications with significant commercial potential are developed. The nanomaterials product applications that we are developing will compete directly with products incorporating both conventional and advanced materials and technologies. While commercially available competitive products may not possess the same attributes as those we offer, other companies may develop and introduce new or competitive products. Our competitors may succeed in developing or marketing materials, technologies and better or less expensive products than the ones we offer. In addition, many of our potential competitors have substantially greater financial and technical resources, and greater manufacturing and marketing capabilities than we do. If we fail to provide nanomaterials at an acceptable price, or otherwise compete on a commodity basis with producers of conventional materials, we will lose market share and revenue to our competitors.

We may need to raise additional capital in the future, which may not be available on acceptable terms or at all. If we are unable to obtain adequate funds, we may be required to delay, scale-back or eliminate some of our manufacturing and marketing operations or we may need to obtain funds through arrangements on less favorable terms or we may be required to sell key production equipment to our largest customer.

We expect to expend resources on research, development and product testing, and in expanding current capacity or capability for new business. In addition, we may incur significant costs in preparing, filing, prosecuting, maintaining and enforcing our patents and other proprietary rights. We may need additional financing if we were to lose an existing customer or suffer a significant decrease in revenue from one or more of our customers. If necessary, we may seek funding through public or private financing and through contracts with governmental entities or other companies. Additional financing may not be available on acceptable terms or at all. If we are unable to obtain adequate funds, we may be required to delay, scale-back or eliminate some of our manufacturing and marketing operations or we may need to obtain funds through arrangements on less favorable terms. Such circumstances could raise doubt as to our ability to continue as a going concern. If we obtain funding on unfavorable terms, we may be required to relinquish rights to some of our intellectual property.

To raise additional funds in the future, we would likely sell our equity or debt securities or enter into loan agreements. To the extent that we issue debt securities or enter into loan agreements, we may become subject to financial, operational and other covenants that we must observe. In the event that we were to breach any of these covenants, then the amounts due under such loans or debt securities could become immediately payable by us, which could significantly harm us. To the extent that we sell additional shares of our equity securities, our stockholders may face economic dilution and dilution of their percentage of ownership.

We currently have a supply agreement with BASF that contains provisions which could potentially result in a mandatory license of technology and/or sale of production equipment to BASF, providing capacity sufficient to meet BASF's production needs. Under our supply agreement with BASF, a "triggering event" also would occur:

if our earnings for a twelve month period ending with our most recently published quarterly financial statements are less than zero and our cash, cash equivalents and certain investments are less than \$1 million, or

upon the acceleration of any debt maturity having a principal amount of more than \$10 million, or if we become insolvent as defined in the supply agreement.

In the event of a triggering event where we are required to sell to BASF production equipment providing capacity sufficient to meet BASF's production needs, the equipment would be sold at either 115% of the equipment's net book value or at the greater of 30% of the original book value of such equipment (including any associated upgrades to it) or 115% of the equipment's net book value, depending on the particular equipment and contract.

If we were determined to have materially breached certain other provisions of our supply agreement with BASF, we similarly could be subject to a “triggering event” that potentially could result in a mandatory license of technology and/or sale of certain production equipment to the customer.

If a triggering event were to occur and BASF elected to proceed with the license and related sale mentioned above, we would lose both significant revenue and the ability to generate significant revenue to replace that which was lost in the near term. Replacement of necessary equipment that would be purchased and removed by the customer pursuant to this triggering event could take in excess of 12 months. Any additional capital outlays required to rebuild capacity would probably be greater than the proceeds from the purchase of the assets pursuant to our agreement with BASF. This potential shortfall might put us in a position where it would be difficult to secure additional funding given what would then be an already tenuous cash position. Such an event would also likely result in the loss of many of our key staff and line employees due to economic realities. We believe that our employees are a critical component of our success and would be difficult to quickly replace and train. Upon the occurrence of such an event, we might not be able to hire and retrain skilled employees given the stigma relating to such an event and its impact on us. We might elect to effectively reduce our size and staffing to a point where we could remain a going concern in the near term.

We depend on key personnel, and their unplanned departure could harm our business.

Our success will depend, in large part, upon our ability to attract and retain highly qualified research and development, management, manufacturing, marketing and sales personnel on favorable terms. Due to the specialized nature of our business, we may have difficulty locating, hiring and retaining qualified personnel on favorable terms. If we were to lose the services of any of our key executive officers or other key personnel, or if we are unable to attract and retain other skilled and experienced personnel on acceptable terms in the future, or if we are unable to implement a succession plan to prepare qualified individuals to assume key roles upon any loss of our key personnel, then our business, results of operations and financial condition could be materially harmed.

We face potential product liability risks which could result in significant costs that exceed our insurance coverage, damage our reputation and harm our business.

We may be subject to product liability claims in the event that any of our products are alleged to be defective or cause harmful effects to humans or physical environments. Because our nanomaterials are used in other companies' products, to the extent our customers become subject to suits relating to their products, these claims may also be asserted against us. As our Solésence™ LLC subsidiary sells fully formulated skin care products to firms in that space, we are now supplying completed products in addition to ingredients. We may incur significant costs including payment of significant damages, in defending or settling product liability claims. Although we maintain insurance for product liability claims, our coverage may not prove sufficient. Even if a suit is without merit and regardless of the outcome, claims can divert management time and attention, injure our reputation and adversely affect demand for our nanomaterials.

We may be subject to periodic litigation and other regulatory proceedings or governmental investigations, which could result in the unexpected expenditure of time and resources.

From time to time, we may be a defendant in lawsuits and regulatory proceedings or are the subject of governmental investigations relating to our business. Due to the inherent uncertainties of litigation, regulatory proceedings and governmental investigations, we cannot accurately predict the ultimate outcome of any such proceedings or investigations. An unfavorable outcome could have a material adverse impact on our business, financial condition and results of operations. In addition, regardless of the outcome of any litigation, regulatory proceedings or governmental investigations, such matters are expensive and will require that we devote substantial resources and executive time to defend, thereby diverting management's attention and resources that are needed to successfully run our business.

The disclosure requirements under the “conflict minerals” provisions of the Dodd-Frank Act could increase our costs and limit the supply of certain metals used in our products and affect our reputation with customers and shareholders.

Under the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010, as amended, or the Dodd-Frank Act, the SEC adopted disclosure requirements, which became effective in 2014, for public companies using certain minerals and metals in their products. These minerals and metals are generally referred to as “conflict minerals” regardless of their country of origin. Commercial sales of our products containing these materials began during 2015. Under these rules, we are required to perform due diligence and disclose our efforts to prevent the sourcing of such conflict minerals from the Democratic Republic of Congo or adjoining countries. As a result of these regulations, we have incurred and expect to continue to incur costs to comply with the disclosure requirements, including costs related to determining the source of any of the conflict minerals used in our products. These new requirements could also adversely affect the sourcing, availability and pricing of such minerals, and the pool of suppliers who provide “conflict free” metals may be limited. As a result, we or our suppliers may not be able to obtain materials necessary for production of our products in sufficient quantities or at competitive prices. In addition, we may not be able to sufficiently verify the origins of all metals used in our products and confirm that they are “conflict free,” which may adversely affect our reputation.

We are subject to governmental regulations. The costs of compliance and liability for noncompliance with governmental regulations could have a material adverse effect on our business, results of operations and financial condition.

Current and future laws and regulations may require us to make substantial expenditures for preventive or remedial action. Our operations, business or assets may be materially and adversely affected by governmental interpretation and enforcement of current or future environmental, health and safety laws and regulations. In addition, our coating and dispersion operations may pose a risk of accidental contamination or injury. The damages in the event of an accident or the costs to prevent or remediate a related event could exceed both the amount of our liability insurance and our resources or otherwise have a material adverse effect on our business, results of operations and financial condition.

In addition, both of our facilities and all of our operations are subject to the plant and laboratory safety requirements of various occupational safety and health laws. We believe we have complied in all material respects with governmental regulations applicable to us. However, we may have to incur significant costs in defending or settling future claims of alleged violations of governmental regulations and compliance with these regulations may materially restrict or impede our operations in the future. In addition, our efforts to comply with or contest any regulatory actions may distract personnel or divert resources from other important initiatives.

The manufacture and use of certain products that contain our nanomaterials are subject to extensive governmental regulation, including regulations promulgated by the FDA, the U.S. Environmental Protection Agency and OSHA. As a result, we are required to adhere to the requirements of the regulations of governmental authorities in the United States and other countries, including regulations issued to date pertaining to REACH. These regulations could increase our cost of doing business and may render some potential markets prohibitively expensive. In addition, new rules or regulations could impose restrictions or prohibitions on certain materials being marketed with or incorporated into certain applications, which could limit our ability to sell our nanomaterials in the marketplace.

A large investor and his affiliates have significant influence on all matters requiring stockholder approval because they beneficially own a large percentage of our common stock and they may vote their shares of common stock in ways with which other stockholders disagree.

As of March 14, 2017, Bradford T. Whitmore, together with his affiliates, Grace Brothers, Ltd. and Grace Investments, Ltd., beneficially owned approximately 43% of the outstanding shares of our common stock. The current ownership position of Mr. Whitmore and his affiliates could delay, deter or prevent a change of control or adversely affect the price that investors might be willing to pay in the future for shares of our common stock. The interests of Mr. Whitmore and his affiliates may differ from the interests of our other stockholders and they may vote the common stock they beneficially own in ways with which our other stockholders disagree. R. Janet Whitmore, one of our directors since 2003 and a stockholder, is the sister of Mr. Whitmore.

We have never paid dividends.

We currently intend to retain earnings, if any, to support our growth strategy. We do not anticipate paying dividends on our stock in the foreseeable future.

Additional sales, or the availability for sale, of substantial amounts of our common stock could adversely affect the value of our common stock.

No prediction can be made as to the effect, if any, that future sales of our common stock, or the availability of our common stock for future sales, will have on the market price of our common stock. Sales of substantial amounts of our common stock in the public market and the availability of shares for future sale could adversely affect the prevailing market price of our common stock. This in turn could impair our future ability to raise capital through an offering of our equity securities.

There may be future sales or other dilution of our equity, which may adversely affect the market price of our common stock.

To the extent of our authorized but unissued shares pursuant to our certificate of incorporation, as amended, we are not restricted from issuing additional shares of common stock, including any securities that are convertible into or exchangeable for, or that represent the right to receive, common stock. The market price of our common stock could decline as a result of future sales of our common stock or the perception that such sales could occur.

Provisions in our certificate of incorporation, our by-laws, and Delaware law could make it more difficult for a third party to acquire us, discourage a takeover, and adversely affect existing stockholders.

Our certificate of incorporation, our by-laws and the Delaware General Corporation Law (the “DGCL”) contain provisions that may have the effect of making more difficult, delaying or deterring attempts by others to obtain control of our Company, even when these attempts may be in the best interests of stockholders. These include provisions on our maintaining a classified Board of Directors and limiting the stockholders’ powers to remove directors or take action by written consent instead of at a stockholders’ meeting. Our certificate of incorporation also authorizes our Board of Directors, without stockholder approval, to issue one or more series of preferred stock, which could have voting and conversion rights that adversely affect or dilute the voting power of the holders of common stock. The DGCL also imposes conditions on certain business combination transactions with “interested stockholders.”

These provisions and others that could be adopted in the future could deter unsolicited takeovers or delay or prevent changes in our control or management, including transactions in which stockholders might otherwise receive a premium for their shares over then current market prices. These provisions may also limit the ability of stockholders to approve transactions that they may deem to be in their best interests.

Failure to protect the integrity and security of individually identifiable data of our customers, vendors and employees could expose us to litigation and damage our reputation.

We receive and maintain certain personal, sensitive and confidential information about our customers, vendors and employees. The collection and use of this information is regulated at the international, federal and state levels, and is subject to certain contractual restrictions in third party contracts. Although we have implemented processes to collect and protect the integrity and security of this personal information, there can be no assurance that this information will not be obtained by unauthorized persons, or collected or used inappropriately. If our security and information systems or the systems of our employees or external business associates are compromised or our employees or external business associates fail to comply with these laws and regulations and this information is obtained by unauthorized persons, or collected or used inappropriately, it could negatively affect our reputation, as well as our operations and financial results, and could result in litigation or regulatory action against us or the imposition of costs, fines or other penalties. While we have not experienced losses related to this area, as privacy and information security laws and regulations change, we may incur additional costs to remain in compliance.

Item 1B. Unresolved Staff Comments

There are currently no open comments from the SEC Staff.

Item 2. Properties

We operate two facilities in the Chicago suburbs - a 36,000 square-foot production, research and headquarters facility in Romeoville, Illinois and a 20,000 square-foot production facility in Burr Ridge, Illinois. We also lease a 9,000 square-foot offsite warehouse in the vicinity of the Romeoville facility.

Our manufacturing operations in Burr Ridge are certified under ISO 9001:2008, and we believe that our manufacturing operations are within the cGMP requirements of the FDA for products that require such compliance. Our facilities are also ISO 14001:2004 certified which is the international standard for environmental management. The Burr Ridge facility has a quality control laboratory designed for the dual purposes of validating operations to cGMP and ISO standards and production process control. This laboratory is equipped to handle many routine analytical and in-process techniques that are currently required.

The Romeoville facility houses our headquarters, advanced engineering, manufacturing (including nanoparticle coating, nanoparticle dispersion and pilot-scale manufacturing) and research and development with three applications development laboratories. All Romeoville manufacturing processes are certified to ISO 9001:2008 and ISO 14001:2004, and we believe that the manufacturing of nanoparticle coating used for sunscreens and personal care is in compliance with the cGMP requirements of the FDA.

We lease our Romeoville and Burr Ridge facilities. During October 2016 we entered into an amendment to our Industrial Lease Agreement for the facility in Romeoville, Illinois, which, among other things, extended the term of such lease through December 31, 2024. We renewed the Burr Ridge facility lease as of September 2010, extending the terms through September 2014 (we subsequently exercised our final tenant option to extend the term through September 2017). On March 14, 2017, we entered into a new Building Lease for the Burr Ridge facility that will begin September 2017 and end during September 2021, with our option to further extend this lease by three additional one-year periods. During 2016 we also renewed the lease for our offsite warehouse through August 2019.

We believe that our leased facilities provide sufficient capacity to fulfill current known customer demand as well as allow for the creation of substantial additional space to enable expansion of key production processes. We believe

additional facilities could be obtained in the area at competitive prices if necessary to support growth. We believe that our capital expenditures made in 2016, and projected for 2017, will support currently anticipated demand from existing customers. Our actual future capacity requirements will depend on many factors, including new and potential customer acceptance of our current and potential nanomaterials and product applications, both expected and currently unplanned growth from existing customers, continued progress in our research and development activities and product testing programs and the magnitude of these activities and programs.

Item 3. Legal Proceedings

We are not a party to any pending legal proceedings or claims that we believe will result in a material adverse effect on our business, financial condition, or operating results.

Item 4. Mine Safety Disclosures

Not applicable.

PART II

Item 5. Market for Registrant's Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities

Market Information; Holders; Dividends

Our common stock is traded on the OTCQB marketplace, operated by OTC Markets Group, since voluntarily delisting from the NASDAQ Capital Market on March 20, 2012. Our symbol, "NANX", did not change as a result of this venue transfer. The following table sets forth, for the periods indicated, the range of high and low sale prices for our common stock on the OTCQB marketplace:

	High	Low
Fiscal year ended December 31, 2016:		
First Quarter	\$0.48	\$0.37
Second Quarter	0.73	0.44
Third Quarter	0.87	0.57
Fourth Quarter	0.81	0.40
Fiscal year ended December 31, 2015:		
First Quarter	\$0.56	\$0.40

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Second Quarter	0.52	0.41
Third Quarter	0.48	0.35
Fourth Quarter	0.49	0.38

On March 14, 2017, the last reported sale price of our common stock was \$0.70 per share, and there were 110 holders of record of our common stock.

We have never declared or paid any cash dividends on our common stock and do not currently anticipate paying any cash dividends or other distributions on our common stock in the foreseeable future. We intend instead to retain any future earnings for reinvestment in our business. Any future determination to pay cash dividends will be at the discretion of our Board of Directors and will be dependent upon our financial condition, results of operations, capital requirements and such other factors deemed relevant by our Board of Directors.

Securities Authorized for Issuance under Equity Compensation Plan

The following table gives information about our common stock that may be issued upon the exercise of options and rights under our 2010 Equity Compensation Plan (the “2010 Equity Plan”) on December 31, 2016. The 2010 Equity Plan replaced the 2004 Equity Compensation Plan (the “2004 Plan”), the 2005 Non-Employee Director Restricted Stock Plan (as amended, the “2005 Plan”), and the Amended and Restated 2006 Stock Appreciation Rights Plan (the “2006 Plan”).

Plan Category	(a) Number of securities to be issued upon exercise of outstanding options, warrants and rights	(b) Weighted - average exercise price of outstanding options, warrants and rights	(c) Number of securities remaining available for future issuance under equity compensation plans (excluding securities reflected in column (a))
Plans Approved by Shareholders	3,027,000	\$ 0.81	1,196,000
Plans Not Approved by Shareholders	None	\$ —	None

Item 6. Selected Financial Data

Not required for a smaller reporting company.

Item 7. Management’s Discussion and Analysis of Financial Condition and Results of Operations

The following discussion and analysis should be read in conjunction with risks discussed in Part I, Item 1A, Risk Factors of this Form 10-K, and the financial statements and related notes thereto appearing elsewhere in this Form 10-K. When used in the following discussions, the words “anticipates,” “believes,” “estimates,” “expects,” “plans,” “intends” and similar expressions are intended to identify forward-looking statements. Such statements are subject to certain risks, uncertainties and contingencies that could cause actual results, performance or achievements to differ materially from those expressed in, or implied by, such statements. See the “Forward Looking Statements” section in Part I, Item 1, of this Form 10-K.

Overview

Nanophase is an advanced materials and applications developer and commercial manufacturer with an integrated family of materials technologies. We produce engineered nano and sub-micron materials for use in a variety of diverse markets: personal care including sunscreens, architectural coatings, industrial coating applications, abrasion-resistant additives, plastics additives, medical diagnostics, solar control/energy, and a variety of surface finishing technologies (polishing) applications, including optics. Finally, we have expanded our offerings beyond active ingredients to include targeted full formulations of skin care products, marketed and sold by our wholly-owned subsidiary, Solésence™ LLC. We target markets in which we believe practical solutions may be found using our products. We work closely with current and potential customers in these target markets to identify their material and performance requirements and market our materials to various end-use applications manufacturers. Recently developed technologies have made certain new products possible and opened potential new markets. For example, we have applied our skills at producing precisely defined nanomaterials to now create and sell larger, sub-micron material products. Our focus is on customer need where we believe we have an advantage, as opposed to finding uses for one particular technology. We expect growth in end-user (manufacturing customers, including customers of our customers) adoption in 2017 and beyond. Our initiatives in targeted market areas are progressing at differing rates of speed, but we have been broadly moving through testing and development cycles, and in a number of cases believe we are approaching first revenue or next stage revenue with particular customers in the industries referenced above. For example, during 2015 we were granted a patent on a new type of particle surface treatment (coating), which became the cornerstone of our new product development in personal care, with first revenue recognized during 2016 and the creation of our Solésence™ LLC subsidiary to manufacture and sell fully developed solutions to targeted customers in the skin care industry, in addition to the additives we have traditionally sold in the personal care area. During 2015 and 2016 we developed and began to sell solutions in the energy management (particularly solar control) industry. We believe that successful introduction of our materials with manufacturers may lead to follow-on orders for other materials in their applications. We expect that we will both work more deeply with current customers and attract additional customers, which should help us achieve growth in these markets in 2017 and beyond.

Critical Accounting Estimates

We review long-lived assets for impairment whenever events or changes in circumstances indicate that the asset's carrying amount may not be recoverable. We conduct long-lived asset impairment analyses in accordance with Financial Accounting Standards Board ("FASB") Accounting Standards Codification ("ASC") Topic 360-10-15, *Impairment or Disposal of Long-Lived Assets*. ASC 360-10-15 requires us to group assets and liabilities at the lowest level for which identifiable cash flows are largely independent of the cash flows of other assets and liabilities and evaluate the asset group against the sum of the undiscounted future cash flows. If the undiscounted cash flows do not indicate the carrying amount of the asset is recoverable, an impairment charge is measured as the amount by which the carrying amount of the asset group exceeds its fair value based on discounted cash flow analysis or appraisals.

Certain assumptions are necessary to assess the impact of risks and uncertainties on the financial information, such as cash flow projections, availability of capital if needed to support the ongoing operations of the business, and our expected compliance with contractual commitments. Any changes in those plans or assumptions could have a material impact on our liquidity and financial condition.

Results of Operations

Years Ended December 31, 2016 and 2015

Total revenue increased to \$10,783,000 in 2016, compared to \$10,313,000 in 2015. A substantial majority of our revenue for each year is from our largest customers, in particular sales to our largest customer in personal care and sunscreen applications. Product revenue, the primary component of our total revenue, increased to \$10,720,000 in 2016, compared to \$10,272,000 in 2015. This increase was primarily due to increased revenue from our largest customer (personal care). Revenue from our top three customers was approximately 69%, 5% and 4%, respectively, in 2016, compared to 63%, 4% and 7% for the same customers in 2015.

Other revenue increased to \$63,000 in 2016, compared to \$41,000 in 2015. This increase primarily relates to customer-paid shipping charges, as that and any customer-paid development projects are reflected in "other revenue."

Cost of revenue generally include costs associated with commercial production and customer development arrangements. Cost of revenue increased to \$7,543,000 in 2016, compared to \$7,199,000 in 2015. The increase in cost of revenue was primarily driven by the increase in product revenue volume, as our annual gross margin was similar (approximately 30%) for each period. We expect to continue new nanomaterial development, primarily using our

NanoArc® synthesis and dispersion technologies, for targeted applications and new markets during 2017 and beyond. At current revenue levels we have generated a positive gross margin, though margins have been impeded by not having enough revenue to efficiently absorb manufacturing overhead that is required to work with current customers and expected future customers. We believe that our current fixed manufacturing cost structure is sufficient to support significantly higher levels of production. The extent to which margins grow, as a percentage of total revenue, will be dependent upon revenue mix, revenue volume, our ability to continue to cut costs and pass commodity market-driven raw materials increases on to customers. We expect that, as product revenue volume increases, our fixed manufacturing costs would be more efficiently absorbed, leading to increased margins. We expect to continue to focus on reducing controllable variable product manufacturing costs, with potential variability related to the commodity metals markets, but may or may not realize absolute dollar gross margin growth through 2017 and beyond, dependent upon the factors discussed above.

Research and development expense, which includes all expenses relating to the technology and advanced engineering groups, primarily consists of costs associated with the development or acquisition of new product applications and coating formulations and the cost of enhancing our manufacturing processes. As an example, we have been, and continue to be, engaged in research to enhance our ability to disperse material in a variety of organic and inorganic media for use as coatings and polishing materials, including polishing products. Much of this work has led to several new products and additional potential new products.

Having demonstrated the capability to produce pilot quantities of mixed-metal oxides in a single crystal phase, we do not expect development of further variations on these materials to present material technological challenges. Many of these materials exhibit performance characteristics that can enable them to serve in various catalytic applications. We are now working on several related commercial opportunities using the same materials. We expect that this technique should enable us to scale to large quantity commercial volumes. We also have an ongoing advanced engineering effort that is focused on the development of new nanomaterials as well as the refinement of existing nanomaterials, as dictated by our customer-driven marketing strategy. We are not certain when or if any significant revenue will be generated from the production of the materials described above.

Research and development expense increased to \$1,554,000 in 2016, compared to \$1,273,000 in 2015. The primary reasons for this increase were salary, outside testing, and materials charges associated with the development and launch of our Solésence™ line of personal care products and related capabilities. We also had an increase in patent legal spending, in part related to additional surface treatment applications and in part related to solar control applications. We expect similar spending in this area during 2017 as we continue with these efforts.

Selling, general and administrative expense decreased to \$2,954,000 in 2016, compared to \$3,019,000 in 2015. The net decrease was primarily attributed to a (primary Romeoville facility) lease extension at a lower rate, partially offset by increased legal fees, and decreased consulting fees and marketing and selling expenses related to the completed launch of our 2015 initiatives in surface finishing applications, and which are now again increasing as we launch Solésence™ personal-care type solutions. We expect 2017 expenses in this area to be approximately 5% higher and driven largely by the selling function as we launch products in personal care, energy, and other areas, depending on the status of certain initiatives.

We had no interest income in either 2016 or 2015. Interest expense was \$15,000 in 2016, compared to \$14,000 in 2015, due to the impact of capital leases on some of our equipment.

Inflation

We believe inflation has not had a material effect on our operations or financial position. However, supplier price increases and wage and benefit inflation, both of which represent a significant component of our costs of operations, may have a material effect on our operations and financial position in 2017 and beyond if we are unable to pass through any increases under present contracts or through to our markets in general.

Liquidity and Capital Resources

Our cash, cash equivalents and short-term investments amounted to \$1,779,000 as of December 31, 2016, compared to \$1,275,000 on December 31, 2015. The net cash used in our operating activities for the year ended December 31, 2016 was \$241,000 compared to \$240,000 for the year ended December 31, 2015. Net cash used in investing activities amounted to \$165,000 for the year ended December 31, 2016, compared to \$288,000 for the year ended December 31, 2015. Capital expenditures amounted to approximately \$204,000 (including a new capital lease for \$75,000) and \$420,000 (including new capital leases for \$132,000) for the years ended December 31, 2016 and 2015, respectively. Net cash provided by financing activities was \$910,000 in 2016, compared to \$59,000 used by financing activities in 2015. On February 10, 2016, we sold 2.6 million shares of our common stock to our largest investor for \$988,000 in proceeds. There were no placement agent or similar fees associated with this transaction. We have used, and expect to continue to use, the proceeds for general corporate purposes. Additionally, on March 4, 2016, we extended the Line of Credit Agreement with Libertyville Bank and Trust, a Wintrust Community Bank, until March 2017. During February 2017, we further extended this agreement until March 2018. No borrowings were outstanding on this line of credit as of December 31, 2016.

Our supply agreements with our largest customer, BASF, contain certain financial covenants which could potentially impact our liquidity. The most restrictive financial covenants under these agreements require that we maintain a minimum of \$1 million in cash, cash equivalents and certain investments, and that we not have the acceleration of any debt maturity having a principal amount of more than \$10 million, in order to avoid triggering the customer's potential right to transfer certain technology and equipment to that customer at a contractually defined price. We had approximately \$1.8 million in cash on December 31, 2016, and no debt. This supply agreement and its covenants are more fully described in Note 12, and our line of credit is more fully described in Note 3, to our Financial Statements referred to in Part II, Item 8, of this Annual Report on Form 10-K.

We believe that cash from operations and cash on hand, in addition to unused borrowing capacity, will be adequate to fund our operating plans through 2017. Our actual future capital requirements in 2017 and beyond will depend, however, on many factors, including customer acceptance of our current and potential nanomaterials and product applications, continued progress in research and development activities and product testing programs, the magnitude of these activities and programs, and the costs necessary to increase and expand our manufacturing capabilities and to market and sell our materials and product applications. Other important issues that will drive future capital requirements will be the development of new markets and new customers as well as the potential for significant unplanned growth with existing customers. Depending on the success of certain projects, we expect that capital spending relating to currently known capital needs for 2017 will be between \$600,000 and \$1,000,000, and further expect to enter into one or more financing leases to finance these acquisitions. If those projects are delayed or ultimately prove unsuccessful, or if we fail to obtain financing on acceptable terms to us, we would expect our capital expenditures may fall below the lower end of the range. Similarly, substantial success in business development projects may cause the actual 2017 capital investment to exceed the top of this range.

Should events arise that make it appropriate for us to seek additional financing, such additional financing may not be available on acceptable terms or even at all, and any such additional financing could be dilutive to our shareholders. Such financing could be necessitated by such things as the loss of existing customers; currently unknown capital requirements in light of the factors described above; new regulatory requirements that are outside our control; the need to meet previously discussed cash requirements to avoid a triggering event under our BASF agreement; or various other circumstances coming to pass that we currently do not anticipate. The failure to have access to sufficient capital to fund our business plans may result in a curtailment or other change in those plans, and under such circumstances, may raise doubt as to our ability to continue as a going concern.

On December 31, 2016, we had a net operating loss carryforward of approximately \$82 million for income tax purposes. Because the Company may have experienced "ownership changes" within the meaning of the U.S. Internal Revenue Code in connection with its various prior equity offerings, future utilization of this carryforward may be subject to certain limitations as defined by the Internal Revenue Code. If not utilized, the remaining carryforward will expire at various dates between January 1, 2018 and December 31, 2036. As a result of the annual limitation and uncertainty as to the amount of future taxable income that will be earned prior to the expiration of the carryforward, we have concluded that it is likely that some portion of this carryforward will expire before ultimately becoming available to reduce income tax liabilities. Changes in Illinois state tax law that began during 2011 will impact net loss carryforward duration and utilization on the state tax level.

Off-Balance Sheet Arrangements

We have not created, and are not party to, any special-purpose or off-balance sheet entities for the purposes of raising capital, incurring debt or operating our business. We do not have any off-balance sheet arrangements or relationships with entities that are not consolidated into our financial statements that are reasonably likely to materially affect our liquidity or the availability of capital resources.

As more fully described in Note 3 to our Financial Statements, referenced in Part II, Item 8 and set forth on page F-11 of this Form 10-K, during July 2014 we entered into a new bank-issued letter of credit and promissory note for up to \$30,000 supporting our obligations under our facility lease agreement. No borrowings have been incurred under this promissory note.

Item 7A. Quantitative and Qualitative Disclosures About Market Risk

Not required for a smaller reporting company.

Item 8. Financial Statements and Supplementary Data

The financial statements, with the report of independent auditors, listed in Item 15 appear on pages F-1 through F-18 of this Form 10-K.

Item 9. Changes in and Disagreements With Accountants on Accounting and Financial Disclosure

None.

Item 9A. Controls and Procedures

Evaluation of Disclosure Controls and Procedures. We are responsible for establishing and maintaining disclosure controls and procedures that are designed to ensure that information required to be disclosed by us in the reports filed by us under the Exchange Act is: (a) recorded, processed, summarized and reported within the time periods specified in the SEC's rules and forms; and (b) accumulated and communicated to our management, including our principal executive and principal financial officers, to allow timely decisions regarding required disclosures. It should be noted that in designing and evaluating our disclosure controls and procedures, we recognize that any controls and procedures, no matter how well designed and operated, can provide only reasonable assurance of achieving the desired control objectives, and that our management necessarily was required to apply its judgment regarding the design of our disclosure controls and procedures. As of the end of the period covered by this report, we conducted an evaluation, under the supervision (and with the participation) of our management, including our Chief Executive Officer and Chief Financial Officer, of the effectiveness of the design and operation of our disclosure controls and procedures pursuant to Rules 13a-15(e) and 15d-15(e) of the Exchange Act. Based on that evaluation, our Chief Executive Officer

and Chief Financial Officer concluded that our disclosure controls and procedures were effective at reaching that level of reasonable assurance.

Management's Annual Report on Internal Control Over Financial Reporting. Management is responsible for the preparation, integrity and fair presentation of the financial statements and Notes to the financial statements. The financial statements were prepared in accordance with the accounting principles generally accepted in the U.S. and include certain amounts based on management's judgment and best estimates. Other financial information presented is consistent with the financial statements.

Management is also responsible for establishing and maintaining adequate internal control over financial reporting as defined in Rules 13a-15(f) and 15d-15(f) under the Securities Exchange Act of 1934. The Company's internal control over financial reporting is designed under the supervision of the Company's principal executive and principal financial officers in order to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. The Company's internal control over financial reporting includes those policies and procedures that:

- (i) Pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of assets of the Company;

- Provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the Company are being made only in accordance with authorizations of management and directors of the Company; and
- (ii) Provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use or disposition of the Company's assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

Management assessed the effectiveness of the Company's internal control over financial reporting as of December 31, 2016. In making this assessment, management used the criteria established in Internal Control—Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission.

Based on our assessment and those criteria, management believes that the Company maintained effective internal control over financial reporting as of December 31, 2016.

This annual report does not include an attestation report of the Company's registered public accounting firm regarding internal control over financial reporting. Management's report was not subject to attestation by the Company's registered public accounting firm pursuant to the rules of the Securities and Exchange Commission that permit the Company to provide only management's report in this annual report.

Changes in Internal Control over Financial Reporting. The Company's management, including Mr. Jankowski, the CEO, and Mr. Cesario, the CFO, confirms that there was no change in the Company's internal control over financial reporting during the quarter ended December 31, 2016 that has materially affected, or is reasonably likely to materially affect, the Company's internal control over financial reporting.

Item 9B. Other Information

None.

PART III

Item 10. Directors, Executive Officers and Corporate Governance

DIRECTORS

Set forth below is certain information regarding the directors of the Company.

Name	Age	Position with Company	Served as Director Since	Term Expires	Class
James A. Henderson	82	Chairman of the Board of Directors	2001	2019	I
James A. McClung, Ph.D.	79	Director	2000	2019	I
R. Janet Whitmore	62	Director	2003	2019	I
Jess A. Jankowski	51	President, Chief Executive Officer and Director	2009	2017	II
Richard W. Siegel, Ph.D.	79	Director	1989	2017	II
W. Ed Tyler	64	Director	2011	2017	II
George A. Vincent, III	72	Director	2007	2018	III

Mr. Henderson has served as a director of the Company since July 2001 and Chairman of the Board of Directors since August 2011. He retired as Chairman and Chief Executive Officer of Cummins Engine Company (now Cummins Inc.) in December 1999, after joining the company in 1964. Mr. Henderson became President and Chief Operating Officer of Cummins in 1977, was promoted to President and Chief Executive Officer in 1994 and served as Chairman and Chief Executive Officer from 1995 until his retirement in 1999. Mr. Henderson attended Culver Military Academy, holds an A.B. in public and international affairs from Princeton University and an M.B.A. from Harvard Business School. Mr. Henderson previously served as a director of AT&T, Inc., International Paper, Rohm & Haas, Hillenbrand, Inc., Inland Steel, and Ryerson, Inc. He serves as Chairman Emeritus of the Board of the Culver Education Foundation and is a past Chair of the Princeton University Board of Trustees. We believe that Mr. Henderson's extensive and diverse background in corporate leadership in technology-based companies, operations experience, and business acumen makes him a valuable member of our Board of Directors.

Mr. McClung has served as a director of the Company since February 2000, and is chair of the Audit and Finance Committee. Currently he is Chair and CEO of Lismore International. He retired as a senior vice president and executive officer for FMC Corporation (which has since split into 3 public corporations: FMC Corporation; TechnipFMC; JB Technologies), a leading producer of a diversified portfolio of chemicals and machinery. He has over 30 years of global business development and operational experience in over 75 countries. This includes managing and developing new technologies and operational processes, and strategic partnerships, for diversified global businesses, including specialized chemicals, process machinery, and health care systems while living in the United States, Europe and Africa. In addition to serving currently on the Boards for Nanophase, 4 D Healthware, and the Nuseed advisory board, he previously served on other corporate boards: Amway Corporation; NCCI; Turtle Wax; Beaulieu Corporation; and Hu-Friedy. He was a founding member of the US-Russia Business Council and is active in other international business organizations, such as Japan American Society, Chicago Council on Global Affairs, Economic Club of Chicago and the Executive Club of Chicago. He is an active Emeritus Trustee for the College of Wooster (Ohio). Mr. McClung earned a bachelor's degree from the College of Wooster (Ohio), master's degree from the University of Kansas, and a doctorate from Michigan State University. We believe that Mr. McClung's extensive global business development and worldwide management experience, including experience in the specialty chemical industry, make him a valuable member of our Board of Directors.

Ms. Whitmore joined the board in November 2003. She is a former director of Silverleaf Resorts, Inc., where she served as Chairman of the Compensation Committee and as a member of the Audit Committee. She is also a former director of Epoch Biosciences, a supplier of proprietary products used to accelerate genomic analysis. Ms. Whitmore is Founder of Benton Consulting, LLC, which specializes in business development and processes. From 1976 through 1999, Ms. Whitmore held numerous engineering and finance positions at Mobil Corporation, including Mobil's Chief Financial Analyst and Controller of Mobil's Global Petrochemicals Division. Ms. Whitmore holds a B.S. degree in Chemical Engineering from Purdue University and an M.B.A. from Lewis University. We believe that Ms. Whitmore's combination of global financial, engineering, and management expertise makes her a valuable member of our Board of Directors.

Mr. Jankowski joined the board in February 2009. He has served as the Company's President and Chief Executive Officer since that time. After joining the Company in 1995, Mr. Jankowski held offices including Vice President of Finance, Chief Financial Officer, Secretary, Treasurer and Controller. From 1990-1995 he served as Controller for

two building and public works contractors in the Chicago area, during which time he had significant business development responsibilities. From 1986 to 1990, he worked for Kemper Financial Services in their accounting control corporate compliance unit, serving as unit supervisor during his last two years. Mr. Jankowski holds a B.S. from Northern Illinois University and an M.B.A. from Loyola University. He served on the TechAmerica Midwest Board from 2008 to 2012 and was an active member of the TechAmerica Midwest CFO Committee from 2006 through 2008. He was appointed to the Advisory Board of the Nanobusiness Commercialization Association in 2009. Mr. Jankowski was also appointed to the Romeoville Economic Development Commission and served from 2004 to 2010. He has also served on the advisory board of NITECH (Formerly WESTEC), an Illinois Technology Enterprise Center focusing on the commercialization of advanced manufacturing technologies from 2003 to 2008. In 2009, Mr. Jankowski was appointed to the board of directors of the Northern Illinois Technology Foundation, an economic development and technology transfer entity that is part of Northern Illinois University. We believe that Mr. Jankowski's long-term and intimate experience with Nanophase operations, along with his financial and management expertise, makes him a valuable member of our Board of Directors.

Dr. Siegel is a co-founder of the Company and has served as a director of the Company since 1989. Dr. Siegel served as a consultant to the Company from 1990 to 2002 with regard to the application and commercialization of nanomaterials. Dr. Siegel is an internationally recognized scientist in the field of nanomaterials. During his tenure on the research staff at Argonne National Laboratory from July 1974 to May 1995, he was the principal scientist engaged in research with the laboratory-scale synthesis process that was the progenitor of the Company's physical-vapor-synthesis production system. Dr. Siegel has been the Robert W. Hunt Professor in Materials Science and Engineering at Rensselaer Polytechnic Institute since June 1995, and served as Department Head from 1995 to 2000. Dr. Siegel was the founding Director of both the Rensselaer Nanotechnology Center (2001-2015) and the U.S. National Science Foundation funded Nanoscale Science and Engineering Center for Directed Assembly of Nanostructures (2001-2013). During the period from 1995 until 1998, he was also a visiting professor at the Max Planck Institute for Microstructure Physics in Germany on an Alexander von Humboldt Research Prize received in 1994. During the period from 2003 until 2004 he was a visiting professor in Japan on a RIKEN Eminent Scientist Award. He chaired the World Technology Evaluation Center worldwide study of nanostructure science and technology for the U.S. government, has served on the Council of the Materials Research Society and as Chairman of the International Committee on Nanostructured Materials. He also served on the Committee on Materials with Sub-Micron Sized Microstructures of the National Materials Advisory Board and was the co-chairman of the Study Panel on Clusters and Cluster-Assembled Materials for the U.S. Department of Energy. He served on the Nanotechnology Technical Advisory Group to the U.S. President's Council of Advisors on Science and Technology during 2003-2009. Dr. Siegel holds an A.B. degree in physics from Williams College and an M.S. degree and Ph.D. from the University of Illinois at Urbana-Champaign. We believe that Dr. Siegel's value to our Board of Directors, as co-founder of the Company and inventor of our initial base technology, is self-explanatory.

Mr. Tyler joined Nanophase as a director in January 2011. Mr. Tyler is Chairman of the Board of First Industrial Realty Trust, where he has served as a director since 2000. He has also served in recent leadership positions at Ideapoint Ventures, an early stage venture fund that focuses on nanotechnologies, and Industrial Nanotech, Inc., an entity which develops and sells nanomaterial solutions. Previously, Mr. Tyler served as President and CEO of Moore Corporation Limited, a provider of data capture, information design, marketing services, digital communications and print solutions. Mr. Tyler also worked for 24 years with R. R. Donnelley & Sons Company in Chicago, beginning his career as an electronics engineer and ultimately serving as Executive Vice President, Sector President, and Chief Technology Officer. He also was responsible for 77 Capital, an early stage venture capital subsidiary of Donnelley, where he was directly responsible for investment decisions and worked closely with the portfolio companies while participating on many of their boards. Mr. Tyler is a former Chairman of the American Red Cross (Mid-America Chapter) and Campaign Chairman of the United Way of Lake County, and serves as a director for several small, private companies. He is a member of the Board of Directors of Lake Forest Graduate School of Management, where he is also an adjunct faculty member. We believe that Mr. Tyler's extensive and diverse background in corporate leadership in technology-based companies, operations experience, and business acumen makes him a valuable member of our Board of Directors.

Mr. Vincent has served as a director of the Company since November 2007. He is the retired Chairman and President of The HallStar Company, where he served as CEO for twenty years. HallStar is a chemical manufacturer and innovator specializing in material science, marketing its products worldwide, primarily into the polymer and personal care industries. Prior to HallStar, Mr. Vincent held positions in purchasing, sales, commercial development and strategic planning with FMC Corporation (chemicals) and General Electric Company (chemicals and plastics). Mr. Vincent has served as Chairman of the Illinois Manufacturers' Association (IMA) and the Chemical Industry Council

of Illinois (CICI), as well as Director of the American Chemistry Council (ACC). Mr. Vincent serves on the Boards of several closely-held companies in the chemicals and materials industry sector. Mr. Vincent holds a Bachelor of Arts degree in Chemistry from Dartmouth College and an M.B.A. degree from Harvard Business School. We believe that Mr. Vincent's extensive experience in the chemicals industry and management leadership makes him a valuable member of our Board of Directors.

Meetings of the Board and Committees -- During the year ended December 31, 2016, the Board of Directors held five meetings. No director missed more than one board or committee meeting held during 2016 (for all committees on which a particular director served).

Committees of the Board of Directors -- The Board of Directors has established an Audit and Finance Committee, Compensation Committee and Nominating and Corporate Governance Committee. Each operates in accordance with its charter (available on our website www.nanophase.com under the “Investor Relations” section). The members of the Audit and Finance Committee are Mr. McClung (Chairman), Mr. Vincent and Dr. Siegel. The members of the Compensation Committee are Mr. Tyler (Chairman), Mr. Henderson, and Mr. Vincent. The members of the Nominating and Corporate Governance Committee are Mr. Henderson (Chairman), Mr. McClung, Dr. Siegel, Mr. Vincent, Mr. Tyler and Ms. Whitmore.

The Audit and Finance Committee generally has responsibility for retaining the Company’s independent public auditors, reviewing the plan and scope of the accountants’ annual audit, reviewing the Company’s internal control functions and financial management policies, reviewing and approving all related party transactions, and reporting to the Board of Directors regarding all of the foregoing. The Audit and Finance Committee held eight meetings during 2016. The Board of Directors has determined that Mr. Vincent and Mr. McClung are the “audit committee financial experts” as described in applicable SEC rules. Each member of the Audit and Finance Committee is independent, as defined in applicable SEC rules.

The Compensation Committee generally has responsibility for establishing executive officer and key employee compensation, reviewing and establishing the Company’s executive compensation, evaluating our Outside Director compensation, and reporting to the Board of Directors regarding the foregoing. The Compensation Committee also has responsibility for administering the 2010 Equity Compensation Plan, as amended (the “2010 Equity Plan”), determining the number of options, if any, to be granted to the Company’s employees and consultants pursuant to the 2010 Equity Plan and reporting to the Board of Directors regarding the foregoing. Regarding most compensation matters, including executive compensation, our management provides recommendations to the Compensation Committee; however, the Compensation Committee does not delegate any of its functions to others in setting compensation. The Compensation Committee does not currently utilize external consultants in executive or director compensation matters. The Compensation Committee held five meetings during 2016. Each member of the Compensation Committee is independent, as defined in applicable SEC rules, is a “non-employee director” as defined in Rule 16b-3 under the Exchange Act and is an “Outside Director” as defined by the regulations under Section 162(m) of the Internal Revenue Code.

The Nominating and Corporate Governance Committee generally has responsibility for evaluating and nominating candidates to serve on the Board of Directors, and for establishing and reviewing our Corporate Governance Principles. Five of the six members of the Nominating and Corporate Governance Committee are independent, as defined in applicable SEC rules. The Nominating and Corporate Governance Committee held one meeting during 2016.

The Board of Directors considers its role in risk oversight to focus primarily on evaluating risk at the entity and strategic levels, with management primarily responsible for managing day-to-day risk factors and presenting summary materials for those positions to the Board of Directors. Consistent with this philosophy, the Board of Directors has no formal policy as to whether the roles of Chief Executive Officer and Chairman should be segregated or combined. The Board of Directors considers the circumstances of the Company and makes a determination as to the appropriate leadership structure for the Company at that time. As of the time of this filing, the positions of CEO and Chairman are held by two individuals – Mr. Henderson serves as Chairman and Mr. Jankowski serves as CEO. Mr. Henderson brings extensive experience in corporate leadership from his own working experience and from the many Boards on which he serves or has served in the past, and Mr. Jankowski is expected to benefit from that experience. The Board of Directors believes that is the most appropriate structure for the Company at this time. Under our Corporate Governance Principles, in the event that the Chairman of the Board is not an Outside Director, the Board will elect a lead independent director, who will have the responsibility to schedule and prepare agendas for meetings of the Outside Directors, communicate with the CEO, disseminate information to the rest of the Board and raise issues with management on behalf of the Outside Directors when appropriate. The Board evaluates its leadership structure on an ongoing basis and may change it as circumstances warrant.

The Board of Directors does not have a stated policy regarding diversity, although pursuant to our Corporate Governance Principles, diversity is one factor that the Nominating and Corporate Governance Committee considers when recommending directors for stockholder approval. The Board seeks experienced individuals for service who bring extensive experience in leadership, operations, finance, and engineering, particularly in areas directly applicable to the Company or its intended future endeavors.

EXECUTIVE OFFICERS

Set forth below is certain information regarding the executive officers of the Company as of the date of this Form 10-K who are not identified above as directors.

Name	Age	Position
Frank Cesario	47	Chief Financial Officer
Kevin Cureton	55	Vice President – Sales, Marketing and Business Development
Nancy Baldwin	65	Vice President - Human Resources and Investor Relations

Mr. Cesario joined the Company in June 2009 as Chief Financial Officer. He brings more than 10 years of CFO and controller experience at manufacturing entities. Prior to joining Nanophase, Mr. Cesario served in a similar capacity with ISCO International, Inc., a publicly traded global supplier of telecommunications equipment, as well as Turf Ventures LLC, a privately held chemicals distributor. He began his career with KPMG Peat Marwick and then served in progressively responsible finance positions within Material Sciences Corporation and Outokumpu Copper, Inc. Mr. Cesario holds an M.B.A. (Finance) from DePaul University and a B.S. (Accountancy) from the University of Illinois, as well as being a registered CPA in the state of Illinois.

Mr. Cureton joined the Company in November 2012 as Vice President of Sales, Marketing and Business Development. His chemical industry experience has spanned more than twenty years with companies including twelve years at AMCOL, where one of his roles was Managing Director of its nanomaterial-based Health & Beauty Solutions division. Prior to that, he made significant contributions at Air Products, Borden, and other entities. He holds an undergraduate degree in chemical engineering from Carnegie Mellon University and an M.B.A. from the University of Chicago.

Ms. Baldwin has served as the Director of Human Resources and Information Technology since joining the Company in 2000. In September of 2008, she was appointed as the Company's Vice President of Human Resources and Investor Relations. Prior to joining Nanophase, she served as Vice President of iLink Global, and Chief Human Resources Officer at the Marketing Store, a global supplier to McDonald's Corporation. Previous experience includes 14 years at Arthur Andersen, LLP & Andersen Consulting, LLP in various positions. Ms. Baldwin has a B.S. in Education from Western Illinois University and post graduate studies at Northern Illinois University. In 2010, Ms. Baldwin was appointed to the Romeoville Economic Development Commission. She is currently an active member of the Will County Three Rivers Manufacturing Human Resources Association.

The Board of Directors elects executive officers and such executive officers, subject to the terms of their employment agreements, serve at the discretion of the Board of Directors. Messrs. Jankowski, Cesario, and Cureton, and Ms. Baldwin, each have employment agreements with the Company. See Item 11 below. There are no family relationships among any of the directors or officers of the Company.

SECTION 16(a) BENEFICIAL OWNERSHIP REPORTING COMPLIANCE

Section 16 of the Exchange Act requires the Company's officers (as defined under Section 16), directors and persons who beneficially own greater than 10% of a registered class of our equity securities to file reports of ownership and changes in ownership with the SEC. Based solely on a review of the forms we have received and on written representations from certain reporting persons that no such forms were required for them, we believe that during 2016 all Section 16 filing requirements applicable to our officers, directors and 10% beneficial owners were complied with by such persons except for the following forms, which were filed late: a Form 4 filing reporting a purchase of 27 shares of stock by Mr. Henderson on February 27, 2015, a Form 4 filing reporting the purchase of 15,523 shares of stock between February 29, 2016 and March 7, 2016 were reported March 10, 2016, and a Form 4 filing reporting an option exercise and the acquisition of the underlying 44,500 shares of stock by Mr. Henderson on September 22, 2016.

CODE OF ETHICS

We have adopted a Code of Business Conduct and Ethics ("Code of Ethics") that applies to, among others, our principal executive officer, principal financial officer and principal accounting officer or controller, or persons performing similar functions. The Code of Ethics is posted on our Internet website www.nanophase.com under the "Investor Relations" section. In the event that we make any amendment to, or grant any waiver from, a provision of the Code of Ethics that requires disclosure under applicable SEC rules, we intend to disclose such amendment or waiver on our website.

Item 11. Executive Compensation

Compliance with Section 162(m)

The Compensation Committee currently intends for all compensation paid to the executive officers to be tax deductible to the Company pursuant to Section 162(m) of the Internal Revenue Code ("Section 162(m)"). Section 162(m) provides that compensation paid to the executive officers in excess of \$1,000,000 cannot be deducted by the

Company for Federal income tax purposes unless, in general, (1) such compensation is performance-based, established by a committee of Outside Directors and objective, and (2) the plan or agreement providing for such performance-based compensation has been approved in advance by stockholders. The Compensation Committee may determine to adopt a compensation program that does not satisfy the conditions of Section 162(m) if in its judgment, after considering the additional costs of not satisfying Section 162(m), it deems such program to be appropriate.

SUMMARY COMPENSATION TABLE

The following table sets forth a summary of the compensation for each of our named executive officers in U.S. dollars for the years ended December 31, 2016 and 2015.

Name and Principal Position	Year	Salary (\$)	Option Bonus Awards (\$)	Non-Equity Incentive Plan Compensation (\$)		Total (\$)
				(3)	(4)	
Jess Jankowski Chief Executive Officer	2016	\$305,831	\$-23,247	\$-22,960		\$352,038
	2015	\$316,371	\$-28,928	\$-21,910		\$367,209
Frank Cesario Chief Financial Officer	2016	\$169,834	\$-10,613	\$-1,224		\$181,671
	2015	\$175,520	\$-12,859	\$-1,224		\$189,603
Kevin Cureton Vice President Sales, Marketing, Business Development	2016	\$186,411	\$-14,656	\$-23,666		\$224,733
	2015	\$188,850	\$-17,857	\$-24,094		\$230,801
Nancy Baldwin Vice President Human Resources and Investor Relations	2016	\$166,686	\$-10,613	\$-9,348		\$186,647
	2015	\$172,626	\$-12,859	\$-8,884		\$194,369

Any amounts earned during 2016 and 2015 would have been paid in early 2017 and 2016, respectively. Bonus compensation is driven by Company performance against its goals as ultimately determined by the Compensation Committee of the Board of Directors. A set of Company-level objectives is created at the beginning of the year, focusing on total revenue, revenue growth, particular sources of revenue growth, business development

(1) achievements, cash flows and related targets, as well as a small discretionary component designed to capture items not specifically listed. Each measure has varying levels of achievement, which is reflected in the aggregate bonus measurement. The resulting bonus calculation is then applied to each individual's bonus potential as a percentage of salary. Because total revenue growth was approximately 4% during 2016 and 2015, performance targets were not met and thus no bonus was awarded to any of the named executive officers for 2016 or 2015.

The amounts in this column represent the aggregate fair value of awards granted in 2016 and 2015 fiscal years in accordance with FASB ASC Topic 718. See Note 10 of the notes to our financial statements contained elsewhere in this Form 10-K for a discussion of all assumptions made by us in determining the FASB ASC Topic 718 values.

(3)

None.

The amounts in this column represent 401(k) match (none during 2016 and 2015), health and life insurance. Health insurance benefits are the same for all employees. Life insurance is provided in the amount of one times the annual base salary with a maximum of \$150,000.

Employment Agreements

Effective as of August 12, 2009, we entered into an employment agreement with Jess Jankowski in connection with his services as President and Chief Executive Officer. No term has been assigned to Mr. Jankowski's employment agreement.

Pursuant to the terms of his employment agreement, Mr. Jankowski will receive an annual base salary of not less than \$275,000. In addition, Mr. Jankowski will be eligible for discretionary bonuses for services to be performed as an executive officer of the Company based on performance and achieving milestones approved by our Board of Directors (the "Board").

Mr. Jankowski will be eligible for such stock options and other equity compensation as the Board deems appropriate, subject to the provisions of the 2010 Equity Plan. Mr. Jankowski will also be entitled to the employee benefits made available by us generally to all of our other executive officers, subject to the terms and conditions of our employee benefit plan in effect from time to time.

In the event Mr. Jankowski's employment is terminated other than for "cause" (as such term is defined in the employment agreement), Mr. Jankowski will receive a sum equal to Mr. Jankowski's base salary in effect at the time of termination for 52 full weeks after the effective date of termination, payable in proportionate amounts on our regular pay cycle for professional employees, provided that Mr. Jankowski signs, without subsequent revocation, a separation agreement and release in a form acceptable to us. In addition, all stock options granted to Mr. Jankowski prior to termination will become fully vested and exercisable in accordance with the applicable option grant agreement and the 2010 Equity Plan. If he is terminated for cause, or if he resigns as an employee of the Company, Mr. Jankowski will not be entitled to any severance or other benefits accruing after the term of the employment agreement and such rights will be forfeited immediately upon the end of such term.

If, within two years after the occurrence of a change in control, as defined in his employment agreement, Mr. Jankowski's employment is terminated other than for cause, his responsibilities or annual compensation are materially reduced without his prior consent, or we cease to be publicly held (each, a "Trigger"), then, subject to Mr. Jankowski signing, without subsequently revoking, a separation agreement and release in a form acceptable to us, Mr. Jankowski will receive a sum equal to his base salary for 104 full weeks after the date the Trigger occurs. In addition, all stock options granted to Mr. Jankowski prior to the Trigger will become fully vested and exercisable in accordance with the applicable option grant agreement and the 2010 Equity Plan.

Effective as of June 24, 2009, we entered into an employment agreement with Mr. Frank Cesario providing for an annual base salary of not less than \$150,000. We also granted to Mr. Cesario options to purchase up to 20,000 shares of common stock at an exercise price of \$1.07 per share with options for one-third of such shares becoming exercisable on each of the first three anniversaries of the date of grant. No term has been assigned to Mr. Cesario's employment agreement. As subsequently amended during 2012, if Mr. Cesario is terminated other than for "cause" (as such term is defined in Mr. Cesario's employment agreement), Mr. Cesario will receive severance benefits in an amount equal to Mr. Cesario's base salary for 26 weeks.

Effective as of November 28, 2012, we entered into an employment agreement with Mr. Kevin Cureton providing for an annual base salary of not less than \$190,000. No term has been assigned to Mr. Cureton's employment agreement. If Mr. Cureton is terminated other than for "cause" (as such term is defined in Mr. Cureton's employment agreement), Mr. Cureton will receive severance benefits in an amount equal to Mr. Cureton's base salary for 26 weeks. In addition, all stock options granted to Mr. Cureton prior to termination will become fully vested and exercisable in connection with the applicable option grant agreement and the 2010 Equity Plan. A signing bonus of \$25,000 was paid upon Mr. Cureton's acceptance of employment.

Effective as of September 25, 2008, we entered into an employment agreement with Ms. Nancy Baldwin providing for an annual base salary of not less than \$150,000. No term has been assigned to Ms. Baldwin's employment agreement. If Ms. Baldwin is terminated other than for "cause" (as such term is defined in Ms. Baldwin's employment agreement), Ms. Baldwin will receive severance benefits in an amount equal to Ms. Baldwin's base salary for 26 weeks. In addition, all stock options granted to Ms. Baldwin prior to termination will become fully vested and exercisable in connection with the applicable option grant agreement and the 2010 Equity Plan.

OUTSTANDING EQUITY AWARDS AT FISCAL YEAR-END

The following table sets forth information regarding each unexercised option held by each of our named executive officers as of December 31, 2016.

name	Option Awards		Stock Awards			
	number of securities underlying unexercised options (#)	Number of Securities Underlying Unexercised Options (#)	option exercise price (\$)	option expiration date	number of shares of stock that have not vested (#)	market value of shares of stock that have not vested (\$)
Jess Jankowski	18,000	-0-	\$4.480	11/06/17		
	23,000	-0-	\$3.140	05/12/18		
	30,000	-0-	\$1.020	05/04/19		
	27,000	-0-	\$1.700	05/03/20		
	85,000	-0-	\$1.260	05/02/21		
	98,000	-0-	\$0.300	08/07/22		
	90,000	-0-	\$0.415	02/14/23		
	60,000	30,000	(1) \$0.520	02/13/24		
	27,000	54,000	(2) \$0.440	02/18/25		
	-0-	69,000	(3) \$0.420	02/23/26		
Frank Cesario	20,000	-0-	\$1.070	06/24/19		
	20,000	-0-	\$1.700	05/03/20		
	31,000	-0-	\$1.260	05/02/21		
	13,667	-0-	\$0.300	08/07/22		
	13,000	-0-	\$0.415	02/14/23		
	26,667	13,333	(1) \$0.520	02/13/24		
	12,000	24,000	(2) \$0.440	02/18/25		
	-0-	31,500	(3) \$0.420	02/23/26		

					—	—
Kevin Cureton	52,000	-0-		\$0.300	11/28/22	
	48,000	-0-		\$0.415	02/14/23	
	50,000	25,000	(1)	\$0.520	02/13/24	
	16,667	33,333	(2)	\$0.440	02/18/25	
	-0-	43,500	(3)	\$0.420	02/23/26	
						—
Nancy Baldwin	9,000	-0-		\$4.480	11/06/17	
	15,000	-0-		\$3.140	05/12/18	
	30,000	-0-		\$1.020	05/04/19	
	27,000	-0-		\$1.700	05/03/20	
	31,000	-0-		\$1.260	05/02/21	
	41,000	-0-		\$0.300	08/07/22	
	39,000	-0-		\$0.415	02/14/23	
	26,667	13,333	(1)	\$0.520	02/13/24	
	12,000	24,000	(2)	\$0.440	02/18/25	
	-0-	31,500	(3)	\$0.420	02/23/26	
						—

(1) The grants expiring February 13, 2024 vested in three equal installments on February 13, 2015, 2016 and 2017.

(2) The grants expiring February 18, 2025 vest in three equal installments on February 18, 2016, 2017 and 2018.

(3) The grants expiring February 23, 2026 vest in three equal installments on February 23, 2017, 2018 and 2019.

POTENTIAL PAYMENT UPON TERMINATION OR CHANGE IN CONTROL

Severance Benefits. Please see discussion of severance benefits under “Employment Agreements” above.

Change in Control. Upon a change in control, the 2010 Equity Plan provides that: (1) vesting under all outstanding stock options will automatically accelerate and each option will become fully exercisable; (2) the restrictions and conditions on all outstanding restricted shares shall immediately lapse; and (3) the holders of performance shares will receive a payment in settlement of the performance shares, in an amount determined by the Compensation Committee, based on the target payment for the performance period and the portion of the performance period that precedes the change in control. If the Company is not the surviving entity, the successor is required to assume all unexercised options.

Payments. The following table quantifies the estimated payments that would be made in each covered circumstance to our named executive officers:

Name	Termination by Company Without Cause (1)	Change in Control (2)	Involuntary Termination in connection with or following a Change in Control (3)
Jess Jankowski	\$ 341,820	\$41,820	\$ 661,820
Frank Cesario	\$ 85,200	\$18,837	\$ 104,037
Kevin Cureton	\$ 125,633	\$27,383	\$ 125,633
Nancy Baldwin	\$ 104,037	\$18,837	\$ 104,037

This amount represents the severance benefits that would be received under the executive officer's employment agreement as described had the executive officer been terminated by the Company without cause on December 31, (1)2016, including the value of any stock options that would have accelerated in connection with such termination. For this purpose, the closing price of our common stock as of December 30, 2016, the last business day of 2016, was used. The amount represents the difference between the exercise price of any unvested options and \$0.72.

This amount represents an estimate of the value that would have been received under the equity compensation plans had a change in control occurred as of December 31, 2016 and the executive officers benefited from an (2)acceleration of vesting in the equity-based plan awards, as described above. For this purpose, the closing price of our common stock as of December 30, 2016, the last business day of 2016, was used. The amount represents the difference between the exercise price of any unvested options and \$0.72.

This amount represents an estimate of the payments and value (including acceleration of vesting of equity-based awards) that would have been received by the executive officers had the executive officers been terminated by the (3)Company without cause on December 31, 2016 in connection with a change in control on this date. For this purpose, the closing price of our common stock as of December 30, 2016, the last business day of 2016, was used. The amount represents the difference between the exercise price of any unvested options and \$0.72.

DIRECTOR COMPENSATION

Upon first being elected to the Board of Directors, each director of the Company who is not an employee or consultant of the Company (an “Outside Director”) is granted stock options to purchase shares of common stock at the closing price as of the date of issuance (the fair market value). This initial option grant to an Outside Director typically vests over three years, though may accelerate upon termination from the Board of Directors.

In 2016, we paid quarterly compensation to the Chairman of the Board of Directors, for an annual rate of \$22,000. We paid quarterly compensation to the Chairman of the Audit and Finance Committee and to the Chairman of the Compensation Committee totaling \$18,000 to each. Each of our other Outside Directors was paid quarterly compensation for an annual total of \$16,000 per Outside Director for services performed in their capacity as a director.

Prior to 2011, we granted our Outside Directors stock appreciation rights (SARs) totaling 106,750 shares, under our Amended and Restated 2006 Stock Appreciation Rights Plan and subsequently under the 2010 Equity Plan. No SARs were granted during 2016 or 2015. The SARs granted vested immediately and were payable upon the directors’ termination from the position of director. During November 2016, we terminated this program and cancelled all vested awards. At the same time, we issued the Outside Directors who had vested SARs cancelled an identical number of options, fully vested on the date of grant, at strike prices identical to the comparable SARs values, which strike prices were all in excess of the closing price of our common stock on this date of grant.

During the first quarter of 2016, we granted our Outside Directors stock options totaling 55,890 shares under the 2010 Equity Plan, as follows: the Chairman of the Board of Directors received stock options to purchase 12,150 shares of our common stock, the Chairman of the Audit and Finance Committee and the Chairman of the Compensation Committee each received stock options to purchase 9,720 shares of our common stock and each of our other Outside Directors received stock options to purchase 8,100 shares of our common stock. Our Outside Directors had the following shares of our common stock underlying stock options (both vested and unvested) outstanding as of December 31, 2016: Mr. Henderson: 50,150 shares; Mr. McClung: 84,270 shares; Mr. Vincent: 86,850 shares; Ms. Whitmore: 71,100 shares; Dr. Siegel: 71,100 shares; and Mr. Tyler: 64,520 shares.

In 2015, we paid quarterly compensation to the Chairman of the Board of Directors, for an annual rate of \$22,000. We paid quarterly compensation to the Chairman of the Audit and Finance Committee and to the Chairman of the Compensation Committee totaling \$18,000 to each. Each of our other Outside Directors was paid quarterly compensation for an annual total of \$16,000 per Outside Director for services performed in their capacity as a director.

In 2005, we adopted, and our stockholders approved, the 2005 Non-Employee Director Restricted Stock Plan (the “Director Restricted Stock Plan”) which reserved 150,000 shares of our common stock to be issued to Outside Directors in the form of restricted shares. In 2005, no awards were made under the Director Restricted Stock Plan. In 2005, we also adopted the Non-Employee Director Deferred Compensation Plan (the “Director Deferred Compensation Plan”) which permits an Outside Director to defer the receipt of director fees until separation from service or the Company undergoes a change in control. We amended the Director Restricted Stock Plan in 2005 to permit an Outside Director to defer receipt of restricted stock granted under it. The deferred restricted shares are accounted for under the Director Deferred Compensation Plan and issued upon separation from service or the Company’s change in control. Under the Director Deferred Compensation Plan, the deferred fees that would have been paid in cash are deemed invested in 5 year U.S. Treasury Bonds during the deferral period. The accumulated hypothetical earnings are paid following the Outside Director’s separation from service or the Company’s change in control. The deferred fees that would have been paid as restricted shares are deemed invested in our common stock during the deferral period. The Director Deferred Compensation Plan is an unfunded, nonqualified deferred compensation arrangement. In 2009, all Outside Directors elected to defer receipts of all of the restricted shares they became entitled to under the Director Restricted Stock Plan, which was consolidated into the 2010 Equity Plan.

All Outside Directors are reimbursed for their reasonable out-of-pocket expenses incurred in attending board and committee meetings.

2016 Outside Director Compensation

Name	Fees Earned	Option Awards	Stock Appreciation	Total(\$)
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	or Paid	(\$)	(1)	Rights	
	in Cash				(\$)
	(\$)				
James A. Henderson	\$22,000	\$11,467		—	\$33,467
James A. McClung	\$18,000	\$11,570		—	\$29,570
W. Ed Tyler	\$18,000	\$3,275		—	\$21,275
R. Janet Whitmore	\$16,000	\$10,102		—	\$26,102
George A. Vincent, III	\$16,000	\$11,024		—	\$27,024
Dr. Richard Siegel	\$16,000	\$10,102		—	\$26,102

The amounts in this column represent the aggregate fair value of awards granted in fiscal 2016 in accordance (1) with FASB ASC Topic 718. See Note 10 of the notes to our financial statements contained elsewhere in this Form 10-K for a discussion of all assumptions made by us in determining the FASB ASC Topic 718 values.

Item 12. Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters

SECURITY OWNERSHIP OF MANAGEMENT

AND PRINCIPAL STOCKHOLDERS

The following table sets forth, as of March 14, 2017 certain information with respect to the beneficial ownership of our common stock by (1) each person known by us to own beneficially more than 5% of the outstanding shares of common stock, (2) each of our directors, (3) each of our named executive officers and (4) all of our executive officers and directors as a group.

Name	Number of Shares Beneficially Owned (1)	Percent of Shares Beneficially Owned	
Bradford T. Whitmore	13,493,599 (2)	43.2	%
Spurgeon Corporation	3,034,710 (3)	9.7	%
Grace Brothers, Ltd.	2,433,300 (4)	7.8	%
John H. Conley, Jr.	2,140,650 (5)	6.9	%
James A. Henderson	519,665 (6)	1.7	%
Richard W. Siegel, Ph.D.	452,538 (7)	1.4	%
James A. McClung	121,843 (8)	*	
W. Ed Tyler	54,440 (9)	*	
R. Janet Whitmore	1,407,158 (10)	4.5	%
George A. Vincent, III	78,450 (11)	*	
Jess A. Jankowski	577,801 (12)	1.8	%
Kevin Cureton	222,833 (13)	*	
Nancy Baldwin	267,487 (14)	*	
Frank J. Cesario	255,950 (15)	*	
All current executive officers and directors as a group (10 persons)	3,958,165 (16)	12.0	%

Unless otherwise indicated below, the person's address is the same as the address for the Company.

*Denotes beneficial ownership of less than one percent.

Beneficial ownership is determined in accordance with the rules of the SEC. Unless otherwise indicated below, the (1) persons in the above table have sole voting and investment power with respect to all shares of common stock shown as beneficially owned by them.

(2) Includes 2,433,300 shares of common stock held by Grace Brothers, Ltd., 601,410 shares of common stock held by Grace Investments, Ltd. and 10,407,435 shares held by Bradford T. Whitmore, as well as 51,454 shares held by his daughter. Mr. Whitmore is a general partner of both Grace entities. In such capacities, Mr. Whitmore shares voting and investment power with respect to the shares of common stock held by the Grace entities. This information is based on information reported on a Form 5 filed on January 11, 2017 with the SEC. The address of the stockholder is 1603 Orrington Avenue, Suite 900, Evanston, Illinois 60201.

(3) Includes 2,433,300 shares of common stock held by Grace Brothers, Ltd. and 601,410 shares of common stock held by Grace Investments, Ltd. Spurgeon Corporation is a general partner of both Grace entities and shares voting and investment power with respect to the shares of common stock held by such Grace entities. This information is based on information reported on the Form 5 referenced above. The address of the stockholder is 1603 Orrington Avenue, Suite 900, Evanston, Illinois 60201.

- (4) This information is based on information reported on the Form 5 referenced above. The address of the stockholder is 1603 Orrington Avenue, Suite 900, Evanston, Illinois 60201.
- (5) This information is based on information reported on Schedule 13G/A filed with the SEC on January 5, 2017. The address of the stockholder is 8 Rene Carr Street, Elkton, Maryland 21921.
- (6) Includes Mr. Henderson's 37,550 shares of common stock issuable upon exercise of options exercisable currently or within 60 days of March 14, 2017.
- (7) Includes Dr. Siegel's 62,700 shares of common stock issuable upon exercise of options exercisable currently or within 60 days of March 14, 2017.
- (8) Includes Mr. McClung's 74,190 shares of common stock issuable upon exercise of options exercisable currently or within 60 days of March 14, 2017, as well as 30,071 shares held by his spouse.
- (9) Includes Mr. Tyler's 54,440 shares of common stock issuable upon exercise of options exercisable currently or within 60 days of March 14, 2017.
- (10) Includes Ms. Whitmore's 62,700 shares of common stock issuable upon exercise of options exercisable currently or within 60 days of March 14, 2017, as well as 238,493 shares held by her children.
- (11) Includes Mr. Vincent's 78,450 shares of common stock issuable upon exercise of options exercisable currently or within 60 days of March 14, 2017.
- (12) Includes Mr. Jankowski's 538,000 shares of common stock issuable upon exercise of options exercisable currently or within 60 days of March 14, 2017, as well as 1,000 shares held by his spouse.
- (13) Includes Mr. Cureton's 222,833 shares of common stock issuable upon exercise of options exercisable currently or within 60 days of March 14, 2017.
- (14) Includes Ms. Baldwin's 266,500 shares of common stock issuable upon exercise of options exercisable currently or within 60 days of March 14, 2017.
- (15) Includes Mr. Cesario's 172,167 shares of common stock issuable upon exercise of options exercisable currently or within 60 days of March 14, 2017.

(16) Includes all executive officers and directors as a group's 1,569,530 shares of common stock issuable upon exercise of options exercisable currently or within 60 days of March 14, 2017.

Item 13. Certain Relationships and Related Transactions, and Director Independence

Under our Audit and Finance Committee's charter, the Audit and Finance Committee must review and approve all related person transactions in which any executive officer, director, director nominee or more than 5% stockholder, or any of their immediate family members, has a direct or indirect material interest. The Audit and Finance Committee may not approve a related person transaction unless it is in, or not inconsistent with, our best interests and, where applicable, the terms of such transaction are at least as favorable to us as could be obtained from an unrelated third party.

We did not engage in any transactions in which a related person had or will have a direct or indirect material interest during 2016 or 2015, except for the February 2016 sale of 2.6 million shares of our common stock to our largest shareholder, Bradford T. Whitmore, at a price of \$0.38 per share, for proceeds of \$988,000, which was reviewed and approved in advance by our Audit and Finance Committee pursuant to the parameters described above. No related party transactions are currently contemplated.

Director Independence. The Board of Directors has determined that the following directors are “independent” as that term is defined in the rules and regulations of the SEC and the NASDAQ Stock Market: Mr. McClung, Mr. Henderson, Dr. Siegel, Mr. Tyler and Mr. Vincent. Though we are no longer listed on NASDAQ, our Board of Directors used the NASDAQ listing standards in making its independence determinations.

The Board of Directors has established an Audit and Finance Committee, Compensation Committee and Nominating and Corporate Governance Committee. The members of the Audit and Finance Committee are Mr. McClung (Chairman), Mr. Vincent, and Dr. Siegel. The members of the Compensation Committee are Mr. Tyler (Chairman), Mr. Henderson, and Mr. Vincent. The members of the Nominating and Corporate Governance Committee are Mr. Henderson (Chairman), Mr. McClung, Dr. Siegel, Mr. Vincent, Mr. Tyler and Ms. Whitmore.

Item 14. Principal Accountant Fees and Services

Audit Fees. The aggregate amount billed by our principal accountant, RSM US LLP (“RSM”), for audit services performed for the fiscal years ended December 31, 2016 and 2015 was approximately \$142,000 and \$158,000, respectively. Audit services include the auditing of financial statements and quarterly reviews.

Audit Related Fees. There were no audit related fees billed by RSM for the years ended December 31, 2016 and 2015, which may include costs incurred for reviews of registration statements, assistance with Staff comment letters, and consultation on various accounting matters in support of our financial statements.

Tax Fees. There were no fees billed by our principal accountant for tax related services for the fiscal years ended December 31, 2016 and 2015.

All Other Fees. Other than those fees described above, during the fiscal years ended December 31, 2016 and 2015, there were no other fees billed for services performed by our principal accountant.

All of the fees described above were approved by our Audit and Finance Committee.

Audit and Finance Committee Pre-Approval Policies and Procedures. Our Audit and Finance Committee pre-approves the audit and non-audit services performed by RSM, our principal accountants, in order to assure that the provision of such services does not impair RSM's independence. Unless a type of service to be provided by RSM has received general pre-approval, it will require specific pre-approval by the Audit and Finance Committee. In addition, any proposed services exceeding pre-approval cost levels or budgeted amounts will require specific pre-approval by the Audit and Finance Committee.

The term of any pre-approval is 12 months from the date of pre-approval, unless the Audit and Finance Committee specifically provides for a different period. The Audit and Finance Committee will periodically revise the list of pre-approved services, based on subsequent determinations, and has delegated pre-approval authority to the Chairman of the Audit and Finance Committee. In the event the Chairman exercises such delegated authority, he shall report such pre-approval decisions to the Audit and Finance Committee at its next scheduled meeting. The Audit and Finance Committee does not delegate its responsibilities to pre-approve services performed by the independent auditor to management.

PART IV

Item 15. Exhibits and Financial Statement Schedules

(a) The following documents are filed as part of this Form 10-K:

¹ The following financial statements of the Company, with the report of independent registered public accounting firm, are filed as part of this Form 10-K:

Report of RSM US LLP, Independent Registered Public Accounting Firm

Balance Sheets as of December 31, 2016 and 2015

Statements of Operations for the Years Ended December 31, 2016 and 2015

Statements of Stockholders' Equity for the Years Ended December 31, 2016 and 2015

Statements of Cash Flows for the Years Ended December 31, 2016 and 2015

Notes to Financial Statements

² A list of exhibits required to be filed as part of this Form 10-K is set forth in the Exhibit Index beginning on page E-1 of this Form 10-K, which immediately precedes such exhibits, and is incorporated herein by reference.

Item 16. Form 10-K Summary

None.

NANOPHASE TECHNOLOGIES CORPORATION

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<u>Report of RSM US LLP, Independent Registered Public Accounting Firm</u>	F-2
<u>Balance Sheets as of December 31, 2016 and 2015</u>	F-3
<u>Statements of Operations for the years ended December 31, 2016 and 2015</u>	F-4
<u>Statements of Stockholders' Equity for the years ended December 31, 2016 and 2015</u>	F-5
<u>Statements of Cash Flows for the years ended December 31, 2016 and 2015</u>	F-6
<u>Notes to the Financial Statements</u>	F-7

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Report of Independent Registered Public Accounting Firm

To the Board of Directors and Stockholders

Nanophase Technologies Corporation

We have audited the accompanying balance sheets of Nanophase Technologies Corporation as of December 31, 2016 and 2015, and the related statements of operations, stockholders' equity, and cash flows for the years then ended. These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on these financial statements based on our audits.

We conducted our audits in accordance with the standards of the Public Company Accounting Oversight Board (United States). Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. The Company is not required to have, nor were we engaged to perform, an audit of its internal control over financial reporting. Our audits included consideration of internal control over financial reporting as a basis for designing audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Company's internal control over financial reporting. Accordingly, we express no such opinion. An audit also includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements, assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audits provide a reasonable basis for our opinion.

In our opinion, the financial statements referred to above present fairly, in all material respects, the financial position of Nanophase Technologies Corporation as of December 31, 2016 and 2015, and the results of its operations and its cash flows for the years then ended, in conformity with U.S. generally accepted accounting principles.

/s/ RSM US LLP

Schaumburg, Illinois

March 29, 2017

NANOPHASE TECHNOLOGIES CORPORATION

BALANCE SHEETS

	(in thousands except share and per share data)	
	As of December 31,	
	2016	2015
ASSETS		
Current assets:		
Cash and cash equivalents	\$1,779	\$1,275
Trade accounts receivable, less allowance for doubtful accounts of \$5 and \$6 on December 31, 2016 and 2015, respectively	434	507
Inventories, net	772	662
Prepaid expenses and other current assets	442	247
Total current assets	3,427	2,691
Equipment and leasehold improvements, net	1,395	1,861
Other assets, net	20	22
	\$4,842	\$4,574
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current liabilities:		
Current portion of capital lease obligations	\$107	\$94
Accounts payable	669	508
Accrued expenses	521	276
Total current liabilities	1,297	878
Long-term portion of capital lease obligations	110	144
Long-term deferred rent	466	519
Asset retirement obligations	178	172
Total long-term liabilities	754	835
Contingent liabilities	—	—
Stockholders' equity:		
Preferred stock, \$.01 par value, 24,088 shares authorized and no shares issued and outstanding	—	—
Common stock, \$.01 par value, 42,000,000 and 35,000,000 shares authorized; 31,229,996 and 28,585,496 shares issued and outstanding on December 31, 2016 and December 31, 2015,	312	286

respectively

Additional paid-in capital	97,359	96,172
Accumulated deficit	(94,880)	(93,597)
Total stockholders' equity	2,791	2,861
	\$4,842	\$4,574

(See accompanying Notes to Financial Statements)

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NANOPHASE TECHNOLOGIES CORPORATION

STATEMENTS OF OPERATIONS

(in thousands except share and per share data)

Years ended December 31,

2016

2015

Revenue:

Product revenue	\$	10,720		\$	10,272
Other revenue		63			41
Total revenue		10,783			10,313

Operating expense:

Cost of revenue		7,543			7,199
Gross profit		3,240			3,114

Research and development expense		1,554			1,273
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Selling, general and administrative expense		2,954			3,019
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Loss from operations		(1,268)		(1,178)
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Interest income		—			—	
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Interest expense		(15)		(14)
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Other, net		—			—	
------------	--	---	--	--	---	--

Loss before provision for income taxes		(1,283)		(1,192)
--	--	--------	---	--	--------	---

Provision for income taxes		—			—	
----------------------------	--	---	--	--	---	--

Net loss	\$	(1,283)	\$	(1,192)
----------	----	--------	---	----	--------	---

Net loss per share-basic and diluted		(0.04)		(0.04)
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Weighted average number of basic and diluted common shares outstanding		30,911,869			28,574,902
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(See accompanying Notes to Financial Statements)

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NANOPHASE TECHNOLOGIES CORPORATION

STATEMENTS OF STOCKHOLDERS' EQUITY

(in thousands except share data)

Description	Preferred Stock		Common Stock		Additional Paid-in Capital	Accumulated Deficit	Total
	Shares	Amount	Shares	Amount			
Balance on December 31, 2014	—	\$ —	28,516,163	\$ 285	\$ 95,966	\$ (92,405)) \$3,846
Stock option exercises	—	—	69,333	1	25	—	26
Stock-based compensation	—	—	—	—	181	—	181
Net loss for the year ended December 31, 2015	—	—	—	—	—	(1,192)) (1,192)
Balance on December 31, 2015	—	\$ —	28,585,496	\$ 286	\$ 96,172	\$ (93,597)) \$2,861
Sale of common stock	—	—	2,600,000	26	962	—	988
Stock option exercises	—	—	44,500	—	18	—	18
Stock-based compensation	—	—	—	—	207	—	207
Net loss for the year ended December 31, 2016	—	—	—	—	—	(1,283)) (1,283)
Balance on December 31, 2016	—	\$ —	31,229,996	\$ 312	\$ 97,359	\$ (94,880)) \$2,791

(See accompanying Notes to Financial Statements)

NANOPHASE TECHNOLOGIES CORPORATION

STATEMENTS OF CASH FLOWS

	(in thousands)	
	Years ended	
	December 31,	
	2016	2015
Operating activities:		
Net loss	\$(1,283)	(1,192)
Adjustments to reconcile net loss to cash used in operating activities:		
Depreciation and amortization	610	735
Impairment of fixed asset	54	—
Share-based compensation	207	182
Changes in assets and liabilities related to operations:		
Trade accounts receivable	73	(119)
Inventories	(110)	288
Prepaid expenses and other assets	(194)	120
Accounts payable	161	(14)
Accrued expenses	241	(240)
Net cash used in operating activities	(241)	(240)
Investing activities:		
Acquisition of equipment and leasehold improvements	(128)	(280)
Payment of accounts payable incurred for the purchase of equipment and leasehold improvements	(37)	(8)
Net cash used in investing activities	(165)	(288)
Financing activities:		
Principal payment on capital leases	(96)	(85)
Proceeds from sale of common stock	988	—
Proceeds from exercise of stock options	18	26
Net cash provided by (used in) financing activities	910	(59)
Increase/(Decrease) in cash and cash equivalents	504	(587)
Cash and cash equivalents at beginning of period	1,275	1,862
Cash and cash equivalents at end of period	\$1,779	\$1,275
Supplemental cash flow information:		
Interest paid	\$15	\$14
Supplemental non-cash investing and financing activities:		
Accounts payable incurred for the purchase of equipment and leasehold improvements	\$—	\$37
Capital lease obligations incurred in the purchase of equipment	\$75	\$132

(See accompanying Notes to Financial Statements)

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NANOPHASE TECHNOLOGIES CORPORATION

NOTES TO FINANCIAL STATEMENTS

(In thousands, except share and per share data or as otherwise noted herein)

(1) Description of Business

Nanophase Technologies Corporation (“Nanophase”, “Company”, “we”, “our”, or “us”) is an advanced materials and applications developer and commercial manufacturer with an integrated family of nanomaterial and related technologies. We produce engineered nano and larger, sub-micron, materials for use in a variety of diverse markets: personal care including sunscreens, architectural coatings, industrial coating applications, abrasion-resistant additives, plastics additives, medical diagnostics, energy, and a variety of surface finishing technologies (polishing) applications, including optics. We have recently expanded our offerings beyond active ingredients to include targeted full formulations of skin care products, marketed and sold by our wholly-owned subsidiary, Solésence™ LLC. We target markets in which we believe practical solutions may be found using our products. We work closely with current and potential customers in these target markets to identify their material and performance requirements and market our materials to various end-use applications manufacturers. Recently developed technologies have made certain new products possible and opened potential new markets. We recently developed new material solutions in the light energy-management area (particularly solar control) that have been taken to potential customers, and for which we are experiencing early-stage, accelerating revenue growth. We also developed a new solution for surface treatments (coatings) which we used to launch new products in personal care, including those of our subsidiary, Solésence™ LLC, in the fall of 2016. Although our primary strategic focus has been the North American market, we currently sell material to customers overseas and have been working to expand our reach within foreign markets. The Company was incorporated in Illinois on November 25, 1989, and became a Delaware corporation during November 1997. Our common stock trades on the OTCQB marketplace under the symbol NANX.

While product sales comprise the majority of our revenue, we also recognize revenue from other sources from time to time. These activities are not expected to drive the long-term growth of the business. For this reason, we classify such revenue as “other revenue” in our Statements of Operations, as it does not represent revenue directly from our nanocrystalline materials.

(2) Summary of Significant Accounting Policies

Use of Estimates and Risks and Uncertainties

The preparation of financial statements requires us to make estimates and assumptions that affect the amounts reported in the financial statements and accompanying notes. Actual results could differ from those estimates. Certain assumptions are also necessary to assess the impact of risks and uncertainties on the financial statements, such as cash flow projections, availability of capital if needed to support the ongoing operations of the business, and our expected compliance with contractual commitments. These risks and uncertainties are further discussed in Note 12. Any changes in these assumptions or business plans could have a material impact on the financial statements.

Cash and Cash Equivalents

Cash and cash equivalents primarily consist of demand deposits, but also include certain lower risk investments with a stated maturity upon acquisition of 90 days or less (e.g., money market funds or a certificate of deposit with a maturity of 90 days or less at the time of purchase).

Trade Accounts Receivable

Trade accounts receivable are carried at original invoice amount less an estimate made for doubtful receivables based on a review of all outstanding amounts on a monthly basis. We determine the allowance for doubtful accounts by identifying troubled accounts and by using historical experience applied to an aging of accounts. Trade accounts receivable are written off when deemed uncollectible. Recoveries of trade accounts receivable previously written off are recorded when received. Our typical credit terms are thirty days from shipment and invoicing.

Inventories

Inventories are stated at the lower of cost, maintained on a first in, first out basis, or market. We have recorded allowances to reduce inventory relating to excess quantities of certain materials. Write-downs of inventories establish a new cost basis, which is not increased for future increases in market value of inventories or changes in estimated excess quantities.

Equipment and Leasehold Improvements

Equipment is stated at cost and is being depreciated over its estimated useful life (3-20 years) using the straight-line method. Leasehold improvements are stated at cost and are being amortized using the straight-line method over the shorter of the useful life of the asset or the term of the lease (3-13 years). Depreciation expense for leased assets is included with depreciation expense for owned assets. From time to time we have self-constructed assets. These assets are stated at cost plus the capitalization of labor and are depreciated over an estimated useful life (7-10 years) using the straight-line method.

Long Lived Assets

We review long-lived assets for impairment whenever events or changes in circumstances indicate that the asset's carrying amount may not be recoverable. We conduct long-lived asset impairment analyses in accordance with ASC 360-10-15, *Impairment or Disposal of Long-Lived Assets*. ASC 360-10-15 requires us to group assets and liabilities at the lowest level for which identifiable cash flows are largely independent of the cash flows of other assets and liabilities and evaluate the asset group against the sum of the undiscounted future cash flows. If the undiscounted cash flows do not indicate the carrying amount of the asset is recoverable, an impairment charge is measured as the amount by which the carrying amount of the asset group exceeds its fair value based on discounted cash flow analysis or

appraisals.

Asset Retirement Obligations

In connection with our leased facilities, we are required to remove certain leasehold improvements upon termination of our occupancy. We follow the provisions of the FASB issued ASC 410-20, *Asset Retirement Obligations*, under which we recognize a liability for the fair value of these asset retirement obligations. The fair value of that liability is measured based on an expected cash flow approach and accretion expense is recognized each period to recognize increases to the fair value of the liability due to the passage of time. Increases to the fair value of the liability, except for accretion, are added to the carrying value of the long-lived asset. Those increases are then reported in amortization expense over the estimated useful life of the long-lived asset.

Activity in the asset retirement obligation account for the years ended December 31, is as follows:

	2016	2015
Balance, beginning	\$172	\$166
Accretion of liability due to passage of time	6	6
Amortization of asset due to passage of time	—	—
Balance, ending	\$178	\$172

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Financial Instruments

We follow ASC Topic 820, *Fair Value Measurements and Disclosures*, which defines fair value, establishes a framework for measuring fair value, and expands disclosures about fair value measurements. The fair value framework requires the categorization of assets and liabilities into three levels based upon the assumptions (inputs) used to price the assets or liabilities. Level 1 provides the most reliable measure of fair value, whereas Level 3 generally requires significant management judgment.

Our financial instruments include cash and cash equivalents, accounts receivable, accounts payable and accrued expenses, along with the promissory note with no related borrowings described in Note 3, and any borrowings on the working capital line of credit described in Note 3. The fair values of all financial instruments were not materially different from their carrying values.

There were no financial assets or liabilities adjusted to fair value on December 31, 2016 and 2015.

Product Revenue

Product revenue consists of sales of product that are recognized when realized and earned. This occurs when persuasive evidence of an arrangement exists, title transfers via shipment of products or when delivery has occurred, the price is fixed or determinable and collectability is reasonably assured.

Other Revenue

Other revenue may include revenue from technology license fees and paid development projects. Technology license fees and paid development projects are recognized when earned pursuant to the agreed upon contractual arrangement, when performance obligations are satisfied, the amount is fixed or determinable, and collectability is reasonably assured.

Shipping and handling costs are included in other revenue when products are shipped and invoiced to the customer. We include the related cost of shipping and handling in cost of goods sold.

Research and Development Expenses

Research and development expenses are recognized as expense when incurred.

Income Taxes

We account for income taxes using the liability method. As such, deferred income taxes reflect the net tax effects of temporary differences between the carrying amounts of assets and liabilities for financial reporting purposes and the amounts used for income tax purposes. Deferred tax assets and liabilities are calculated using the enacted tax rates and laws that are expected to be in effect when the anticipated reversal of these differences is scheduled to occur. Deferred tax assets are reduced by a valuation allowance when, in the opinion of management, it is more likely than not that some portion or all of the deferred tax assets will not be realized.

When tax returns are filed, it is highly certain that some positions taken would be sustained upon examination by the taxing authorities, while others are subject to uncertainty about merits of the position taken or the amount of the position that would be ultimately sustained. The benefit of a tax position is recognized in the financial statements in the period during which, based on all available evidence, management believes it is more likely than not that the position will be sustained upon examination, including the resolution of appeals or litigation processes, if any. Tax positions taken are not offset or aggregated with other positions. Tax positions that meet the more-likely-than-not recognition threshold are measured as the largest amount of tax benefit that is more than 50 percent likely of being realized upon settlement with the applicable taxing authority. The portion of the benefits associated with tax positions taken that exceeds the amount measured, as described above, is reflected as a liability for uncertain tax benefits in the accompanying balance sheets along with any associated interest and penalties that would be payable to the taxing authorities upon examination.

We have not recorded a reserve for any tax positions for which the ultimate deductibility is highly certain but for which there is uncertainty about the timing of such deductibility. We file tax returns in all appropriate jurisdictions, which includes a federal tax return and Illinois state tax return. Open tax years for both jurisdictions are 2013 to 2015, which statutes expire in 2017 to 2019, respectively, under most cases and subject to appropriate laws and regulations. When and if applicable, potential interest and penalty costs are accrued as incurred, with expenses recognized in selling, general and administrative expenses in the statements of operations. As of December 31, 2016 and 2015, we had no liability for unrecognized tax benefits.

Earnings Per Share

Options to purchase approximately 859,000 shares of common stock that were outstanding as of December 31, 2016 were not included in the computation of earnings per share for the year ended December 31, 2016, as the impact of such shares would be both negligible and anti-dilutive. Options to purchase approximately 210,000 shares of common stock that were outstanding as of December 31, 2015 were not included in the computation of earnings per share for the year ended December 31, 2015, as the impact of such shares would be both negligible and anti-dilutive.

New Accounting Pronouncements

During May 2014, the FASB issued Accounting Standards Update (“ASU”) No. 2014-09 (“ASU 2014-09”), *Revenue from Contracts with Customers*, and several related updates including ASU No. 2016-08 and ASU No. 2016-10, which supersedes nearly all existing revenue recognition guidance under U.S. generally accepted accounting principles. The new standard requires a company to recognize revenue when it transfers goods or services to customers in an amount that reflects the consideration that the company expects to receive for those goods or services. Additionally, the guidance requires certain disclosures designed to help users of financial statements better understand the nature, amount, timing, and uncertainty of revenue and cash flows arising from contracts with customers. ASU 2014-09 is effective for annual reporting periods beginning after December 15, 2017, including interim periods within that reporting period, which is our first quarter of 2018. The new standard allows application either retrospectively to each prior reporting period presented or retrospectively as a cumulative-effect adjustment as of the date of adoption. We are evaluating the effect that ASU 2014-09 will have on our financial statements and related disclosures, but do not expect it to have a material impact on our financial position, results of operations, or cash flows.

During February 2016, the FASB issued ASU No. 2016-02 (“ASU 2016-02”), *Leases (Topic 842)*. This standard requires the recognition of assets and liabilities arising from lease transactions on the balance sheet and the disclosure of key information about leasing arrangements. Accordingly, a lessee will recognize a lease asset for its right to use the underlying asset and a lease liability for the corresponding lease obligation. Both the asset and liability will initially be measured at the present value of the future minimum lease payments over the lease term. Subsequent measurement, including the presentation of expenses and cash flows, will depend on the classification of the lease as

either a finance or an operating lease. Initial costs directly attributable to negotiating and arranging the lease will be included in the asset. For leases with a term of 12 months or less, a lessee can make an accounting policy election by class of underlying asset to not recognize an asset and corresponding liability. Lessees will also be required to provide additional qualitative and quantitative disclosures regarding the amount, timing and uncertainty of cash flows arising from leases. These disclosures are intended to supplement the amounts recorded in the financial statements and provide additional information about the nature of an organization's leasing activities. The amendments in this standard are effective for fiscal years, and interim periods within those fiscal years, beginning after December 15, 2018, with early adoption permitted. We are currently evaluating the impact its adoption will have on the presentation of our financial statements and related disclosures.

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During August 2014, the FASB issued ASU No. 2014-15, *Disclosure of Uncertainties about an Entity's Ability to Continue as a Going Concern* ("ASU 2014-15"). ASU 2014-15 will explicitly require management to assess an entity's ability to continue as a going concern, and to provide related footnote disclosure in certain circumstances. The new standard is effective for all entities in the first annual period ending after December 15, 2016, or January 1, 2017 for us. Earlier adoption was permitted. The adoption did not impact the presentation of our financial statements, financial position, results of operations, cash flows and related disclosures.

During March 2016, the FASB issued ASU No. 2016-09, *Improvements to Employee Share-Based Payment Accounting*, which amends ASC Topic 718, *Compensation - Stock Compensation*. The objective of this update is part of the FASB's Simplification Initiative as it applies to several aspects of the accounting for share-based payment transactions, including the income tax consequences, classification of awards as either equity or liabilities, and classification on the statement of cash flows. The effective date of the update is for fiscal years beginning after December 15, 2016 and interim periods within that reporting period, or January 1, 2017 for us. Early adoption was permitted. The adoption did not have a material impact on the presentation of our financial statements, financial position, results of operations, cash flows and related disclosures.

(3) Note and Line of Credit

During July 2014 we entered into a bank-issued letter of credit and related promissory note for up to \$30 in borrowings to support our obligations under our facility lease agreement. We then sold our certificates of deposit. No borrowings have been incurred under this promissory note. Should any borrowings occur in the future, the interest rate would be the prime rate plus 1%, with the bank having the right to "set off" or apply unpaid balances against our checking account if we fail to meet our obligations under any borrowings under the note. It is our intention to renew this note annually, for as long as we need to pursuant to the terms of our facility lease agreement. Because there were no amounts outstanding on the note at any time during 2016 or 2015, we have recorded no related liability on our balance sheet.

During March 2015, we entered into a Business Loan Agreement (the "Line of Credit Agreement") with Libertyville Bank and Trust Company, a Wintrust Community Bank ("Libertyville"), our primary bank. This Line of Credit Agreement was subsequently amended on April 13, 2015. Under the Line of Credit Agreement, as amended, Libertyville will provide a maximum of \$300, or 75% of our eligible accounts receivable, whichever is less, of revolving credit, collateralized by a senior priority lien on our accounts receivable, inventory, equipment, general intangibles and fixtures. Interest on any borrowings would be the prime rate at the time plus 1%. Availability to draw on the line requires us to have at least \$1 million in cash, including any amounts borrowed, at Libertyville on the date of any advance. Advances may only occur at the beginning or end of a fiscal quarter and must be repaid in full within five days of the advance. The Line of Credit Agreement was to expire on March 4, 2016, but during March 2016 was extended until March 4, 2017. During February 2017, this agreement was further extended to March 2018. No borrowing on this line was outstanding on December 31, 2016.

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(4) Inventories

Inventories consist of the following:

	As of December 31,	
	2016	2015
Raw materials	\$283	\$184
Finished goods	510	530
	793	714
Allowance for excess quantities	(21)	(52)
	\$772	\$662

(5) Equipment and Leasehold Improvements

Equipment and leasehold improvements consist of the following:

	As of December 31,	
	2016	2015
Machinery and equipment	\$14,587	\$14,562
Office equipment	790	778
Office furniture	110	110
Leasehold improvements	4,814	4,789
Construction in progress	75	11
	20,376	20,250
Less: Accumulated depreciation and amortization	(18,981)	(18,389)
	\$1,395	\$1,861

Depreciation expense was \$605 and \$726, for the years ended December 31, 2016 and 2015, respectively.

(6) Lease Commitments

We lease our operating facilities under operating leases. During October 2016 we entered into a Third Lease Amendment related to our primary facility in Romeoville, Illinois, extending the term of the lease through December 31, 2024. The current monthly rent on this lease amounts to \$25.

We lease our Burr Ridge, Illinois, facility under an agreement extended during September 2010, which extended the term through September 2014 (we have since exercised our final tenant option to extend the term through September 2017). During March 2017, we entered into a new Building Lease for this facility that will begin September 2017 and extend through September 2021, with our having the option to further extend this lease by three additional one-year periods. The current monthly rent on this lease amounts to \$15. During 2016 we also renewed our lease for our offsite warehouse in Romeoville, Illinois, through August 2019. The current monthly rent on this lease amounts to \$5.

The following is a schedule of future minimum lease payments including real estate taxes as required under the above operating leases, as well as the remaining lease payments under capital leases as referenced below:

Year ending December 31:	Operating Leases	Capital Leases
2017	\$ 698	58
2018	700	45
2019	691	34
2020	589	18
2021	554	15
Thereafter	1,289	—
Total minimum payments required:	\$ 4,521	* \$ 170 *

* After paying \$60 to retire a capital lease during January 2017, the remaining payments under capital leases include principal of \$147 and interest of \$23. Also, includes future payments of the Burr Ridge Building Lease executed March 2017 as described above.

Rent expense, including real estate taxes, under these leases amounted to \$597 and \$588, for the years ended December 31, 2016 and 2015, respectively.

On December 31, 2016 equipment under capital leases had a cost of \$362 with accumulated depreciation of \$62, compared to \$316 and \$29, respectively, on December 31, 2015. Principal and interest payments are due monthly under the capital lease obligations through October 2020. We entered into one new capital lease during 2016 for \$75 and a 5-year duration (through August 2021), and recognized an impairment charge, reducing the value of two other pieces of capital equipment by \$54 in aggregate. We entered into three new capital leases during 2015 for \$132 and 3 to 5 year durations (through August 2020).

(7) Accrued Expenses

Accrued expenses consist of the following:

As of
December

31,
2016 2015

Accrued payroll and related expenses	\$ 167	\$ 108
Customer net volume rebate payable	201	—
Other	153	168
	\$ 521	\$ 276

(8) Income Taxes

Our net income tax provision, including both current and deferred, related to U.S. federal and state income taxes, is none.

A reconciliation of income tax expense to the amount computed by applying the Federal income tax rate to loss before provision for income taxes as of December 31, 2016 and 2015 is as follows:

	2016	2015
Income tax credit at statutory rates	\$(436)	\$(405)
Nondeductible expenses	2	3
State income tax, net of federal benefits	(66)	(61)
Other	144	(3)
Increase in valuation allowance	356	466
	\$—	\$—

Deferred income taxes reflect the net tax effects of temporary differences between the carrying amounts of assets and liabilities for financial reporting purposes and the amounts used for income tax purposes. Significant components of our deferred income taxes consist of the following:

	As of December 31,	
	2016	2015
Deferred tax assets:		
Net operating loss carryforwards	\$31,935	\$31,590
Inventory and other allowances	16	28
Charitable contribution carryforwards	5	6
Excess (tax) book depreciation	805	709
Excess (tax) book amortization	69	67
Share-based compensation	1,328	1,396
Other accrued costs	219	225
Total deferred tax assets	34,377	34,021
Less: Valuation allowance	(34,377)	(34,021)
Deferred income taxes	\$—	\$—

The valuation allowance increased approximately \$0.4 million and \$0.5 million for the years ended December 31, 2016 and 2015, respectively (with no expiring net operating loss carryforwards and credits for either period; a portion of the charitable contribution carryforward expired during 2016) due principally to the change in the net operating loss carryforward and uncertainty as to whether future taxable income will be generated prior to the expiration of the carryforward period. Under the Internal Revenue Code, certain ownership changes, including the prior issuance of preferred stock and our public offering of common stock, may subject us to annual limitations on the utilization of our net operating loss carryforward. As of December 31, 2016, the amounts subject to limitations has not yet been determined.

We have net operating loss carryforwards for tax purposes of approximately \$82 million on December 31, 2016, which expire between 2018 and 2036.

During 2011, the state of Illinois suspended the use of net operating loss carryforwards for a four year period beginning 2011, extending the term of all net loss carryforwards by a corresponding four years.

(9) Capital Stock

As of December 31, 2016 and 2015, we had 24,088 authorized but unissued shares of preferred s