NANOPHASE TECHNOLOGIES Corp
Form 10-K
April 04, 2019

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, 2018

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 of incorporation or organization)	(I.R.S. Employer Identification No.)

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 every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit such files). Yes 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, a smaller reporting company, or an emerging growth company. See the definitions of “large accelerated filer,” “accelerated filer,” “smaller reporting company,” and “emerging growth company” in Rule 12b-2 of the Exchange Act. (Check one):

Large accelerated filer	Accelerated filer
Non-accelerated filer	Smaller reporting company
	Emerging growth company

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act.

Indicate by check mark whether the registrant 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, 2018 was $32,493,881 as of such date.

The number of shares outstanding of the registrant’s common stock, par value $.01, as of March 29, 2019 was 33,911,792.

DOCUMENTS INCORPORATED BY REFERENCE

None.

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PART I

Item 1. General

Company Background

Nanophase Technologies Corporation ("Nanophase" or the "Company", including "we", "our" or "us") is a skin and sun care focused company that offers engineered materials, formulation development and commercial manufacturing with an integrated family of technologies. 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 development and application laboratories and manufacturing capacity in two locations in the Chicago, Illinois, area.

In recent years, we have advanced and expanded our expertise in nanoscale engineering to include non-nano materials as well as an array of skin care formulations designed to address skin health while imparting an excellent sensory experience. We produce materials for use in three business areas: personal care ingredients, including ingredients for use in sunscreens as active ingredients; fully formulated cosmetics of our own design which are developed, marketed and distributed under the Solésence® brand name by our wholly owned subsidiary Solesence, LLC (identified throughout this report as our Solésence® subsidiary); and in our advanced materials products, which includes architectural coatings, industrial coating applications, abrasion-resistant additives, plastics additives, medical diagnostics, energy (including solar control) and a variety of surface finishing technologies (polishing) applications, including optics.

Although our technology can be applied to a wide variety of applications, we have focused our efforts on only a handful of applications to gain a depth of knowledge and maximize our potential to grow rapidly. In particular, we have refined our development focus primarily to the personal care market. 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, but we currently have not made a definitive decision to extend our primary development focus outside the personal care market. We believe this focused approach will contribute to a higher success rate for related opportunities than we would experience by pursuing more opportunities simultaneously.

Our manufacturing is based on Lean Six Sigma discipline and is registered under the ISO 9001, American National Standard, Quality Management System Requirements; the 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.

Personal Care Ingredients Business

Our largest line of business is the manufacture and sale of personal care ingredients. We manufacture and supply hundreds of metric tons of surface engineered zinc oxide and titanium dioxide to our customers annually that are used by major global consumer products companies for sunscreens and personal care products. We produce these products using proprietary coating and dispersion technologies that comply with the requirement of cGMP.

Solésence® Business

Commencing in 2015, we expanded our offerings beyond personal care ingredients to include fully formulated skin care products developed, marketed and sold by our Solésence® subsidiary. Although our Solésence® products are fully formulated for consumer use, we do not sell directly to consumers or distribute products to consumers under the Solésence® brand through intermediaries or resellers. Instead, we sell our Solésence® products to manufacturers, formulators and distributors of consumer personal care products as market-ready products, as customized white label products or as custom-developed products, in each case, for sale or distribution to consumers under our customers' brand names.

During 2015 we were granted a patent on a new type of particle surface treatment (coating) — now called Active Stress Defense™ Technology — which has become the cornerstone of our new product development in our Solésence® business, with first revenue recognized during 2016. We have developed and expanded our in-house formulating capability, through which we have created multiple fully formulated finished cosmetics products for sale in markets focused on skin care and environmental protection. Products developed and sold by our Solésence® subsidiary are all produced under the requirements of cGMP, which enables us to leverage the expertise we developed in the manufacture personal care ingredients.

Advanced Materials Business

Our third line of business is the manufacture and sale of other advanced nanoparticle materials. Our advanced materials 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.

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.

Sources and Availability of Raw Materials.

Most of the raw materials we use are readily 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. In certain cases, moreover, certain raw materials that we deal with have a very limited supply, such as cerium oxide, classified as “Rare Earth elements,” for use in surface finishing technologies (polishing) applications, as well as the very high purity zinc that we use in personal care applications. Although we currently believe we have developed adequate commercial relationships to supply the necessary raw materials for our business which are not readily commercially available, our business is subject to the pricing and availability of certain raw materials—see Item 1A—Risk Factors, in this report.

Markets and Distribution

We have steadily expanded our ability to commercially utilize and deliver our finished goods and technologies. Through large-scale manufacturing, we have developed production expertise that has allowed us to improve processes relating to those materials as well as processes relating to other materials. 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.

Personal Care Ingredients Business

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"), the largest customer in our personal care ingredients line of business. 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 $70 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.

Solésence® Business

We market our fully formulated finished products directly to various brands in the skin care and cosmetics markets on a global basis. This represents a progression from providing ingredients to manufacturers of finished products, to offering Solésence®-branded finished products to marketers and sellers of skin care products. With our first Solésence® product revenue recognized during 2016, we had our first material amounts of Solésence® product revenue in 2017, and we expect these sales to expand in 2019. Historically, we have seen our customer-focused marketing approach increase our probability of success in many markets, allowing us to use an integrated platform of technologies and typically reduce the total time-to-market. We expect our Solésence® products business to enhance both our degree of control of the business development cycle, and to further reduce our total time-to-market.

Advanced Materials Business

Our technologies for engineering and manufacturing nanomaterials, and our understanding of how to make nanomaterials exhibit desirable performance characteristics in various media, have resulted in commercial nanomaterials solutions that we believe offer superior performance in many applications. Our products are used in a variety of applications, including architectural coatings, polishing applications (including optical glass and CMP (Chemical Mechanical Planarization)), plastics additives, medical diagnostics, textiles and graphic arts, energy control applications, and others. As advanced materials 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 our intellectual property and technologies to remain competitive in the fields of nanomaterials development, applications development and commercialization.

Research and Development

Most of our research and development is directly related to Solésence® product and personal care ingredient 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. Our efforts in research and development, cosmetic formulating, 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 skin care-related markets; and 3) continuing to improve our core technologies to improve manufacturing operations and reduce costs.

Our total research and development expense, which includes all expenses relating to our technology and advanced engineering groups, during the years ended December 31, 2018 and 2017, was $2.1 million and $1.7 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, 2018, we had cumulative research and development expenses of approximately $5.3 million and cumulative expenditures on equipment and leasehold improvements of approximately $0.3 million.

Competitive Advantage

In our personal care ingredients business, we believe that aggressively pursuing applications in targeted areas will help us to compete as a technical and commercial innovator using our materials expertise and, more importantly, to be perceived as a solutions provider by our customers, giving us a distinct market advantage over companies that are simply materials suppliers.

In our Solésence® business, we have a proprietary Active Stress Defense ™ technology, which offers unique product performance-related and aesthetic advantages in environmental protection skin care. By combining our proprietary dispersion capabilities and formulation know-how, our Solésence® products enable our customers to expand the range of skin care and color cosmetics categories that can include sun protection, and their products consequently fill a unique market segment which drives demand for our Solésence® products as raw materials.

In our advanced materials business, we have created an integrated platform of commercial nanomaterial technologies that are patented, patent-pending or proprietary. These technologies revolve around our two distinct manufacturing process (PVS – Plasma Vapor Synthesis and NAS - NanoArc® Synthesis) and 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.

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 engineered materials and bulk finished goods in quantities ranging from grams to metric tons. Our facilities are registered under ISO 9001 international standards and are cGMP compliant for applicable bulk pharmaceutical chemical ingredient and sunscreen 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, Aluminum Oxide, Iron Oxide and Octyltrimethoxysilane under REACH. Our facilities are also registered under the international standard for environmental management, ISO 14001.

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 4 pending U.S. patent applications. We also own 47 foreign patents and patent applications consisting of 27 issued or allowed foreign patents and 20 pending foreign patent applications. All of the pending and owned foreign patents are counterparts to domestic filings covering our platform of nanotechnologies and surface treatments. We have 2 U.S. patents, along with their 6 foreign counterparts, that are set to expire in 2019. 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 advanced material 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.

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.

In addition to competition in the advanced materials and related markets, our Solésence® subsidiary faces competition from a wide variety of offerings in the field of skin care. Our Solésence® products compete with existing solutions as well as new solutions from various sources, including other product developers who seek to serve skin care brands and integrated brands who also manufacture their own products in-house, and we must differentiate their value proposition in order to gain traction in this marketplace. We believe that our Solésence® technology, coupled with our expanding product formulations capability, will allow us to become a competitive player in this market.

Governmental Regulations, Including Climate Change

The manufacture and use of certain of the products that contain our metal oxides 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, Aluminum Oxide, Iron Oxide and Octyltrimethoxysilane under REACH).

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 registered under 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, 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 and applicable drug 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, 2018, we had a total of 54 full-time employees, 5 of whom hold advanced degrees. Additionally, we have a number of temporary-to-permanent employees and contractors with specific industry experience that have become a part of our talent pool. We have no collective bargaining agreements and believe that we have a strong relationship with our employees, whom management believes represent the strength of our Company.

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 personal care ingredients, advanced materials and Solésence® formulated products. 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, and aside from our largest customer, we are seeing the composition of these key customers change with the growth we are experiencing within our Solésence® subsidiary. In particular, revenue from three customers - the largest customer in our personal care ingredients business (BASF), the first significant customer for our Solésence® products (Colorescience), and the largest customer of our advanced materials business (Byk-Chemie) constituted approximately 74%, 7% and 3%, respectively, of our 2018 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 27A of the Securities Act of 1933, as amended (the "Securities Act"), and 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 managem 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 2019 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 and Solésence® products; our manufacturing capacity and product mix flexibility in light of customer demand; our limited marketing experience, including with our suite of Solésence® products; 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, especially any new governmental regulations focusing on the processing, handling, storage or sale of nanomaterials, 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 $2.1 million in 2018 and $0.8 million in 2017. As of December 31, 2018, we had an accumulated deficit of approximately $97.8 million and may incur a loss on an annual basis during 2019. 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 advanced 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 74%, 7% and 3%, respectively, of our total revenue in 2018 and sales to these same customers accounted for 61%, 0% and 11%, respectively, of our total revenue in 2017.

Given the nature of our products, and the fact that markets for them, or our positions in those markets, 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 skin care applications including sunscreens, and now fully formulated skin care products. Additional product areas include architectural coatings, surface finishing technologies (polishing), medical diagnostics, 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 advanced materials, applications, or products.

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 materials and share development and manufacturing resources. We also seek to coordinate the development, manufacture and marketing of our engineered materials products, particularly as a result of our selling additives that must be integrated into complete formulations by the customer. With our personal care and advanced materials products, 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. With our Solésence® products, we design, produce and often package finished formulations for our customers. We intend to rely on the sales and marketing channels of our customers, who are responsible for the direct consumer marketing and sales contact. Their ability to market and sell these products to their customers will directly impact our ability to achieve growth in these markets.

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 engineered materials, applications, or products.

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. It is 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, and our financial and liquidity position and results of operations would be substantially harmed.

Our businesses depend substantially on the availability and pricing of particular grades/types of raw materials, including certain materials that are classified as "Rare Earth" elements and very high purity zinc, that are available in limited supply.

Our product specifications often require particular grades/types of raw materials, including certain materials that are classified as "Rare Earth" elements and very high purity zinc, that are available in limited supply. 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. It is possible that these materials will become unavailable to us from our sole-source processors at competitive prices or at any price, and that we will be unable to identify alternate processors. In certain cases, moreover, certain raw materials that we deal with have a very limited supply, such as cerium oxide, classified as "Rare Earth elements," for use in surface finishing technologies (polishing) applications, as well as the very high purity zinc that we use in personal care applications. In the event that these rare raw materials or sole-source processing became unavailable to us, or available to us only at substantially higher prices, we could be unable to continue to manufacture and sell our products and may be unable to continue to operate our businesses.

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. We have, and may in the future, license certain of our intellectual property, such as trademarks and know-how, 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 personal care ingredients, advanced materials and Solésence® products 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 and products or for new materials and products 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 engineered materials and processes. Our success will depend, in large part, upon our ability to keep pace with engineered 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 engineered 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 engineered 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 engineered 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 engineered materials 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.

In addition to competition in the personal care ingredients, advanced materials and related markets, our Solésence® subsidiary faces competition from a wide variety of offerings in the field of skin care. Our Solésence® products compete with existing solutions as well as new solutions from various sources, including other product developers who seek to serve skin care brands and integrated brands who also manufacture their own products in-house, and we must differentiate their value proposition in order to gain traction in this marketplace.

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 or because of currently unknown capital requirements, new regulatory requirements or the need to meet the cash requirements discussed below to avoid a triggering event under our BASF agreement. Given our expected growth in our Solésence® business, we may also have temporary working capital demands that we cannot fund with existing capital, while remaining in compliance with the covenants included in our BASF supply agreement described below. 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 certain current assets are less than $1,000,000; which may be composed of no less than $500,000 cash, cash equivalents, and certain investments, no more than a combined $500,000 of certain related inventory, of which no more than $250,000 can be raw material, and past due receivables, 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.

This agreement also requires Nanophase to maintain certain finished goods inventory levels as “safety stock,” beginning in the first quarter of 2019, and increasing through the third quarter of 2019 to a negotiated level based on agreed demand metrics, in order to maintain the $500,000 non-cash component discussed above. After September 30, 2019, should our safety stock fall below the prescribed amount of material, the quarter-end cash requirement would revert to $1,000,000 in cash, cash equivalents, and certain investments. The safety stock requirement may be adjusted upon mutual agreement.

If a triggering event were to occur, 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.

The Company has substantial fixed obligations, and insufficient liquidity may have a material adverse effect on the Company's financial condition and business.

The Company has substantial fixed obligations, including a term loan to the Company from Beachcorp, LLC and rent obligations for our facilities located in Romeoville, Illinois, and Burr Ridge, Illinois.

Although the Company's cash flows from operations and its available capital, including the proceeds from revolving loans, have been sufficient to meet our fixed obligations to date, the Company's future liquidity could be negatively affected by the risk factors discussed in this report. If the Company's liquidity is materially diminished, the Company might not be able to timely pay its debts or rent, or to comply with certain operating and financial covenants under its financing agreements.

Agreements governing our debt and our BASF Supply Agreement include financial and other covenants. Failure to comply with these covenants could result in events of default.

Our financing agreements include various financial and other covenants. In addition, our Supply Agreement with BASF requires the Company to satisfy minimum liquidity requirements. The Company's ability to comply with these covenants may be affected by events beyond our control, including demand for our products, pricing of raw materials, and our ability to grow our revenue so that our margins improve. In addition, our financing agreements contain other negative covenants customary for such financings. These covenants are subject to important exceptions and qualifications. If we fail to comply with these covenants and are unable to remedy or obtain a waiver or amendment, an event of default would result.

If an event of default were to occur, our lenders could, among other things, declare outstanding amounts due and payable or BASF could, among other things, compel a transfer of certain of our proprietary technology and equipment to BASF at a contractually-defined price which may be less than fair market value. In addition, an event of default or declaration of acceleration under one financing agreement could also result in an event of default under other of our financing agreements due to cross-default and cross-acceleration provisions. The acceleration of significant amounts of debt could require us to renegotiate, repay or refinance the obligations under our financing arrangements.

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 Solesence, LLC subsidiary sells fully formulated skin care products, 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 materials and finished products.

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 engineered materials and our Solésence® products 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.

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 for our nanomaterial products and work in process.

New rules or regulations could impose requirements, restrictions or prohibitions on the processing, handling, storage or sale of nanomaterials, or on certain materials being marketed with or incorporated into certain applications, any which new rules or regulations could substantially increase our costs of doing business or limit our ability to sell our personal care, advanced materials and Solésence® products in the marketplace.

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

Not required for a smaller reporting company.

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 registered under ISO 9001, 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 registered under ISO 14001 which is the international standard for environmental management.

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 and formulating laboratories. The Romeoville 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. All Romeoville manufacturing processes are registered under ISO 9001 and ISO 14001, and we believe that the particle coating processes used for our ingredients and fully formulated sunscreens and cosmetic products for personal care are 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. On March 14, 2017, we entered into a new Building Lease for the Burr Ridge facility that began in September 2017 and will 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 2018, and projected for 2019, 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 engineered materials, applications and products, 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 under the symbol "NANX" on the OTCQB marketplace, operated by OTC Markets Group. 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, 2018:		
First Quarter	$0.52	$ 0.40
Second Quarter	1.34	0.43
Third Quarter	1.10	0.70
Fourth Quarter	0.90	0.68
Fiscal year ended December 31, 2017:		
First Quarter	$0.78	$0.57
Second Quarter	0.74	0.61
Third Quarter	0.76	0.63
Fourth Quarter	0.74	0.36

On March 29, 2019, the last reported sale price of our common stock was $0.50 per share, and there were 114 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. Our Business Loan Agreement, dated as of March 4, 2018, requires us to obtain the written consent of Libertyville Bank and Trust Company prior to paying any cash dividends on our common stock.

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 1, Item 1, of this Form 10-K.

Overview

Nanophase is a skin and sun care focused company that offers engineered materials, formulation development and commercial manufacturing with an integrated family of technologies. Our expertise in nanoscale engineering allows us to effectively coat and disperse particles on a nano and "non-nano" scale for use in a variety of diverse markets: personal care ingredients, including sunscreens as active ingredients; full formulations of skin care products, marketed and sold by our wholly owned subsidiary, Solesence, LLC (referred to in this report as our "Solésence® subsidiary"); and in our advanced materials line of business for use in architectural coatings, industrial coating applications, abrasion-resistant additives, plastics additives, medical diagnostics, energy (including solar control) and a variety of surface finishing technologies (polishing) applications, including optics.

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, 2018 and 2017

Total revenue increased to $14,193,000 in 2018, compared to $12,471,000 in 2017. A substantial majority of our revenue for each year is from our largest customers, in particular, sales to our largest customer in skin care and sunscreen applications. Product revenue, the primary component of our total revenue, increased to $14,040,000 in 2018, compared to $12,129,000 in 2017. This increase was due both from an increase in revenue from our largest customer (Personal Care), from 61% of revenue in 2017 to 74% of revenue in 2018, and our largest Solesénce® (Finished Packaged Consumer Products) customer, from 0% in 2017 to 7% in 2018. Revenue from our top three customers was approximately 74%, 7% and 3%, respectively, in 2018, compared to 61%, 0% and 11% for the same customers in 2017.

Other revenue decreased to $153,000 in 2018, compared to $342,000 in 2017. This decrease primarily related to the technology development agreement between Nanophase and ETI in 2017, which included a one-time technology development fee of $250,000 that management has classified as “other revenue.” Other revenue also includes customer-paid shipping charges, and any other customer-paid development projects.

Cost of revenue generally includes costs associated with commercial production and customer development arrangements. Cost of revenue increased to $10,903,000 in 2018, compared to $8,621,000 in 2017. The increase in cost of revenue was primarily driven by the increase in product revenue volume, increases in the costs of zinc metal raw material, and manufacturing inefficiencies pertaining to our new personal care materials, which decreased our annual gross margin by approximately 8% when compared to that of the prior year. We expect to continue new materials development and dispersion technologies for personal care applications, new markets, and for our formulated Solésence® products during 2019 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 revenue volume. 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, and the speed and efficiency with which we are able to scale up production for our Solésence® products. We expect that, as product revenue volume increases, our fixed manufacturing costs will be more efficiently absorbed, which should lead to increased margins as we grow. 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 2019 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 finished product formulations for skin care, new product applications for our skin care ingredients, and coating formulations and the cost of enhancing our manufacturing processes. As an example, we are focusing the bulk of our resources on developing new product formulations as we expand marketing and sales efforts relating to our Solésence® products. This work has led to several new products and additional potential new products. Our efforts in research and development, cosmetic formulating, 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 skin care-related markets; and 3) continuing to improve our core technologies to improve manufacturing operations and reduce costs.

Research and development expense increased to $2,057,000 in 2018, compared to $1,736,000 in 2017. 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 registration and maintenance of patents in preparation for expanding international business opportunities. We expect similar spending in this area during 2019 as we continue with these efforts.

Selling, general and administrative expense increased to $3,256,000 in 2018, compared to $2,886,000 in 2017. The net increase was primarily attributed to professional fees which include audit and legal, exhibitions and tradeshows, software upgrades and temporary help. We expect 2019 expenses in this area to be approximately 3% higher and driven largely by the selling function, as we plan to launch products in personal care, and other areas, depending on the status of certain initiatives.

Interest expense was $58,000 in 2018, compared to $34,000 in 2017, due mainly 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 2019 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 amounted to $1,345,000 as of December 31, 2018, compared to $1,955,000 as of December 31, 2017. The cash used in operating activities for the year ended December 31, 2018 was $1,342,000 compared to $960,000 used for the year ended December 31, 2017. This was in part due to an increase in inventories, prepaid expenses, accounts payable and accrued expenses partially offset by a decrease in accounts receivable as of December 31, 2018. Net cash used in investing activities amounted to $160,000 for the year ended December 31, 2018, compared to $72,000 for the year ended December 31, 2017. Cash capital expenditures amounted to approximately $160,000 and $209,000 for the years ended December 31, 2018 and 2017, respectively. We did not dispose of or sell any assets during 2018 and received $137,000 during 2017 related to the sale of fixed assets that we no longer utilize. Net cash provided by financing activities was $892,000 in 2018, compared to $1,208,000 in 2017. On December 20, 2017, we sold 2.5 million shares of our common stock to our largest investor for $1,000,000 in proceeds and had no such sales during 2018. No selling commission or other remuneration was paid in connection with this transaction. We have used the

proceeds for general corporate purposes. During February 2017, we extended our Line of Credit Agreement with Libertyville Bank and Trust, a Wintrust Community Bank ("Libertyville"), until March 2017. During March 2018, we executed a new business loan agreement with Libertyville (the "New Line of Credit Agreement") on substantially similar terms, except the revolving credit limit was increased from $300,000 to $500,000, and there were certain limitations imposed on our ability to, among other things, incur additional indebtedness for borrowed money outside the ordinary course of business (like a capital lease, receivables factoring or a mortgage), sell, lease or use our assets as collateral for additional credit, pay cash dividends or engage in certain business transactions without Libertyville's prior written consent. Outstanding borrowings were $0 and $300,000 on this line of credit as of December 31, 2018, and December 31, 2017, respectively. The maturity date for the New Line of Credit Agreement was March 4, 2019. During March 2019, we executed a new business loan agreement with Libertyville (the "New Business Loan Agreement") on substantially similar terms, with the addition of mirroring the requirements for holding $500,000 in inventory and other non-cash items that are discussed within the most recent amendment to the BASF supply agreement in lieu of cash. The New Business Loan Agreement has a maturity date of April 4, 2020. On November 16, 2018, we entered into a Business Loan Agreement (the "Master Agreement") with Beachcorp, LLC. The Master Agreement relates to two loan facilities, each evidenced by a separate promissory note dated as of November 16, 2018: a term loan to the Company of up to $500,000 to be disbursed in a single advance (the "Term Loan") with a fixed annual interest rate of 8.25%, payable quarterly, accruing from the date of such advance and with principal due on December 31, 2020; and an asset-based revolving loan facility for the Company of up to $2,000,000 (the "Revolver Facility"), with floating interest accruing at the prime rate plus 3% (8.25% minimum) per year, with a borrowing base consisting of qualified accounts receivable of the Company, and with all principal and accrued interest due March 31, 2020. The Term Loan and Revolver Facility are secured by all the unencumbered assets of the Company and subordinated to Libertyville's secured interest under the New Business Loan Credit Agreement. The Master Agreement substantially restricts the Company's ability to incur additional indebtedness during the terms of both the Term Loan and the Revolver Facility. On December 31, 2018, the balance on the term loan was $500,000 and the balance on the Revolver facility was $832,000. For more information regarding the New Business Loan Agreement, see Note 4 to our Financial Statements referred to in Part II, Item 8 of this Annual Report on Form 10-K.

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 $1,000,000 in certain current assets; which may be composed of no less than $500,000 cash, cash equivalents, and certain investments, no more than a combined $500,000 of certain related inventory, of which no more than $250,000 can be raw material, and certain receivables, 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. At December 31, 2018, we had approximately $1.3 million in cash and total availability under our revolving loans from Libertyville and Beachcorp, LLC of $308,000. At December 31, 2018, we were technically overdrawn on the Beachcorp, LLC line of credit by $192,000, which was absorbed by an increase in the borrowing base in early January. This was due to the mechanics of the control account not being fully established, and we believe we have a resolution. This supply agreement and its covenants are more fully described in Note 13, and our line of credit is more fully described in Note 4, 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, should be adequate to fund our operating plans through 2019, but this is dependent on several things over which we have limited control. Our largest customer made up 74% of our 2018 revenue, and expects a material reduction in orders from us in 2019. This was not anticipated during our production and operational planning throughout 2018. We have seen an increase in sales of our Solésence® products in 2018, which we expect to continue, but to a greater extent, in 2019. This may require additional investment in working capital. Given these issues, and other commercial realities, we are monitoring the additional working capital demands that this could create as we continue to execute on our Solésence® growth strategy. The timing of cash flows is critical. If cash generated from operations is not materially consistent with our plans, we believe that we may need to seek additional funding to address working capital demands. This uncertainty has caused us to be unable to assert that, for the next twelve months, we have enough current cash and guaranteed access to financing to fund operations, and to continue with our current growth strategy in terms of investment in capital equipment and in operating expenses related to Solesence®, without securing additional financing. We believe that we will be able to secure additional financing if needed, but we do not have any additional financing commitments in place as of today. However, we may not be able to secure additional financing in a timely manner under commercially reasonable terms, or at all. If we are unable to secure additional financing, we would need to delay capital expenditures related to our Solésence® growth strategy, which could impede growth in 2019 and 2020.

Our actual future capital requirements in 2019 and beyond will depend on many factors, including customer acceptance of our current and potential engineered materials, applications, and products, 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 engineered materials, applications, and products. 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 2019 will be between $700,000 and $850,000, to be funded by our existing loans and lines of credit. If those projects are delayed or ultimately prove unsuccessful, or if we fail to be able to support the additional cost of funding them in the near term, 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 2019 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 an existing customer; a significant decrease in revenue from one or more of our customers; temporary working capital demands resulting from our expected growth in our Solésence® business that we cannot fund with existing capital; currently unknown capital requirements considering 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, 2018, we had a net operating loss carryforward of approximately $79 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, 2019 and December 31, 2038. 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.

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. This note expires July 2019. 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 officer, 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 (our principal executive officer) and our Chief Financial Officer (our principal 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 officer and principal financial officer 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;

(ii) 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

(iii) 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, 2018. 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, our management, including our Chief Executive Officer (our principal executive officer) and our Chief Financial Officer (our principal financial officer), believes that the Company maintained effective internal control over financial reporting as of December 31, 2018.

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 Form 10-K.

Changes in Internal Control over Financial Reporting. The Company's management, including the Chief Executive Officer (our principal executive officer) and Chief Financial Officer (our principal financial officer), confirm that there was no change in the Company's internal control over financial reporting during the quarter ended December 31, 2018 that has materially affected, or is reasonably likely to materially affect, the Company's internal control over financial reporting.

Item 9B. Other Information

On March 22, 2019, we executed the renewal of the Line of Credit Agreement, dated as of March 4, 2019, with Libertyville, our primary bank, which replaces the Line of Credit Agreement with Libertyville that expired on March 4, 2019. Under the Line of Credit Agreement, Libertyville will provide a maximum of (i) $500,000 or (ii) two times the sum of (a) 75% of our eligible accounts receivables and (b) our cash deposited with Libertyville, whichever is less, of revolving credit to us, collateralized by a senior priority lien on our accounts receivable, inventory, equipment, general intangibles and fixtures. Interest is payable monthly on any advances at a floating interest rate of the prime rate at the time plus 1%. We must have $500,000 in cash, inclusive of the borrowed amount, 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 business days of the advance. Amounts due under the New Business Loan Agreement must be paid in full on April 4, 2020. While the Line of Credit Agreement is in effect, we cannot, among other things, engage in any business activities substantially different than those in which we are presently engaged, and there are limitations imposed on our ability to, among other things, incur additional indebtedness for borrowed money, including capital leases, sell, transfer, mortgage, assign, pledge, lease or grant a security interest in or encumber any of our assets, sell with recourse any of our accounts other than to Libertyville, cease operations, merge, transfer, acquire or consolidate with any other entity, change our name, dissolve or transfer or sell collateral outside the ordinary course of business, pay any cash dividends, loan, invest in or advance money or assets to any other person or entity, purchase, create or acquire any interest in any other entity, or incur any obligation as a surety or guarantor other than in the ordinary course of business, in each case without Libertyville’s prior written consent.

We intend to utilize this borrowing capacity for short-term working capital needs on an as-needed basis. The foregoing description is not complete and is qualified in its entirety by reference to the full text of the Business Loan Agreement, the Promissory Note and the Commercial Security Agreement between the Company and Libertyville, all of which are dated March 4, 2019 and were executed on March 22, 2019, which are filed as Exhibits 10.33, 10.34 and 10.35, respectively, to this Form 10-K and are incorporated herein by reference.

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	84	Chairman of the Board of Directors	2001	2019	I
James A. McClung, Ph.D.	81	Director	2000	2019	I
R. Janet Whitmore	64	Director	2003	2019	I
Jess A. Jankowski	53	President, Chief Executive Officer and Director	2009	2020	II
Richard W. Siegel, Ph.D.	81	Director	1989	2020	II
W. Ed Tyler	66	Director	2011	2020	II
George A. Vincent, III	74	Director	2007	2021	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 Educational 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 chairs the Audit and Finance Committee. Currently he is Chair and CEO of Lismore International, a global business advisory firm. 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 operational business experience in over 75 countries developing new technologies and operational processes, and strategic partnerships for diversified businesses while living in the United States, Europe and Africa. In addition to serving currently on the Boards of Directors of Nanophase, and 4 D Healthware, 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 continues to be active in other international business organizations: Japan American Society of Chicago, 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), and received their Distinguished Alumni Award in 2014. Mr. McClung earned a bachelor's degree from the College of Wooster, master's degree from the University of Kansas, and a doctorate from Michigan State University.

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. Ms. Whitmore is the sister of Bradford T. Whitmore, who, together with his affiliates Grace Brothers, Ltd. and Grace Investments, Ltd., beneficially owned approximately 47% of the outstanding shares of our common stock as of March 25, 2019 and who is also the manager of Beachcorp, LLC, from which the Company singed a financing contract on November 16, 2018.

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. 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 a past member of the TechAmerica Midwest CFO Committee. 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. From 2009 to 2018, 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. From 2011 to 2015, he served as a subject matter expert for the Invest Illinois Venture Fund. 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 was named a Fellow of the Materials Research Society in 2010, the American Institute of Medical and Biological Engineering in 2015, and the National Academy of Inventors in 2017. 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 on 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. 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, 2018, the Board of Directors held five meetings, all of which were attended by each director. No director missed more than one committee meeting (for committees on which they served) during 2018.

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 four meetings during 2018. 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 2018. 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 2018.

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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
Kevin Cureton	57	Chief Commercial Officer
Jaime Escobar	47	Chief Financial Officer
Nancy Baldwin	67	Vice President - Human Resources and Investor Relations

Mr. Cureton joined the Company in November 2012 as Vice President of Sales, Marketing and Business Development. Effective January 1, 2018, Mr. Cureton was named Chief Commercial Officer. His chemical industry experience has spanned more than twenty years, the majority of which has been in the personal care industry, including twelve years at AMCOL International Corporation, where he served as the founder and Managing Director of its skin care and dermatology technology business. Prior to AMCOL, he made significant contributions at Air Products, Borden, and other entities. Mr. Cureton holds a Bachelors of Science in chemical engineering from Carnegie

Mellon University and an M.B.A. from the University of Chicago Booth School of Business.

Mr. Escobar has served as the Chief Financial Officer since joining the Company in March 2018 and has served as our Corporate Secretary since May 2018. Before joining the Company, Mr. Escobar served as the Controller of Abrasic 90 Inc. d/b/a CGW Camel Grinding Wheels, USA, a manufacturer and distributor of abrasive products, from May 2016 until March 2018. Prior to that, Mr. Escobar served as Accounting Manager for Termax Corporation, a supplier to the automotive industry, from June 2013 until March 2016; as a Plant Lead Analyst for Chrysler Group LLC, assigned to a vehicle assembly plant, from June 2012 until June 2013; and as an Accounting Manager for Midas International Corporation, an automobile services company, from May 2011 until June 2012. He has also served in roles of increasing responsibility at AMCOL International Corporation, a marketer of diverse specialty materials with a core expertise in minerals and polymer science, including serving as Assistant Controller of American Colloid Company from October 2004 until July 2007 and as Controller of AMCOL Health & Beauty Solutions (HBS) from July 2007 until April 2011. Mr. Escobar holds a B.S. in Accounting with a minor in Business Administration from Northeastern Illinois University, and is a registered CPA in the state of Illinois.

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, and served as Vice-Chairman from 2014-2017. In 2013, Ms. Baldwin was appointed to the Will County Workforce Investment Board; she was appointed to serve as Vice-Chair in 2016 - 17; and was appointed as Chairman for the 2018 – 2019 term. She is currently an active member of the Will County Three Rivers Manufacturing 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, Cureton, and Escobar, 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 2018 all Section 16 filing requirements applicable to our officers, directors and 10% beneficial owners were complied with by such persons.

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

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, 2018 and 2017.

Name and Principal Position	Year	Salary ($)	Bonus ($) (1)	Option Awards ($) (2)	Non-Equity Incentive Plan Compensation ($) (3)	All Other Compensation ($) (4)	Total ($)
Jess Jankowski	2018	$319,250	$—	$59,677	$—	$ 22,697	$401,624
Chief Executive Officer	2017	$317,471	$—	$44,242	$—	$ 21,613	$383,326
Kevin Cureton	2018	$216,346	$—	$53,046	$—	$ 17,221	$286,613
Chief Commercial Officer	2017	$201,346	$—	$27,310	$—	$ 16,574	$245,230
Nancy Baldwin	2018	$141,800	$—	$26,523	$—	$ 2,490	$170,813
Vice President Human Resources and Investor Relations	2017	$157,342	$—	$19,663	$—	$ 9,221	$186,227
Jaime Escobar	2018	$115,385	$—	$12,789	$—	$ 5,508	$133,682
Chief Financial Officer (5)	2017	$—	$—	$—	$—	$ —	$—

(1) Any amounts earned during 2018 and 2017 would have been paid in early 2019 and 2018, 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 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. Although total revenue growth was approximately 13% and 16% during 2018 and 2017, respectively, performance targets were not met and thus no bonus was awarded to any of the named executive officers for 2018 or 2017.

(2) The amounts in this column represent the aggregate grant date fair value of awards granted in 2018 and 2017 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.

(4) The amounts in this column represent 401(k) match (total for executive officers of $5,109 during 2018 and $6,094 during 2017), 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.

(5) Mr. Escobar joined the Company as its Chief Financial Officer effective March 26, 2018.

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 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 full-time 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.

Effective as of March 26, 2018, we entered into an employment agreement with Mr. Jaime Escobar providing for an annual base salary of not less than $150,000. We also granted to Mr. Escobar options to purchase up to 36,000 shares of common stock at an exercise price of $0.44 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 was assigned to Mr. Escobar's employment agreement. If Mr. Escobar is terminated other than for "cause" (as such term is defined in Mr. Escobar's employment agreement), Mr. Escobar will receive severance benefits in an amount equal to Mr. Escobar's base salary

for 26 weeks if termination happens on or before September 30, 2020 or 13 weeks if termination happens after September 30, 2020. In addition, all stock options granted to Mr. Escobar 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, 2018.

	Option Awards					Stock Awards	
Name	**Number of Securities Underlying Unexercised Options (#) Exercisable**	**Number of Securities Underlying Unexercised Options (#) Unexercisable**		**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							
	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		
	90,000	-0-		$ 0.520	02/13/24		
	81,000	-0-		$ 0.440	02/18/25		
	46,000	23,000	(1)	$ 0.420	02/23/26		
	27,000	54,000	(2)	$ 0.680	02/21/27		
	-0-	90,000	(3)	$ 0.820	05/23/28	—	—
Kevin Cureton							
	52,000	-0-		$ 0.300	11/28/22		
	48,000	-0-		$ 0.415	02/14/23		
	75,000	-0-		$ 0.520	02/13/24		
	50,000	-0-		$ 0.440	02/18/25		
	29,000	14,500	(1)	$ 0.420	02/23/26		
	16,664	33,336	(2)	$ 0.680	02/21/27		
	-0-	80,000	(3)	$ 0.820	05/23/28	—	—
Nancy Baldwin							
	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
	40,000	-0-		$ 0.520	02/13/24
	36,000	-0-		$ 0.440	02/18/25
	21,000	10,500	(1)	$ 0.420	02/23/26
	12,000	24,000	(2)	$ 0.680	02/21/27
	-0-	40,000	(3)	$ 0.820	05/23/28
Jaime Escobar					
	-0-	36,000	(4)	$ 0.44	03/26/28

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

(2) The grants expiring February 21, 2027 vest in three equal installments on February 21, 2018, 2019 and 2020.

(3) The grants expiring May 23, 2028 vest in three equal installments on May 23, 2019, 2020 and 2021.

(4) The grants expiring March 26, 2028 vest in three equal installments on March 26, 2019, 2020 and 2021.

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 the following 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	$ 329,022	$9,772	$ 648,272
Kevin Cureton	$ 118,625	$6,125	$ 118,625
Nancy Baldwin	$ 74,828	$4,428	$ 74,828
Jaime Escobar	$ 85,440	$10,440	$ 85,440

(1) 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, 2018, 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 31, 2018, the last business day of 2018, was used. The amount represents the difference between the exercise price of any unvested options and $0.73.

(2) This amount represents an estimate of the value that would have been received under the 2010 Equity Plan had a change in control occurred as of December 31, 2018 and the executive officers benefited from an acceleration of vesting in the 2010 Equity Plan awards, as described above. For this purpose, the closing price of our common stock as of December 31, 2017, the last business day of 2018, was used. The amount represents the difference between the exercise price of any unvested options and $0.73.

(3) 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 Company without cause on December 31, 2018 in connection with a change in control on this date. For this purpose, the closing price of our common stock as of December 31, 2018, the last business day of 2018, was used. The amount represents the difference between the exercise price of any unvested options and $0.73.

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 2018, we paid quarterly compensation to the Chairman of the Board of Directors, for an annual total of $22,000. We paid quarterly compensation to the Chairman of the Audit and Finance Committee and to the Chairman of the Compensation Committee an annual total of $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.

During the second quarter of 2018, we granted our Outside Directors stock options totaling 69,000 shares under the 2010 Equity Plan, as follows: the Chairman of the Board of Directors received stock options to purchase 15,000 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 12,000 shares of our common stock and each of our other Outside Directors received stock options to purchase 10,000 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, 2018: Mr. Henderson: 80,150 shares; Mr. McClung: 108,270 shares; Mr. Vincent: 96,850 shares; Ms. Whitmore: 91,100 shares; Dr. Siegel: 91,100 shares; and Mr. Tyler: 88,520 shares.

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.

	2018 Outside Director Compensation		
Name	Fees Earned or Paid	Option Awards ($) (1)	Total ($)

	in Cash ($)		
James A. Henderson	$22,000	$ 9,946	$31,946
James A. McClung	$18,000	$ 7,957	$25,957
W. Ed Tyler	$18,000	$ 7,957	$25,957
R. Janet Whitmore	$16,000	$ 6,630	$22,630
George A. Vincent, III	$16,000	$ 6,630	$22,630
Dr. Richard Siegel	$16,000	$ 6,630	$22,630

(1) The amounts in this column represent the aggregate grant date fair value of awards granted in fiscal 2018 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.

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

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, 2018. 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	3,509,000	$ 0.67	664,000
Plans Not Approved by Shareholders	None	$ —	None

SECURITY OWNERSHIP OF MANAGEMENT

AND PRINCIPAL STOCKHOLDERS

The following table sets forth, as of March 25, 2019 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 current executive officers and directors as a group. There were 33,911,792 shares of common stock outstanding as of March 25, 2019.

Name	Number of Shares Beneficially Owned (1)		Percent of Shares Beneficially Owned	
Bradford T. Whitmore	15,993,599	(2)	47.1	%
Spurgeon Corporation	3,034,710	(3)	8.9	%
Grace Brothers, Ltd.	2,433,300	(4)	7.2	%
John H. Conley, Jr.	2,340,000	(5)	6.9	%
James A. Henderson	542,265	(6)	1.6	%
Richard W. Siegel, Ph.D.	467,604	(7)	1.4	%
James A. McClung	139,923	(8)		*
W. Ed Tyler	72,520	(9)		*
R. Janet Whitmore	1,603,311	(10)	4.7	%
George A. Vincent, III	83,516	(11)		*
Jess A. Jankowski	684,000	(12)	2.0	%
Kevin Cureton	301,833	(13)		*
Nancy Baldwin	300,487	(14)		*
Jaime Escobar	12,000	(15)		*
All current executive officers and directors as a group (10 persons)	4,207,459	(16)	11.8	%

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.

(1) Beneficial ownership is determined in accordance with the rules of the SEC. Unless otherwise indicated below, the 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 12,907,435 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 4 filed on December 21, 2018 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 4 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 4 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 December 29, 2018. The address of the stockholder is 8 Rene Carr Street, Elkton, Maryland 21921.

(6) Includes Mr. Henderson’s 60,150 shares of common stock issuable upon exercise of options exercisable currently or within 60 days of March 25, 2019.

(7) Includes Dr. Siegel’s 77,766 shares of common stock issuable upon exercise of options exercisable currently or within 60 days of March 25, 2018.

(8) Includes Mr. McClung’s 92,270 shares of common stock issuable upon exercise of options exercisable currently or within 60 days of March 25, 2018, as well as 30,071 shares held by his spouse.

(9) Includes Mr. Tyler’s 72,520 shares of common stock issuable upon exercise of options exercisable currently or within 60 days of March 25, 2018.

(10) Includes Ms. Whitmore's 77,766 shares of common stock issuable upon exercise of options exercisable currently or within 60 days of March 25, 2018, as well as 238,493 shares held by her children.

(11) Includes Mr. Vincent's 83,516 shares of common stock issuable upon exercise of options exercisable currently or within 60 days of March 25, 2018.

(12) Includes Mr. Jankowski's 624,000 shares of common stock issuable upon exercise of options exercisable currently or within 60 days of March 25, 2018, as well as 1,000 shares held by his spouse.

(13) Includes Mr. Cureton's 301,833 shares of common stock issuable upon exercise of options exercisable currently or within 60 days of March 25, 2018.

(14) Includes Ms. Baldwin's 299,500 shares of common stock issuable upon exercise of options exercisable currently or within 60 days of March 25, 2018.

(15) Includes Mr. Escobar's 12,000 shares of common stock issuable upon exercise of options exercisable currently or within 60 days of March 25, 2019.

(16) Includes all current executive officers and directors as a group's 1,701,321 shares of common stock issuable upon exercise of options exercisable currently or within 60 days of March 25, 2018.

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 since January 1, 2018, except that, on November 16, 2018, we entered into a Business Loan Agreement (the "Master Agreement") with Beachcorp, LLC, a newly formed affiliate of Bradford T. Whitmore who, together with his affiliates Grace Brothers, Ltd. and Grace Investments, Ltd., beneficially owned approximately 47.1% of the outstanding shares of our common stock as of March 25, 2019. Mr. Whitmore is the brother of R. Janet Whitmore, one of our directors since 2003 and also a stockholder. The Master Agreement relates to two loan facilities, each evidenced by a separate promissory note dated as of November 16, 2018: a term loan to the Company of up to $500,000 to be disbursed in a single advance (the "Term Loan") with a fixed annual interest rate of 8.25%, payable quarterly, accruing from the date of such advance and with principal due on December 31, 2020; and an asset-based revolving loan facility for the Company of up to $2,000,000 (the "Revolver Facility"), with floating interest accruing at the prime rate plus 3% (8.25% minimum) per year, with a borrowing base consisting of qualified accounts receivable of the Company, and with all principal and any accrued interest due March 31, 2020. Interest payments are due every quarter. From origination on November 16, 2018 through March 26, 2019, the largest aggregate amount of principal outstanding under the Term Loan was $500,000 and the largest aggregate amount of principal outstanding under the Revolver Facility was $970,000, the total amount of principal paid was $0, and the total the amount of interest paid was $21,000. The amount of accrued interest was $7,000 as of December 31, 2018. As of March 26, 2019, the balance on the Term Loan was $500,000 and the balance on the Revolver Facility was $1,448,000. The Term Loan and Revolver Facility are secured by all the unencumbered assets of the Company and subordinated to Libertyville's secured interest under the New Business Loan Agreement. The Master Agreement substantially restricts the Company's ability to incur additional indebtedness during the terms of both the Term Loan and the Revolver Facility. The Master Agreement was reviewed and approved in advance by our Audit and Finance Committee pursuant to the parameters described above. No other related person 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, 2018 and 2017 was approximately $178,000 and $176,000, 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, 2018 and 2017, 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, 2018 and 2017.

All Other Fees. Other than those fees described above, during the fiscal years ended December 31, 2018 and 2017, 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, 2018 and 2017
Statements of Operations for the Years Ended December 31, 2018 and 2017
Statements of Stockholders' Equity for the Years Ended December 31, 2018 and 2017
Statements of Cash Flows for the Years Ended December 31, 2018 and 2017

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, and is incorporated herein by reference.

Item 16. Form 10-K Summary

NONE.

NANOPHASE TECHNOLOGIES CORPORATION

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Report of Independent Registered Public Accounting Firm

To the Stockholders and the Board of Directors of

Nanophase Technologies Corporation

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheets of Nanophase Technologies Corporation (the Company) as of December 31, 2018 and 2017, the related consolidated statements of operations, stockholders‘ equity and cash flows for the years then ended, and the related notes to the consolidated financial statements (collectively, the financial statements). In our opinion, the financial statements present fairly, in all material respects, the financial position of the Company as of December 31, 2018 and 2017, and the results of its operations and its cash flows for the years then ended, in conformity with accounting principles generally accepted in the United States of America.

Emphasis of Matter Regarding Going Concern

The accompanying financial statements have been prepared assuming that the Company will continue as a going concern. As discussed in Note 3 to the financial statements, the Company has suffered recurring losses from operations and has limited liquidity to fund current operations. This raises substantial doubt about the Company‘s ability to continue as a going concern. Management‘s plans in regard to these matters also are described in Note 3. The financial statements do not include any adjustments that might result from the outcome of this uncertainty.

Basis for Opinion

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

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

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

/s/ RSM US LLP

We have served as the Company‘s auditor since 2001.

Schaumburg, Illinois

April 3, 2019

NANOPHASE TECHNOLOGIES CORPORATION

CONSOLIDATED BALANCE SHEETS

	As of December 31,	
	2018	2017
	(in thousands except share and per share data)	
ASSETS		
Current assets:		
Cash	$1,345	$1,955
Trade accounts receivable, less allowance for doubtful accounts of $9 and $5 on December 31, 2018 and 2017 respectively	829	1,115
Inventories, net	2,242	1,385
Prepaid expenses and other current assets	273	169
Total current assets	4,689	4,624
Equipment and leasehold improvements, net	1,865	1,624
Other assets, net	15	18
	$6,569	$6,266
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current liabilities:		
Line of credit, related party	$832	$—
Line of credit, bank	—	300
Current portion of capital lease obligations	218	143
Accounts payable	1,608	1,038
Accrued expenses	979	543
Total current liabilities	3,637	2,024
Long-term portion of capital lease obligations	506	416
Long-term loan, related party	500	—
Long-term deferred rent	344	410
Asset retirement obligations	198	184
Total long-term liabilities	1,548	1,010
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 shares authorized; 33,911,792 and 33,847,793 shares issued and outstanding on December 31, 2018 and December 31, 2017, respectively	339	338
Additional paid-in capital	98,795	98,563

Accumulated deficit	(97,750)	(95,669)
Total stockholders' equity	1,384	3,232
	$6,569	$6,266

(See accompanying Notes to Financial Statements)

NANOPHASE TECHNOLOGIES CORPORATION

CONSOLIDATED STATEMENTS OF OPERATIONS

	Years ended December 31,	
	2018	2017
	(in thousands except share and per share data)	
Revenue:		
Product revenue	$ 14,040	$ 12,129
Other revenue	153	342
Total revenue	14,193	12,471
Operating expense:		
Cost of revenue	10,903	8,621
Gross profit	3,290	3,850
Research and development expense	2,057	1,736
Selling, general and administrative expense	3,256	2,886
Loss from operations	(2,023)	(772)
Interest expense	(58)	(34)
Other, net	—	17
Loss before provision for income taxes	(2,081)	(789)
Provision for income taxes	—	—
Net loss	$ (2,081)	$ (789)
Net loss per share-basic and diluted	$ (0.06)	$ (0.03)
Weighted average number of basic and diluted common shares outstanding	33,871,815	31,335,956

(See accompanying Notes to Financial Statements)

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NANOPHASE TECHNOLOGIES CORPORATION

CONSOLIDATED STATEMENTS OF STOCKHOLDERS' EQUITY

(in thousands except share data)

Description	Preferred Stock Shares	Amount	Common Stock Shares	Amount	Additional Paid-in Capital	Accumulated Deficit	Total
Balance on December 31, 2016	—	$ —	31,229,996	$ 312	$ 97,359	$ (94,880)	$ 2,791
Sale of common stock	—	—	2,500,000	25	975	—	1,000
Stock option exercises	—	—	117,797	1	46	—	47
Stock-based compensation	—	—	—	—	183	—	183
Net loss for the year ended December 31, 2017	—	—	—	—	—	(789)	(789)
Balance on December 31, 2017	—	$ —	33,847,793	$ 338	$ 98,563	$ (95,669)	$ 3,232
Stock option exercises	—	—	63,999	1	28	—	29
Stock-based compensation	—	—	—	—	204	—	204
Net loss for the year ended December 31, 2018	—	—	—	—	—	(2,081)	(2,081)
Balance on December 31, 2018	—	$ —	33,911,792	$ 339	$ 98,795	$ (97,750)	$ 1,384

(See accompanying Notes to Financial Statements)

NANOPHASE TECHNOLOGIES CORPORATION

CONSOLIDATED STATEMENTS OF CASH FLOWS

	Years ended December 31,	
	2018	2017
	(in thousands)	
Operating activities:		
Net loss	$(2,081)	(789)
Adjustments to reconcile net loss to cash used in operating activities:		
Depreciation and amortization	322	344
(Gain) on disposal of fixed asset	—	(12)
Share-based compensation	204	183
Changes in assets and liabilities related to operations:		
Trade accounts receivable	286	(681)
Inventories	(857)	(367)
Prepaid expenses and other assets	(104)	27
Accounts payable	518	369
Accrued expenses	370	(34)
Net cash used in operating activities	(1,342)	(960)
Investing activities:		
Acquisition of equipment and leasehold improvements	(160)	(209)
Proceeds from disposal of equipment	—	137
Net cash used in investing activities	(160)	(72)
Financing activities:		
Principal payment on capital leases	(169)	(139)
Proceeds from line of credit, bank	1,200	300
Payments to the line of credit, bank	(1,500)	—
Proceeds from Beachcorp term loan	500	—
Proceeds from line of credit, Beachcorp LLC	970	—
Payments to line of credit, Beachcorp LLC	(138)	—
Proceeds from sale of common stock	—	1,000
Proceeds from exercise of stock options	29	47
Net cash provided by financing activities	892	1,208
(Decrease) Increase in cash and cash equivalents	(610)	176
Cash and cash equivalents at beginning of period	1,955	1,779
Cash and cash equivalents at end of period	$1,345	$1,955
Supplemental cash flow information:		
Interest paid	$51	$34

Supplemental non-cash investing and financing activities:		
Accounts payable incurred for the purchase of equipment and leasehold improvements	$52	$—
Capital lease obligations incurred in the purchase of equipment	$334	$481

(See accompanying Notes to Financial Statements)

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 a skin and sun care focused compan that offers engineered materials, formulation development and commercial manufacturing with an integrated family of technologies. Our expertise in nanoscale engineering allows us to effectively coat and disperse particles on a nano and “non-nano“ scale for use in a variety of diverse markets: personal care ingredients, including sunscreens as active ingredients; full formulations of skin care products, marketed and sold by our wholly-owned subsidiary, Solesence, LLC (our “Solésence® subsidiary“), which comprise two of our three major product categories; and in architectural coatings, industrial coating applications, abrasion-resistant additives, plastics additives, medical diagnostics, energy (including solar control) and a variety of surface finishing technologies (polishing) applications, including optics — all of which fall in to the advanced materials product category.

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, and our Solésence® products to cosmetics and skin care brands. Recently developed technologies have made certain new products possible and opened potential new markets. During 2015 we were granted a patent on a new type of particle surface treatment (coating) — now called Active Stress Defense ™ Technology — which became the cornerstone of our new product development in personal care, with first revenue recognized during 2016. In addition, through the creation of our Solésence® subsidiary, we utilize this particle surface treatment to manufacture and sell fully developed solutions to targeted customers in the skin care industry, in addition to the ingredients we have traditionally sold in the personal care area.

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 the sale of our products.

(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

The Cash balance on December 31, 2018 consists of funds borrowed from our Term Loan and Revolving Line of Credit, both of which are facilitated by Beachcorp, LLC. Our ability to access cash from our credit facility solely depends on carrying an Accounts Receivable balance greater than the outstanding loan balance in the Revolving Line of Credit. As part of the agreement, we are required to have a bank account in place to act as a depository account for our customers. This account is referred to as the Control Account. Furthermore, there is an Account Control Agreement in place which provides Beachcorp, LLC the ability to exercise control over the account via approval of requested transfers. According to our agreements with Beachcorp, LLC, Nanophase is to be the party initiating any transfers, whether to Nanophase or to Beachcorp, LLC, and approval to access any monies within this account can only be withheld by Beachcorp, LLC if the borrowing base falls below the Company's qualified receivables, or if we are in arrears with respect to interest payments due Beachcorp, LLC. The failure of Nanophase to remedy the previously mentioned conditions could lead to Beachcorp, LLC gaining the right, through a "springing" feature administered by Libertyville Bank and Trust, a Wintrust Community Bank ("Libertyville"), to transfer funds to itself without direct approval from Nanophase. Due to the restrictive nature on this account to Nanophase Technologies Corporation, any balance in the account constitutes restricted cash. The restricted cash balance in this account on December 31, 2018 was zero.

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 between thirty and sixty days from shipment and invoicing.

Inventories

Inventories are stated at the lower of cost, maintained on a first in, first out basis, or net realizable value. 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 (3-7 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:

	2018	**2017**
Balance, beginning	$184	$178
Accretion of liability due to passage of time	14	6
Amortization of asset due to passage of time	—	—
Balance, ending	$198	$184

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 from Libertyville Bank and Trust and any borrowings on the working capital line of credit and term loan from Beachcorp, LLC 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, 2018 and 2017.

Product Revenue

On January 1, 2018, we adopted Accounting Standards Updates (“ASU“) 2014-09 and 2015-14, *Revenue from Contract with Customers (Topic 606)*, using the modified retrospective method applied to those contracts that were not completed as of January 1, 2018. Results for reporting periods beginning after January 1, 2018 are presented under Topic 606, while prior period amounts are not adjusted and continue to be reported in accordance with our historical accounting under the Financial Accounting Standards Board (“FASB“) Accounting Standards Codification (“ASC“) Topic 605. Based on our contract evaluation, we determined that there was no need to record any changes to our opening retained earnings due to the impact of our adoption of Topic 606. The adoption of Topic 606 did not have a material impact on our consolidated condensed financial statements.

Revenues are recognized at a point in time, typically when control of the promised goods is transferred to customers, in an amount that reflects the consideration we expect to receive in exchange for those goods.

We generally expense sales commissions when incurred because the amortization period would have been one year or less. These costs are recorded within selling, general and administrative expenses. Customers’ deposits, deferred revenue and other receipts are deferred and recognized when the revenue is realized and earned. Cash payments to

customers are classified as reductions of revenue in our statements of operations.

We do not disclose the value of the unsatisfied performance obligations for contracts with an original expected length of one year or less or contracts for which we recognize revenue that we have the right to invoice for goods completed.

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 the obligation under the agreed upon contractual arrangement is performed on our part. We recognized a one-time technology development fee of $20,000 in 2018 relating to our agreement with Colorescience. We recognized a one-time technology fee of $250,000 in 2017 relating to our agreement with Eminess Technologies, Inc.

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.

Reclassifications

Certain balances on the 2017 financial statements have been reclassified to conform to 2018 presentation with no impact to the net income.

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 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. 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, 2018, and 2017, we had no liability for unrecognized tax benefits.

Earnings Per Share

Options to purchase approximately 839,000 shares of common stock that were outstanding as of December 31, 2018 were not included in the computation of earnings per share for the year ended December 31, 2018, as the impact of such shares are anti-dilutive. Options to purchase approximately 646,000 shares of common stock that were outstanding as of December 31, 2017 were not included in the computation of earnings per share for the year ended December 31, 2017, as the impact of such shares are anti-dilutive.

New Accounting Pronouncements

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. The company expects to adopt this guidance for leases existing at the date of adoption and expects to recognize a liability and corresponding asset associated with in-scope leases. The company has commenced identifying its lease population but is still in the process of determining those amounts to be recognized as liabilities and right of use assets.

(3) Going Concern / Liquidity

We believe that cash from operations and cash on hand, in addition to unused borrowing capacity, should be adequate to fund our operating plans through 2019, but this is dependent on several things over which we have limited control. Our largest customer made up 74% of our 2018 revenue, and expects a material reduction in orders from us in 2019, which has limited our flexibility and required us to make cash management a top priority. We also expect growth in our Solésence® business, which we view as a critical strategic undertaking, and may require additional investment in working capital. Our current plan is to continue to invest in Solésence®-related operating expenses and capital equipment. Given the uncertainties relating to our largest customer, as well as our growth strategy for Solésence®, we believe that we may need to seek additional funding to address working capital demands within the next twelve months.

These circumstances raise significant doubt as to the Company's ability to operate as a going concern under U.S. GAAP. The accompanying financial statements have been prepared on a going concern basis in accordance with U.S. GAAP. As such, no adjustments have been made to the consolidated financial statements for the recoverability of assets and classification of liabilities that might be necessary should the Company be unable to continue operating as a going concern.

We believe that we will be able to secure additional financing if needed, but we do not have any additional financing commitments in place as of today. However, we may not be able to secure additional financing in a timely manner under commercially reasonable terms, or at all. If we are unable to secure additional financing, we would need to delay capital expenditures related to our Solésence® growth strategy, which could impede growth in 2019 and 2020.

(4) Note and Lines 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. 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 do so pursuant to the terms of our facility lease agreement. Because there were no amounts outstanding on the note at any time during 2018 or 2017, 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 and was extended on each of March 4, 2016 and February 14, 2017. Under the Line of Credit Agreement, as amended, Libertyville will provide a maximum of $300 or 75% of our eligible accounts receivable, whichever was 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 required us to have at least $1 million in cash, including any amounts borrowed, at Libertyville on the date of any advance. Advances could only occur at the beginning or end of a fiscal quarter and were required to be repaid in full within five days of the advance. Borrowings on this line were $300 on December 31, 2017. These borrowings were repaid in January 2018. The Line of Credit Agreement expired on March 4, 2018.

On March 22, 2019, we executed a New Business Loan Agreement, dated as of March 4, 2019, with Libertyville, which replaces the Line of Credit Agreement with Libertyville having a maturity date of March 4, 2019. Under the New Business Loan Agreement, Libertyville will provide a maximum of (i) $500 or (ii) two times the sum of (a) 75% our eligible accounts receivables and (b) our cash deposited with Libertyville, whichever is less, of revolving credit to us, collateralized by a senior priority lien on our accounts receivable, inventory, equipment, general intangibles and fixtures. Interest is payable monthly on any advances at a floating interest rate of the prime rate at the time plus 1%. We must have $500 in cash, inclusive of the borrowed amount, 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 business days of the advance. Amounts due under the Line of Credit Agreement must be paid in full on April 4, 2020.

On November 16, 2018, we entered into a Business Loan Agreement (the "Master Agreement") with Beachcorp, LLC. Beachcorp, LLC is managed by Bradford T. Whitmore, who, together with his affiliates Grace Brothers, Ltd. and Grace Investments, Ltd., beneficially owned approximately 47% of the outstanding shares of our common stock as of March 25, 2019. The Master Agreement relates to two loan facilities, each evidenced by separate promissory notes, each dated November 16, 2018: a term loan to the Company of up to $500 to be disbursed in a single advance (the "Term Loan") with a fixed annual interest rate of 8.25%, payable quarterly, accruing from the date of such advance and with principal due on December 31, 2020; and an asset-based revolving loan facility for the Company of up to $2,000 (the "Revolver Facility"), with floating interest accruing at the prime rate plus 3% (8.25% minimum) per year, with a

borrowing base consisting of qualified accounts receivable of the Company, and with all principal and accrued interest due March 31, 2020. The Term Loan and Revolver Facility are secured by all the unencumbered assets of the Company and subordinated to Libertyville's secured interest under the New Business Loan Agreement. The Master Agreement substantially restricts the Company's ability to incur additional indebtedness during the terms of both the Term Loan and the Revolver Facility. On December 31, 2018, the balance on the term loan was $500 and the balance on the Revolver Facility was $832, there was $7 in 2018 interest expense, all of which was accrued and unpaid at year-end. As Beachcorp, LLC is an affiliate of one of our shareholders, this amounts to interest to be paid to a related party. On December 31, 2018, the outstanding borrowings exceed the borrowing base per the credit agreement by $192, which was absorbed by an increase in the borrowing base. Nanophase is required to repay this amount to Beachcorp, LLC upon next receipt of funds, unless new billings are made which exceed any such amount before repayment is made. The balance of borrowing base, loan amount, and any excess payments required over the available borrowing base will change as frequently as daily, given the operational nature of the elements of the Revolver Facility.

(5) Inventories

Inventories consist of the following:

	As of December 31,	
	2018	2017
Raw materials	$1,086	$543
Finished goods	1,243	863
	2,329	1,406
Allowance for excess quantities	(87)	(21)
	$2,242	$1,385

Equipment and Leasehold Improvements

(6)

Equipment and leasehold improvements consist of the following:

	As of December 31,	
	2018	2017
Machinery and equipment	$15,513	$14,936
Office equipment	840	811
Office furniture	110	110
Leasehold improvements	4,839	4,839
Construction in progress	97	157
	21,399	20,853
Less: Accumulated depreciation and amortization	(19,534)	(19,229)
	$1,865	$1,624

Depreciation expense was $305 and $336, for the years ended December 31, 2018 and 2017, respectively.

(7) 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 $37.

During March 2017, we entered into a new Building Lease for our Burr Ridge, Illinois facility that began in September 2017 and extends 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 the lease for our offsite warehouse in Romeoville, Illinois, through August 2019. The current monthly rent on this lease amounts to $7.

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
2019	$ 689	$ 274
2020	587	255
2021	554	196
2022	420	109
2023	430	5
Thereafter	440	—
Total payments	3,120	839
Less amounts representing interest	—	(115)
Total minimum payments required:	$ 3,120	$ 724

Rent expense, including real estate taxes, under these leases amounted to $644 and $621, for the years ended December 31, 2018 and 2017, respectively. Amortization expense related to assets under capital lease is included in depreciation expense.

On December 31, 2018 equipment under capital leases had a cost of $957 with accumulated depreciation of $76, compared to $757 and $43, respectively, on December 31, 2017. Principal and interest payments are due monthly under the capital lease obligations through May 2023. The remaining payments under capital leases include principal of $724 and interest of $115. We entered into four new capital leases during 2018 for $334 and a 5 years duration (through 2023). We entered into three new capital leases during 2017 for $481 and a 5-year duration (through 2022).

(8) Accrued Expenses

Accrued expenses consist of the following:

	As of December 31,	
	2018	2017
Accrued payroll and related expenses	$200	$196
Customer net volume rebate payable	540	214
Other	239	133
	$979	$543

(9) 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, 2018 and 2017 is as follows:

	2018	2017
Income tax credit at statutory rates	$(437)	$(268)
Nondeductible expenses	4	2
State income tax, net of federal benefits	(156)	(45)
Expiration of NOL	1,559	—
Effect of US tax rate change	—	9,284
Expiration of stock options	180	188
Change in valuation allowance	(1,148)	(9,161)
	$—	$—

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,	
	2018	**2017**
Deferred tax assets:		
Net operating loss carryforwards	$22,560	$23,520
Inventory and other allowances	35	12
Charitable contribution carryforwards	2	2
Excess (tax) book depreciation	524	577
Excess (tax) book amortization	57	53
Share-based compensation	749	885
Other accrued costs	141	167
Total deferred tax assets	24,068	25,216
Less: Valuation allowance	(24,068)	(25,216)
Deferred income taxes	$—	$—

The valuation allowance decreased approximately $1.1 million and decreased $9.2 million for the years ended December 31, 2018 and 2017, respectively (net of approximately $1.6 million and $0 million for the years ended December 31, 2018 and 2017, respectively, for expiring net operating loss carryforwards) due principally to the expiring of net operating loss carryforwards. 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, 2018, the amounts subject to limitations have not yet been determined.

On December 22, 2017, the President of the United States signed into law the Tax Cuts and Jobs Act tax reform legislation. This legislation makes significant changes in U.S. tax law, including a reduction in the corporate tax rates, changes in net operating loss carryforwards and carrybacks and a repeal of the corporate alternative minimum tax. The legislation reduced the U.S. corporate tax rate from the current rate of 34% to 21%. As a result of the enacted law, the Company was required to revalue deferred tax assets and liabilities at the enacted rate. This revaluation resulted in a reduction in the deferred tax asset and valuation allowance of $9.3 million. The other provisions of the Tax Cuts and Jobs Act did not have a material impact on the financial statements as of December 31, 2017 and for the year then ended. With the new legislation, the Securities and Exchange Commission issued guidance under Staff Accounting Bulletin No. 118, Income Tax Accounting Implications of the Tax Cuts and Jobs Act (“SAB 118“) directing taxpayers to consider the impact of the U.S. legislation as “provisional“ when it does not have the necessary information prepared or analyzed in reasonable detail to complete its accounting for the change in tax law. There was no impact on the income tax expense for the federal corporate tax rate change for the period ended December 31, 2017 due to the tax period’s taxable loss and the calculation related to the change is complete.

We have net operating loss carryforwards for tax purposes of approximately $79 million on December 31, 2018. $77 million expire between 2019 and 2037. All net operating loss carryforwards generated after January 1, 2018, do not expire. Therefore, the $2 million generated this year will not expire.

(10) Capital Stock

As of December 31, 2018, and 2017, we had 24,088 authorized but unissued shares of preferred stock. In addition, as of December 31, 2018, 664,000 authorized but unissued shares of common stock have been reserved for future equity grants under our 2010 Equity Compensation Plan.

(11) Stock Options and Stock Grants

We have entered into stock option agreements with certain officers, employees and directors. The stock options generally expire ten years from the date of grant.

Employee Stock Options

We follow ASC Topic 718, *Share-Based Payments*, in which compensation expense is recognized only for share-based payments expected to vest. We recognized compensation expense related to stock options of $204 and $183 for the years ended December 31, 2018 and 2017, respectively.

As of December 31, 2018, there was approximately $392 of total unrecognized compensation cost related to non-vested share-based compensation arrangements granted under our stock option plans. That cost is expected to be recognized over a remaining weighted-average period of 2.1 years.

The following table illustrates the various assumptions used to calculate the Black-Scholes option pricing model for options granted for all years presented:

	Years Ended December 31,	
	2018	2017
Weighted-average risk-free interest rates:	2.9 %	2.1 %
Dividend yield:	0.00%	0.00%
Weighted-average expected life of the option:	7 years	7 years
Weighted-average expected stock price volatility:	94 %	94 %
Weighted-average fair value of the options granted:	$0.64	$0.55

We use the Black−Scholes option pricing model to determine the fair value of stock-based compensation. The Black−Scholes model requires us to make several assumptions, including the estimated length of time employees will retain their vested stock options before exercising them (“expected term”), the estimated volatility of our common stock price over the expected term and estimated forfeitures. Expected price volatility of the fiscal 2018 and 2017 grants is based on the daily market rate changes of our stock going back to January 1, 2011. The shares granted in fiscal 2018 and 2017 had a vesting period of three years and a contractual life of 10 years. Forfeitures were estimated at 4% for the years ended December 31, 2018 and 2017, based on our historical experience. The Black−Scholes model also requires a risk-free interest rate, which is based on the U.S. Treasury yield curve in effect at the time of the grant, and the dividend yield on our common stock, which is assumed to be zero since we do not pay dividends and have no current plans to do so in the future. Changes in these assumptions can materially affect the estimate of fair value of stock-based compensation and consequently, the related expense recognized on the statement of operations. We recognize stock-based compensation expense on a straight-line basis.

The following table summarizes the option activity for our employees and directors during the year ended December 31, 2018:

	Weighted	Weighted Average

Options	(rounded) Shares	Average Exercise Price per Share	Remaining Contractual Term (years)	Aggregate Intrinsic Value (000s)
Outstanding on January 1, 2018	3,141,000	$ 0.73		
Granted	571,000	$ 0.80		
Exercised	(64,000)	$ 0.45		
Forfeited or expired	(233,000)	$ 1.81		
Outstanding on December 31, 2018	3,415,000	$ 0.67	5.8	$ 590
Exercisable on December 31, 2018	2,448,000	$ 0.65	4.7	$ 527
Shares available for grant	664,000			

The aggregate intrinsic value in the table above is based on our closing stock price of $0.73 on the last business day for the year ended December 31, 2018.

During the years ended December 31, 2018 and 2017, the total intrinsic value of our stock options exercised was $25 and $26, respectively. Cash received for option exercises was $29 and $47 during the years ended December 31, 2018 and 2017, respectively. We had approximately 64,000 options exercised during the year ended December 31, 2018, compared to 118,000 in 2017. Based on our election of the “with and without“ approach, no realized tax benefits from stock options were recognized for the years ended December 31, 2018 and 2017.

(12) 401(k) Profit-Sharing Plan

We have a 401(k) profit-sharing plan covering substantially all employees who meet defined service requirements. During 2017, we implemented a new Company contribution program, in which 10% of the employee’s contribution will be matched up to an 8% contribution (for a match of up to 0.8% of a participant’s salary). Contributions made in 2018 and 2017 aggregated to $21 and $19, respectively.

(13) Significant Customers and Contingencies

Revenue from three customers constituted approximately 74%, 7% and 3%, respectively, of our 2018 revenue. Amounts included in accounts receivable on December 31, 2018 relating to these three customers were approximately $316, $74 and $31, respectively. Revenue from these three customers constituted approximately 61%, 0% and 11%, respectively, of our 2017 revenue. Amounts included in accounts receivable on December 31, 2017 relating to these three customers were approximately $6, $1 and $432, respectively. The loss of one of these significant customers or the failure to attract new customers could have a material adverse effect on our business, results of operations and financial condition.

We currently have exclusive supply agreements with BASF Corporation (“BASF“), our largest customer, that have contingencies outlined which could potentially result in the license of technology and/or the sale of production equipment from the Company to the customer intended to provide capacity sufficient to meet the customer’s production needs. This outcome may occur if we fail to meet certain performance requirements, certain other obligations and/or certain financial condition covenants. The financial condition covenants in one of our supply agreements with BASF “trigger“ a technology transfer right (license and equipment sale at BASF’s option) in the event (a) that earnings for the 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 $500,000, or (b) of an acceleration of any debt maturity having a principal amount of more than $10 million. There are certain minimum finished goods inventory requirements with the new amendment to the supply agreement. This agreement also requires Nanophase to maintain certain finished goods inventory levels as “safety stock,“ beginning in the first quarter

of 2019, and increasing through the third quarter of 2019 to a negotiated level based on agreed demand metrics, in order to maintain the $500,000 non-cash component discussed above. After September 30, 2019, should our safety stock fall below the prescribed amount of material, the quarter-end cash requirement would revert to $1,000,000 in cash, cash equivalents, and certain investments. The safety stock requirement may be adjusted upon mutual agreement.

Our supply agreements with BASF also “trigger“ a technology transfer right in the event of our insolvency, as further defined within the agreements. In the event of an equipment sale, upon incurring a triggering event, the equipment would be sold to the customer at either 115% of the equipment’s net book value or the greater of 30% of the original book value of such equipment, and any associated upgrades to it, or 115% of the equipment’s net book value, depending on the equipment and related products.

We believe that we should have sufficient cash and credit availability (See Liquidity and Capital Resources in Management’s Discussion and Analysis in Part II, Item 7 of this Form 10-K for a further discussion, as well as the description of our Line of Credit Agreement described in Note 3) to operate our business during 2019, but this is dependent on several things over which we have limited control. If a triggering event were to occur and BASF elected to proceed with the license and related equipment sale mentioned above, we would receive royalty payments from this customer for products sold using our technology; however, 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 could be purchased and removed by the customer pursuant to this triggering event could take in excess of twelve months. Any additional capital outlays required to rebuild capacity would probably be greater than the proceeds from the purchase of the assets as dictated by our agreement with the customer. Similar consequences would occur if we were determined to have materially breached certain other provisions of the supply agreement with BASF. Any such 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 it could be difficult to replace them quickly. Given the occurrence of any such event, we might not be able to hire and retain skilled employees given the stigma relating to such an event and its impact on us. Finally, any shortfall in capital needed to operate the business as management intends, including with respect to avoiding this triggering event as described above, may result in a curtailment of certain activities or anticipated investments.

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 or because of currently unknown capital requirements, new regulatory requirements or the need to meet the cash requirements discussed above to avoid a triggering event under our BASF agreement. Given our expected growth in our Solésence® business, we may also have temporary working capital demands that we cannot fund with existing capital, while remaining in compliance with the covenants included in our BASF agreement described above. 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, and any such additional financing could be dilutive to our shareholders. 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.

(14) Business Segmentation and Geographical Distribution

Revenue from international sources approximated $600 and $1,835 for the years ended December 31, 2018 and 2017, respectively. As part of our revenue from international sources, we recognized approximately $534 and $1,713 in product revenue from a number of German companies, in the aggregate, for the years ended December 31, 2018 and 2017, respectively.

Our Operations comprise a single business segment and all of our long-lived assets are located within the United States. We categorize our revenue stream into three main product categories, Personal Care Ingredients, Advanced Materials and Solésence®. The revenues for 2018 and 2017 by category are as follows:

Product Category	**2018**	**2017**
Personal Care Ingredients	$10,573	$7,874
Advanced Materials	2,253	4,543
Solésence®	1,367	54
Total Sales	$14,193	$12,471

(15) Subsequent Events

As discussed in Note 3, the Line of Credit Agreement with our primary bank (Libertyville) expired in March 2019, but during March 2019 we executed the New Business Loan Agreement with Libertyville. Under the New Business Loan Agreement, Libertyville will provide a maximum of (i) $500,000 or (ii) two times the sum of (a) 75% of our eligible accounts receivable and (b) our cash deposited with Libertyville, whichever is less, of revolving credit to us, collateralized by a senior priority lien on our accounts receivable, inventory, equipment, general intangibles and fixtures. Interest is payable monthly on any advances at a floating interest rate of the prime rate at the time plus 1%. We must have $500,000 in cash, inclusive of the borrowed amount, 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 business days of the advance. Amounts due under the New Business Loan Agreement must be paid in full on April 4, 2020. While the New Business Loan Agreement is in effect, we cannot, among other things, engage in any business activities substantially different than those in which we are presently engaged, and there are limitations imposed on our ability to, among other things, incur additional indebtedness for borrowed money, including capital leases, sell, transfer, mortgage, assign, pledge, lease or grant a security interest in or encumber any of our assets, sell with recourse any of our accounts other than to Libertyville, cease operations, merge, transfer, acquire or consolidate with any other entity, change our name, dissolve or transfer or sell collateral outside the ordinary course of business, pay any cash dividends, loan, invest in or advance money or assets to any other person or entity, purchase, create or acquire any interest in any other entity, or incur any obligation as a surety or guarantor other than in the ordinary course of business, in each case without Libertyville’s prior written consent.

EXHIBIT INDEX

Exhibit Number	
2	Plan and Agreement of Merger dated as of November 25, 1997 by and between the Company and its Illinois predecessor, incorporated by reference to Exhibit 2 to the Company's Annual Report on Form 10-K for the year ended December 31, 1997 (the "1997 10-K"), SEC File No. 000-22333.
3(i).1	Certificate of Incorporation of the Company, incorporated by reference to Exhibit 3.1 to the 1997 10-K, SEC File No. 000-22333.
3(i).2	First Amendment to the Certificate of Incorporation of the Company dated July 27, 2006, incorporated by reference to Exhibit 99.3 to the Company's Current Report on Form 8-K filed July 27, 2006, SEC File No. 000-22333.
3(i).3	Second Amendment to the Certificate of Incorporation of the Company dated August 23, 2010, incorporated by reference to Exhibit A of the Company's Definitive Proxy Statement on Schedule 14A filed July 9, 2010, SEC File No. 000-22333.
3(i).4	Third Amendment to the Certificate of Incorporation of the Company, incorporated by reference to Exhibit 3.1 to the Company's Current Report on Form 8-K filed August 29, 2016.
3(ii).1	By-Laws of the Company, incorporated by reference to Exhibit 3.2 to the 1997 10-K, SEC File No. 000-22333.
4.1	Specimen stock certificate representing common stock, incorporated by reference to Exhibit 4.1 to the Company's Registration Statement on Form S-1/A filed November 4, 1997 (File No. 333-36937) (the "Form S-1/A").
4.2	Form of Warrants, incorporated by reference to Exhibit 4.2 to the Company's Registration Statement on Form S-1 filed October 1, 1997 (File No. 333-36937) (the "IPO S-1").
4.3	Certificate of Designations of Series A Junior Participating Preferred Stock, incorporated by reference to Exhibit 4.4 to the Company's Annual Report on Form 10-K for the year ended December 31, 1998, SEC File No. 000-22333.

4.4	Stock Purchase Agreement dated August 25, 2006 between the Company and Rohm and Haas Electronic Materials CMP Holdings, Inc., incorporated by reference to Exhibit 99.1 to the Company's Current Report on Form 8-K filed August 28, 2006, SEC File No. 000-22333.
4.5	Registration Rights Agreement dated August 25, 2006 between the Company and Rohm and Haas Electronic Materials CMP Holdings, Inc., incorporated by reference to Exhibit 99.2 to the Company's Current Report on Form 8-K filed August 28, 2006, SEC File No. 000-22333.

4.6	Common Stock Purchase Agreement, dated February 10, 2016, between the Company and Bradford T. Whitmore, incorporated by reference to Exhibit 4.1 of the Company's Current Report on Form 8-K filed February 10, 2016.
4.7	Common Stock Purchase Agreement, dated December 19, 2017, between the Company and Bradford T. Whitmore, incorporated by reference to Exhibit 4.1 of the Company's Current Report on Form 8-K filed December 21, 2017.
10.1	Industrial Building Lease dated September 15, 2004 between the Company and the Village of Burr Ridge, incorporated by reference to Exhibit 10.32 to the Company's Annual Report on Form 10-K for the year ended December 31, 2004 (the "2004 10-K"), SEC File No. 000- 22333.
10.2	Industrial Building Lease Agreement between Centerpoint Properties Trust (formerly CP Financing Trust) and the Company, dated June 15, 2000, incorporated by reference to Exhibit 10.23 to the Company's Annual Report on Form 10-K for the year ended December 31, 2000 (the "2000 10-K"), SEC File No. 000-22333.
10.3	Lease Amendment effective October 1, 2005 between the Company and Centerpoint Properties Trust, incorporated by reference to Exhibit 99.1 to the Company's Current Report on Form 8-K filed October 20, 2005, SEC File No. 000-22333.
10.4	Second Amendment to Industrial Lease Agreement, dated as of November 13, 2014 between the Company and MLRP 1319 Marquette LLC, successor-in-interest to Centerpoint Properties Trust, incorporated by reference to Exhibit 10.4 to the Company's Annual Report on Form 10- K for the year ended December 31, 2014.
10.5	Third Amendment to Industrial Lease Agreement, entered into on October 17, 2016 and effective October 1, 2016, by and between the Company and 1319 Marquette, LLC, incorporated by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K filed October 19, 2016.
10.6	Mutual Cooperation Agreement entered into on January 17, 2012, by and among the Company, C.I. Kasei Co., Ltd. and CIK NanoTek Corporation, incorporated by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K filed January 20, 2012, SEC File No. 000-22333.
10.7	Trademark Ownership Assignment Agreement, dated March 31, 2012, between the Company and CIK NanoTek Corporation, incorporated by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K filed April 4, 2012, SEC File No 000-22333.
10.8	Memorandum on the Payment of Royalty, dated March 31, 2012, between the Company and CIK NanoTek Corporation, incorporated by reference to Exhibit 10.2 to the Company's Current Report on Form 8-K filed April 4, 2012, SEC File No 000-22333.

10.9	Supply Agreement between the Company and Schering-Plough HealthCare Products, Inc. dated as of March 15, 1997, incorporated by reference to Exhibit 10.17 to the Form S-1/A.
10.10*	Zinc Oxide Supply Agreement dated as of September 16, 1999 between the Company and BASF Corporation, as assignee, incorporated by reference to Exhibit 10.22 to the Company's Annual Report on Form 10-K for the year ended December 31, 1999, SEC File No. 000-22333.
10.11*	Amendment No. 1 to Zinc Oxide Supply Agreement dated as of January, 2001 between the Company and BASF Corporation, incorporated by reference to Exhibit 10.24 to the 2000 10-K, SEC File No. 000-22333.
10.12	Amendment No. 2. to Zinc Oxide Supply Agreement dated as of March 17, 2003 between the Company and BASF Corporation, incorporated by reference to Exhibit 10.26 to the Company's Annual Report on Form 10-K for the year ended December 31, 2002 (the "2002 10-K"), SEC File No. 000-22333.

10.13*	Amendment No. 3 to Zinc Oxide Supply Agreement entered into on December 12, 2012, between the Company and BASF Corporation, incorporated by reference to Exhibit 10.1 of the Company's Current Report on Form 8-K filed December 6, 2012, SEC File No. 000-22333.
10.14	Z-COTE HP-2 Brand Supply Agreement dated May 15, 2006 between the Company and BASF Corporation, incorporated by reference to Exhibit 99.1 to the Company's Current Report on Form 8-K filed June 20, 2006, SEC File No. 000-22333.
10.15*	Amendment No. 4 to Zinc Oxide Supply Agreement entered into on March 11, 2019, between the Company and BASF Corporation, incorporated by reference to Exhibit 10.1 of the Company's Current Report on Form 8-K filed March 15, 2019, SEC File No. 000-22333.
10.16*	Amended and Restated Cooperation Agreement dated August 25, 2006 between the Company and Rohm and Haas Electronic Materials CMP Inc., incorporated by reference to Exhibit 99.3 to the Company's Current Report on Form 8-K filed August 28, 2006, SEC File No. 000- 22333.
10.17	Supply Agreement effective as of March 23, 2009, between the Company and Rohm and Haas Electronic Materials CMP Inc., incorporated by reference to Exhibit 10.56 to the Company's Annual Report on Form 10-K for the year ended December 31, 2008, SEC File No. 000-22333.
10.18*	Distributor Agreement dated October 24, 2005 between Johnson Matthey Catalog Company, Inc., d/b/a ALFA AESAR and the Company, incorporated by reference to Exhibit 99.1 to the Company's Current Report on Form 8-K filed November 1, 2005, SEC File No. 000-22333.
10.19*	Supply Agreement dated March 3, 2006 between Roche Diagnostics GmbH and the Company, incorporated by reference to Exhibit 99.1 to the Company's Current Report on Form 8-K filed March 9, 2006, SEC File No. 000-22333.
10.20*	First Amendment to the Supply Agreement entered into on November 19, 2014 between the Company and Roche Diagnostics GmbH, incorporated by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K filed November 25, 2014.
10.21*	Second Amendment to the Supply Agreement, entered into on November 21, 2016, between the Company and Roche Diagnostics GmbH, incorporated by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K filed November 28, 2016.
10.22	Joint Development Agreement dated March 23, 2004 between the Company and Altana Chemie AG, incorporated by reference to Exhibit 10.29 to the 2003 10-K, SEC File No. 000-22333.

10.23*	Agreement dated July 7, 2008 between the Company and Altana Chemie GmbH, incorporated by reference to Exhibit 99.1 to the Company's Current Report on Form 8-K filed July 18, 2008, SEC File No. 000-22333.
10.23*	Settlement and Termination Agreement, dated August 20, 2010, between the Company and Altana Chemie GmbH, incorporated by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K filed August 25, 2010, SEC File No. 000-22333.
10.25*	Supply Agreement, dated as of March 31, 2016, between the Company and Ester Solutions Company, incorporated by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K filed April 6, 2016.

10.26	Promissory Note, dated March 4, 2015, granted by the Company in favor of Libertyville Bank and Trust Company, incorporated by reference to Exhibit 10.2 to the Company's Current Report on Form 8-K filed March 10, 2015.
10.27	Commercial Security Agreement, dated March 4, 2015, between the Company and Libertyville Bank and Trust Company, incorporated by reference to Exhibit 10.3 to the Company's Current Report on Form 8-K filed March 10, 2015.
10.28	Change in Terms Agreement, dated March 4, 2016, between the Company and Libertyville Bank and Trust Company, incorporated by reference to Exhibit 10.2 of the Current Report on Form 8-K filed March 10, 2016.
10.29	Change in Terms Agreement, dated February 14, 2017, between the Company and Libertyville Bank and Trust Company, incorporated by reference to Exhibit 10.32 to the Company's Annual Report on Form 10-K for the year ended December 31, 2016.
10.30	Promissory Note, executed by the Company on March 26, 2018, granted by the Company in favor of Libertyville Bank and Trust Company, incorporated by reference to Exhibit 10.34 to the Company's Annual Report on Form 10-K for the year ended December 31, 2017.
10.31	Commercial Security Agreement, executed by the Company on March 26, 2018, between the Company and Libertyville Bank and Trust Company, incorporated by reference to Exhibit 10.35 to the Company's Annual Report on Form 10-K for the year ended December 31, 2017.
10.32	Business Loan Agreement, executed by the Company on March 22, 2019, between the Company and Libertyville Bank and Trust Company (filed herewith).
10.33	Change in Terms Agreement, executed by the Company on March 22, 2019, between the Company and Libertyville Bank and Trust Company (filed herewith).
10.34	Employment Agreement effective as of September 25, 2008, between the Company and Nancy Baldwin, incorporated by reference to Exhibit 99.1 to the Company's Current Report on Form 8-K filed October 2, 2008, SEC File No. 000-22333. +
10.35	Employment Agreement effective August 12, 2009 between the Company and Jess Jankowski, incorporated by reference to Exhibit 10.3 to the Company's Quarterly Report on Form 10-Q for the quarter ended June 30, 2009, SEC File No. 000-22333. +
10.36	

	Employment Agreement dated November 28, 2012, between the Company and Kevin Cureton, incorporated by reference to Exhibit 10.36 to the Company's Annual Report on Form 10-K for the year ended December 31, 2012, SEC File No. 000-22333. +
10.37	Employment Agreement dated March 26, 2018 between the Company and Jaime Escobar, incorporated by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K filed March 20, 2018, SEC File No. 000-22333. +
10.40	Nanophase Technologies Corporation 2004 Equity Compensation Plan ("2004 Equity Plan"), incorporated by reference to Exhibit 4 to the Company's Registration Statement on Form S-8 (File No. 333-119466). +

10.50	2008 Long-Term Cash Incentive Plan, incorporated by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K filed July 25, 2008, SEC File No. 000-22333.
10.51	Nanophase Technologies Corporation 2010 Equity Compensation Plan, as amended, incorporated by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K filed August 29, 2016.
10.52	Form of Stock Option Award Agreement under the 2010 Equity Compensation Plan, incorporated by reference to Exhibit 10.47 to the Company's Annual Report on Form 10-K for the year ended December 31, 2013.
10.53	Building Lease, dated as of September 15, 2010, between the Company and the Village of Burr Ridge, incorporated by reference to Exhibit 10.50 to the Company's Annual Report on Form 10-K for the year ended December 31, 2016.
10.54	Building Lease, dated as of March 13, 2017, between the Company and the Village of Burr Ridge, incorporated by reference to Exhibit 10.51 to the Company's Annual Report on Form 10-K for the year ended December 31, 2016.
10.55*	Know-How License Agreement, executed by the Company on June 26, 2017, between the Company and Eminess Technologies, Inc., incorporated by reference to Exhibit 10.1 of the Current Report on Form 8-K filed June 29, 2017.
10.56*	Exclusive Supply Agreement, executed by the Company on June 26, 2017, between the Company and Eminess Technologies, Inc., incorporated by reference to Exhibit 10.2 of the Current Report on Form 8-K filed June 29, 2017.
10.57	Technology Development Agreement, executed by the Company on June 26, 2017, between the Company and Eminess Technologies, Inc., incorporated by reference to Exhibit 10.3 of the Current Report on Form 8-K filed June 29, 2017.
21.1	Subsidiary of the Company.
23.1	Consent of RSM US LLP. (filed herewith)
31.1	Certification of the Chief Executive Officer (principal executive officer) pursuant to Rules 13a-14(a) and 15d-14(a) under the Exchange Act. (filed herewith)

31.2	Certification of the Chief Financial Officer (principal financial officer) pursuant to Rules 13a-14(a) and 15d-14(a) under the Exchange Act. (filed herewith)
32	Certification of the Chief Executive Officer (principal executive officer) and Chief Financial Officer (principal financial officer) pursuant to 18 U.S.C. Section 1350. (filed herewith)
101	The following materials from the Company's Annual Report on Form 10-K for the year ended December 31, 2017, formatted in XBRL (Extensible Business Reporting Language): (1) the Balance Sheets, (2) the Statements of Operations, (3) the Statements of Cash Flows, (4) the Statements of Stockholders' Equity, and (5) the Notes to the Financial Statements.

*Confidentiality previously granted for portions of this agreement.

+Indicates management contracts or compensatory plans or arrangements.

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the Registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized, on the 3rd day of April, 2019.

NANOPHASE TECHNOLOGIES CORPORATION

By: /s/ Jess A. Jankowski
Jess A. Jankowski
President and Chief Executive Officer

Pursuant to the requirements of the Securities Exchange Act of 1934, this Report has been signed below by the following persons on behalf of the registrant and in the capacities indicated on the 3rd day of April, 2019.

Signature	**Title**
/s/ Jess A. Jankowski Jess A. Jankowski	President, Chief Executive Officer (principal executive officer, principal financial officer, and principal accounting officer) and Director
/s/ James A. Henderson James A. Henderson	Chairman of the Board of Directors
/s/ George A. Vincent, III George A. Vincent, III	Director
/s/ James A. McClung James A. McClung	Director
/s/ Richard W. Siegel Richard W. Siegel	Director
/s/ W. Ed Tyler W. Ed Tyler	Director
/s/ R. Janet Whitmore R. Janet Whitmore	Director