

**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, 2021
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
(State or other jurisdiction
of incorporation or organization)

36-3687863
(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 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	<input type="checkbox"/>	Accelerated filer	<input type="checkbox"/>
Non-accelerated filer	<input type="checkbox"/>	Smaller reporting company	<input checked="" type="checkbox"/>
		Emerging growth company	<input type="checkbox"/>

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 has filed a report on and attestation to its management's assessment of the effectiveness of its internal control over financial reporting under Section 404(b) of the Sarbanes-Oxley Act (15 U.S.C. 7262(b)) by the registered public accounting firm that prepared or issued its audit report.

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, 2021 was \$27,240,325 as of such date.

The number of shares outstanding of the registrant's common stock, par value \$.01, as of March 31, 2022 was 48,893,573.

DOCUMENTS INCORPORATED BY REFERENCE

None.

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PART I

Item 1. General

Company Background

Nanophase Technologies Corporation (“Nanophase,” “Company,” “we,” “our,” or “us”), along with its wholly owned subsidiary, Solésence, LLC (our “Solésence beauty science subsidiary”), is a leading innovator in minerals-based and scientifically-driven health care solutions across beauty and life science categories, protecting skin from environmental aggressors and aiding in medical diagnostics. Skin health and medical diagnostics combined currently make up the great majority of our business and drive our forward growth strategy, with additional revenue being generated from other legacy advanced materials applications. 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.

Leveraging a platform of integrated patented and proprietary technologies, we create products with unique performance to enhance end-consumers’ health and well-being. We offer soup-to-nuts production, from engineered materials, formulation development, and finished product development, to commercial manufacturing and packaging capabilities. Our expertise in materials engineering allows us to effectively coat and disperse materials on a nano and “non-nano” scale for use in a variety of markets in skin health, including for use in sunscreens as Active Pharmaceutical Ingredients (“APIs”) and as fully developed prestige skin care products—marketed and sold through our Solésence beauty science subsidiary. We believe that we have developed technological advantages with respect to our APIs sold for use as ingredients, while our Solésence beauty science technologies lead to enhanced efficacy and aesthetics in our finished products, which have received broad acceptance in the marketplace. Due to the enhanced efficacy and aesthetic qualities offered by our proprietary technology platform, Solésence finished products satisfy growing consumer demands around “clean” and inclusive beauty. Solésence beauty science also benefits from the Company’s vertical integration with each product’s key active ingredient that delivers its point-of-difference. This vertical integration helps us to improve efficiency and avoid potential major supply chain challenges while also addressing ongoing sustainability efforts.

We have seen recent conditions significantly increase demand for our medical diagnostics materials. Polymerase Chain Reaction (“PCR”) testing for various viruses, most notably SARS-CoV-2 (“COVID-19”), has become a critical use of our technology in the life science space. While we saw reduced demand for these materials in 2021, when compared to 2020, it is difficult to predict whether the increased demand for our medical diagnostic materials used in COVID-19 testing will expand to establish a new “floor” as we continue through the currently unprecedented period of testing and awareness of the way viruses impact all of us. We believe that our deep expertise in materials science has created advantages that enable performance in certain tests that may not be achievable through other materials. Outside of life science, we continue to sell advanced materials for use in legacy applications, all of which, along with medical diagnostics, currently fall into the advanced materials product category.

Given our technological position, in addition to the historical market acceptance of our APIs for use in skin health products and sunscreens, rapidly growing sales for our suite of Solésence® finished products, and the expanded use of our diagnostic materials in aiding the fight to curb the spread of COVID-19 and other viruses, in 2021 we announced that we reoriented our Company strategy. We continue to see unprecedented demand in both beauty science and life science areas. The markets for both have shown an appetite for what we are producing, and management believes that this growth is happening now due to a confluence of our technology, market conditions that favor what we produce, and our expanded expertise in these areas.

Nanophase, and Solésence, is now focusing our combined business-, ingredient-, and product-development capabilities on products with unique performance that enhance consumers’ wellbeing through beauty science and life science applications — in skin health and medical diagnostics, respectively. While we will continue to produce and sell materials to our other advanced materials customers, it is not our strategic focus. We may develop additional technologies, or find unique applications outside of our core markets in the future, but to maximize the use of our resources today, we plan on expanding efforts in areas where we have proven we can deliver innovation and growth.

Solésence Beauty Science Business

In 2020, Solésence beauty science surpassed our personal care ingredients business in terms of total revenue, and in 2021, Solésence beauty science more than doubled our revenue from personal care ingredients. We believe that Solésence offers the greatest growth potential of any group of products in any market in the Company’s history. Our volumes are continuing to grow, limited mainly by our capacity. We expect our Solésence volume, based on 2022 shipments and customer orders in-hand, to exceed full year 2021 volume.

The extent to which we grow will be dependent upon our ability to effectively expand our capabilities during the first two quarters of 2022. As a result, we have made significant investments in facilities and equipment as well as in human resources, both in Q4 2021 and so far in Q1 2022. We are prioritizing facilities expansion, human resources, and capital investment in this business to allow for continued, profitable growth.

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 2017. We now offer a suite of three technologies under our Active Stress Defense™ platform, each of which offers a distinct market advantage in terms of performance, aesthetics, and/or “clean” positioning in UV and environmental protection, with flexible formulas that allow for adoption by a range of brands with different market positions. We continue to develop and expand our in-house formulating capability, through which we have created, and now sold, more than 250 SKUs of fully formulated finished cosmetics products in markets focused on skin health, with the majority in prestige beauty. Products developed and sold by our Solésence beauty science subsidiary are all produced under the requirements of current Good Manufacturing Standards (“cGMP”), as enforced by the U.S. Food and Drug Administration (“FDA”), which enables us to leverage the expertise we developed in the manufacture of personal care ingredients. 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 brand partners 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. In early 2022, Solésence (through Nanophase, as its parent company) was granted site clearance by Australia’s Therapeutic Goods Administration (“TGA”) for the full finished product manufacture of creams, lotions, sprays, sticks and all topical sunscreen forms. TGA site clearance is legally required for brands to market Solésence-made products as primary sunscreens in Australia. Our initial focus will be on establishing a footprint with both new and existing Solésence brand partners, to enable the sale of our patented skin health products as primary sunscreens.

Personal Care Ingredients Business

Historically, our largest line of business has been the manufacture and sale of APIs in the skin health and sun care markets, which we deliver to customers through strategic partnerships. We manufacture and supply hundreds of metric tons of surface engineered zinc oxide and titanium dioxide to our customers annually, and these are used by major global consumer products companies for sunscreens and skin health-focused personal care products. We produce these products using proprietary coating and dispersion technologies that comply with the requirements of cGMP and are classified as Active Pharmaceutical Ingredients, or APIs, by the FDA. We believe we have strong opportunities for growth in API sales in 2022.

Advanced Materials Business

Our third line of business has been the manufacture and sale of advanced nanoparticle materials, including a material used in life science applications to enhance the performance of PCR test methods. Given the high level of demand for our medical diagnostics material, this now composes the majority of our advanced materials business. We continue to service other profitable markets where we have had a degree of success in the past, including applications in food packaging, coatings and optical polishing, but our strategic focus and related future development is in the area of life science and any related applications that may be created as we work to develop future materials to satisfy this growing area.

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. However, we require very high purity zinc for our personal care applications that have occasionally seen shortages in prior years. 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.

Some of the raw materials that are critical to the production of our products and parts that are critical to the operation of our equipment are sourced from single suppliers, suppliers from China and Korea, and in some cases, a single supplier from China. In December 2019, a novel strain of coronavirus (SARS-CoV-2) emerged in Wuhan, Hubei Province, China, which was proclaimed by the World Health Organization to have been the cause of a global pandemic (COVID-19). Although operations of our third-party suppliers were disrupted to a certain extent in 2020 from the pandemic, particularly related to receiving packaging for our Solésence products on a timely basis, by mid-2021, we saw less impact from COVID-19 supply chain issues on our suppliers. As of this writing, parts of China appear to be having delays in shipping exports. We have not yet experienced any feedback from these potential activities through our chain of supply. Given the Russian invasion of Ukraine, we do not anticipate any directly related supply disruptions as we do not knowingly source any materials directly from either country. Beginning in late 2021, and for the near future, we expect labor shortages to be another risk in this regard over which we have limited control. Additionally, we could be disrupted by conditions unrelated to our business operations or that are beyond our control, including but not limited to international trade restrictions and conditions related to COVID-19 or other epidemics. We typically maintain no less than one month’s supply of raw materials and parts that are sourced from sole suppliers and make efforts to identify additional suppliers who may be able to provide such raw materials or parts.

Markets and Distribution

Solésence Beauty Science Business

We develop and manufacture beauty products for our brand partners on a global basis. These products are fully-formulated solutions built around proprietary Solésence technologies, which are aligned with consumer demand for “clean” and inclusive beauty products that enhance skin health. Solésence clients, or brand partners, are positioned in skin care, makeup/cosmetics, and sun care markets, with the majority of our partners operating in the prestige beauty segment with retail, direct-to-consumer, and/or omnichannel strategies. This represents a move downstream from our previous position — one of providing ingredients to manufacturers — to offering finished products that we believe offer a clear and distinct market advantage relative both aesthetics and performance. With our first Solésence beauty science product revenue recognized during 2017, we had our first material amounts of Solésence product revenue in 2018, and saw significant expansion in these sales during 2020 and 2021. Solésence brand partners have experienced strong growth as our products have seen broad acceptance from retailers, adoption by consumers, and recognition by third-party media outlets through awards and accolades. We expect our Solésence beauty science business to enhance both our degree of control of the business development cycle, and to further enable our ability to grow rapidly.

Personal Care Ingredients Business

In addition to serving strategic partners 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 annual revenue of approximately \$77 billion, is a “globally leading supplier of sustainable high-performance ingredients for the personal care industry,” with recognized brands, significant revenue, and a broad sales network. BASF is primarily responsible for the business development cycle and maintains the direct customer relationships. We have a long-term exclusive relationship with BASF, primarily to provide nano-scale zinc oxide-based products to be used in personal care cosmetics, with sunscreens and daily wear products being the dominant applications.

Advanced Materials Business

Our technologies for engineering and manufacturing life science materials and other nanomaterials, and our understanding of how to make nano and other advanced materials exhibit desirable performance characteristics in various media, have resulted in commercial materials solutions that we believe offer superior performance in many applications. Medical diagnostics, which we view as being a life science application, was the largest market for our materials in 2020 and 2021, and we expect this to be true for the foreseeable future. This is a key area of focus in advanced materials in terms of new business development. Our legacy markets for advanced materials include architectural coatings, surface treatment (polishing), plastics additives, textiles 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 for life science applications. We believe we are well-positioned with our platform of integrated commercial nanomaterial technologies to respond to this demand, although outside of life science areas, we are currently not actively developing new business in this area.

Research and Development

Most of our research and development over the past few years has been directly related to Solésence beauty science product and personal care ingredient applications development. In 2020 and 2021, we increased development of our medical diagnostics materials as market demand has expanded. 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 materials technologies and/or materials that have the capability to serve multiple beauty or life science 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, 2021 and 2020, was \$2.2 million and \$1.6 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, 2021, we had cumulative research and development expenses of approximately \$5.7 million and cumulative expenditures on equipment and leasehold improvements of approximately \$0.3 million.

Competitive Advantage

In our Solésence beauty science business, our Active Stress Defense™ platform of proprietary technologies offers unique performance-related and aesthetic advantages in environmental protection skin health products, including in UVA/UVB, pollution and HEV (blue) light protection. By combining our proprietary dispersion capabilities and formulation know-how, our Solésence products enable our brand partners to expand the range of products within skin care and color cosmetics categories that can include sun and environmental protection, and their products consequently fill a unique market segment which drives the growing demand for our Solésence products.

In our personal care ingredients business, we believe that targeted collaborations with our long-standing customers in the ingredients space will enable them to have a competitive advantage which will sustain and/or grow their market share in the sunscreen API market. Both the Solesence® beauty science business and the personal care ingredients business have been positively impacted by the growing interest among consumers for mineral-based sunscreens, which management sees as a validation of the Company strategy.

In our advanced materials business, we have created an integrated platform of commercial nanomaterial technologies that are patented, patent-pending or proprietary, and result in products that see end use in a variety of applications, including use in enhancing the performance of PCR testing for various viruses, including COVID-19. These technologies revolve around our two distinct manufacturing process (PVS – Plasma Vapor Synthesis and NAS – NanoArc® Synthesis) and are designed to deliver nano- and advanced-materials solutions 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 allowed us to produce up to several hundred metric tons in this segment annually.

Manufacturing Operations

We currently 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 two existing facilities are registered under the ISO 9001, American National Standard, Quality Management System Requirements, and ISO 14001, American National Standard, Environmental Management System Requirements. We are compliant with cGMP for products under U.S. Food and Drug Administration (“FDA”) regulation, applying to the manufacture of APIs and OTC Finished Dosage Form materials (primarily used in sun protection). We have registered 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”). Currently, we have registered Zinc Oxide, Aluminum Oxide, Iron Oxide and Octyltrimethoxysilane under REACH. We leased a third facility, also in the Chicago area, in late 2021 to be built out for additional manufacturing and warehouse space in 2022 in response to growing demand. Over time, we expect this facility to have similar capabilities and registrations as those in our two current manufacturing facilities.

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. Beginning in late 2019, we also began to employ a significant number of temporary operators to assist us in supporting the production of our Solésence products. Our manufacturing approach, targeted engineering actions, and capital investment have resulted in continuing process innovations and improvements that have reduced the variable manufacturing cost significantly over the past several years, while increasing our capacity to meet demand.

We are committed to a Lean Six Sigma 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 10 U.S. patents and 8 pending U.S. patent applications. We also own 43 foreign patents and patent applications consisting of 33 issued or allowed foreign patents and 10 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.

Competition

Within each of our targeted markets and product applications, we face potential competition from contract manufacturers and developers, 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 on market segments and opportunities where our materials and related technologies are superior to those of our competitors, often due to our abilities to produce highly engineered ingredients to meet specific performance requirements, develop advanced material solutions for customers' specific applications, and in the case of Solésence, finished products that impart the benefits of minerals-based products with superior tactile, visual, and performance characteristics.

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 advanced materials do not always justify a process change or outweigh their frequently higher costs.

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

In addition to competition in the advanced materials and related markets, our Solésence beauty science 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 and manufacturers who seek to serve skin care brands and integrated brands who also manufacture their own products in-house, and we must differentiate our value proposition in order to gain traction in this marketplace. The complexities of sunscreen regulation and the nuances of the development and manufacture of sunscreen products present a barrier for brands with integrated manufacturing in other skin care and cosmetics areas. Still, several Solésence customers have internal development and manufacturing capabilities that are similar to the capabilities of Solésence, and can serve as indirect competition to our products and services. We believe that our Solésence beauty science technology and our expertise in the nuances of formulating products that contain UV protection, coupled with our expanding capability to produce novel formats, will allow us to become a competitive player in this market on a sustainable basis.

Governmental Regulations, Including Climate Change

The manufacture and use of certain of the products that contain Active Pharmaceutical Ingredients 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 also comply with the European Chemical Agency's regulations issued to date pertaining to the chemicals we have registered under REACH. In early 2022, we were granted site clearance by Australia's TGA for the full finished product manufacture of creams, lotions, sprays, sticks and all topical sunscreen forms. TGA site clearance is legally required for brands to market Solésence-made products as primary sunscreens in Australia. Our initial focus will be on establishing a footprint with both new and existing Solésence brand partners, to enable the sale of our patented skin health products as primary sunscreens.

We are committed to environmental health and safety ("EH&S"). We believe we comply with all applicable exposure limit standards issued by the United States Department of Labor's Occupational Health and Safety Administration ("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, 2021, we had a total of 58 full-time employees, 6 of whom hold advanced degrees. Additionally, we have a number of temporary, and temporary-to-permanent employees, typically 90 to 110 on a rotating basis, and a number of 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 Solésence formulated products, personal care ingredients, and advanced materials. We have some agreements that give customers the right to purchase a specific quantity of ingredients during a specified time period. These agreements, however, do not obligate the customers to purchase any minimum quantity of such ingredients. 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, and our medical diagnostics customer, we are seeing the composition of these key customers change with the growth we are experiencing within our Solésence beauty science subsidiary, which has grown to exceed Personal Care Ingredients and Advanced Materials combined. For 2021, total Solésence revenue amounted to \$18.2M or 62% of total revenue compared to \$6.7M, or 39% for 2020. In particular, revenue from five customers across all business areas, our largest customer in personal care applications (BASF), three of our Solésence customers, and, within our advanced materials business, our medical diagnostics application customer, constituted approximately 26%, 19%, 15%, 10%, and 8%, respectively, of our 2021 total revenue.

As our Solésence products continue to represent more of our total revenues, we expect to see a number of smaller (sub-10% of revenue) customers represent a more significant portion of our total revenue. We have experienced this in 2021 and expect it to continue in 2022 and beyond. 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. To reduce the impact of having a high concentration of sales to a limited number of customers, we have aggressively pursued new customers through our market focused business model, and particularly through our Solésence beauty science subsidiary. To the extent we are successful in both 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 management's current beliefs and are based on information now available to it. Accordingly, these statements are subject to certain risks, uncertainties and contingencies that could cause our actual results, performance or achievements in 2022 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 high purity zinc, and other items impacted by supply chain pressures; uncertain demand for, and acceptance of, our Solésence products, and our advanced materials; 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; business interruptions due to unexpected events or public health crises, including viral pandemics such as COVID-19; 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

Not required for a smaller reporting company.

Item 1B. Unresolved Staff Comments

Not required for a smaller reporting company.

Item 2. Properties

We have traditionally operated 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 20,000 square-foot offsite warehouse in the vicinity of the Romeoville facility. At the end of 2021, we leased an additional production facility of 260,000 square-feet in Bolingbrook, Illinois.

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. This facility is 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), filling and assembly of our Solésence[®] products, 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 was extended for one year to end during September 2022, with our option to further extend this lease by two additional one-year periods. We exercised the first lease extension for the Burr Ridge facility in February, 2021. On August 6, 2019 we entered into a new warehouse lease for a different property in Romeoville that began in September 2019 and will end in September 2022, with our option to extend this lease for one additional year.

During December 2021, we entered into a Standard Form Industrial Lease for a new facility in Bolingbrook, Illinois, which, among other things, will end in May of 2032, with options to extend this lease at market rent for each of three concurrent five-year periods.

With the addition of our new Bolingbrook space, we believe that our leased facilities will 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 we will be able to expand certain operations, and consolidate others, to support additional growth in an economically efficient manner. We believe that our capital expenditures made in 2021, and projected for 2022, will support currently anticipated demand from existing and expected customers through 2022 and in to 2023. Management will spend considerable time in 2022 determining how best to optimize our facilities to maximize growth over the next few years. 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:

	<u>High</u>	<u>Low</u>
Fiscal year ended December 31, 2021:		
First Quarter	\$ 1.26	\$ 0.74
Second Quarter	1.76	1.15
Third Quarter	2.77	1.52
Fourth Quarter	4.45	2.46
Fiscal year ended December 31, 2020:		
First Quarter	\$ 0.49	\$ 0.21
Second Quarter	0.56	0.17
Third Quarter	0.65	0.32
Fourth Quarter	0.95	0.55

On March 25, 2022, the last reported sale price of our common stock was \$3.12 per share, and there were 120 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 Agreements with Beachcorp, LLC (“Beachcorp”), Strandler, LLC (“Strandler”), and Libertyville Bank and Trust Company (“Libertyville”), dated as of November 19, 2018, January 28, 2022, and December 21, 2021 respectively, require us to obtain the written consent of the lender 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 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 health-oriented, science-driven company, which, along with its wholly owned subsidiary, Solésence, LLC (our “Solésence beauty science subsidiary”), is focused in various beauty- and life-science markets. Our primary skin health products are fully developed prestige skin care formulations with mineral-based UV protection, marketed and sold through our Solésence beauty science subsidiary, enabled by our proprietary Active Pharmaceutical Ingredients (“APIs”) which are also marketed as APIs for sale to manufacturers of other types of skin health products, including sunscreens and daily care products. In terms of the balance of our life sciences focus, we have seen current conditions significantly increase demand for our medical diagnostics ingredients, which are used in testing for various viruses, most notably COVID-19. Additionally, we continue to sell products in legacy markets including architectural coatings, industrial coating applications, abrasion-resistant additives, plastics additives, and surface finishing technologies (polishing) applications— all of which, along with medical diagnostics, currently fall into the advanced materials product category.

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.

Other critical estimates include the allowance for doubtful accounts applied against our receivables balance as well as an inventory reserve. In the determination of a reserve to apply toward receivables, management considered provisions in FASB ASC 450-20-25 regarding the recognition of loss contingencies and applied a reserve balance against gross receivables to arrive at the net reported balance. Under the guidance referenced above, management judgmentally applied an estimate of the portion of gross receivables for which loss is both probable and can be reasonably estimated and accrued a loss contingency by a charge to income. A \$60,000 and \$9,000 bad debt reserve was applied to gross receivables for 2021 and 2020, respectively. Particularly with respect to customers of our Solésence beauty science subsidiary, it can be difficult to estimate collectability. We frequently require significant deposits from customers before ordering materials and scheduling production. This serves as a good indicator of the customer’s wherewithal to pay for the balance of the product when shipped. In cases where it is difficult to establish creditworthiness, we require payment of the full amount before we ship. Notwithstanding these credit security measures, we frequently find that pay cycles get extended for reasons that can be outside of our control. The nature of the business is that there are many product launches, often by smaller or start-up companies, that may not result in initial commercial success. This has resulted in extensions of payment terms, but collectability has ultimately occurred in most cases. As our Solésence beauty science subsidiary grows, we will monitor this closely and adjust estimates as necessary.

Management also monitors the value of inventory for the effects of aging, obsolescence, and seasonality. Consistent with the provisions in FASB ASC 330-10-35, we adjust inventory valuation upon management’s determination that the net realizable value of our inventory, which applies the average cost method, is lower than its historic cost. In the application of this policy in 2021, management deemed a portion of inventory will likely experience such an impairment and elected to apply a \$406,000 inventory reserve in anticipation. Some of the materials in question are nearing expiration and therefore more difficult to sell, some represent soon-to-be obsolete products, and some are raw materials that we no longer use regularly.

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. While we have seen costs increase on an inflationary basis as we enter 2022, it is our belief that we will be able to offset much of this cost as we gain greater production efficiencies and seek to increase our pricing where possible.

Results of Operations

Years Ended December 31, 2021 and 2020

Total revenue increased to \$29,475,000 in 2021, compared to \$17,123,000 in 2020. 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, finished skin health products marketed through our Solésence beauty science subsidiary, and medical diagnostics. Product revenue, the primary component of our total revenue, increased to \$29,325,000 in 2021, compared to \$16,422,000 in 2020. This increase was due to rapid growth in the adoption of our Solésence® products, and growth in 2021 sales to our largest customer in our personal care ingredients business, offset by a decrease in revenue from our medical diagnostics materials customer (within our advanced materials business).

Current Significant Customers

	2021	2020
Largest Personal Care Customer	26%	30%
Solésence Customer - 1	19%	14%
Solésence Customer - 2	15%	11%
Solésence Customer - 3	10%	5%
Medical Diagnostics Customer	8%	20%
Significant Customer Total	<u>78%</u>	<u>80%</u>

Cost of revenue generally includes costs associated with commercial production and customer development arrangements. Cost of revenue increased to \$20,785,000 in 2021, compared to \$11,133,000 in 2020. The increase in cost of revenue was primarily driven by the rapid increases in product revenue volume, with attendant inefficiencies caused by hitting capacity limits in various critical processes. Lower-than-expected volume in the fourth quarter of 2021, write-downs of obsolete inventory, reduction in contract revenue (which generally has little direct cost associated with it), and changes in product mix added to relative increases in cost of revenue. While gross margin dollars increased by approximately \$2,700,000, all of these factors contributed to a reduction of overall gross margin percentage by 6% when compared to 2020. We expect to continue new materials development and dispersion technologies for personal care applications and for our formulated Solésence products during 2022 and beyond, as part of our business model. At current revenue levels we have generated a positive gross margin, though margins can be impeded by the cyclicity of our demand, often leading to the Company 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 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 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 and cost and wage inflation, but may or may not realize gross margin percentage growth through 2022 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, advancement of our medical diagnostics ingredient knowledge, and the cost of enhancing our manufacturing processes. As an example, we are currently focusing the bulk of our resources on developing new product formulations, and related new technologies, 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 materials technologies and/or materials that have the capability to serve multiple skin health-related markets; and 3) continuing to improve our core technologies to improve manufacturing operations and reduce costs.

Research and development expense increased to \$2,235,000 in 2021, compared to \$1,571,000 in 2020. The primary reasons for this were increases in compensation expense and headcount, outside testing, and materials charges associated with the development and launch of our Solésence line of personal care products and related capabilities. We expect expenses for research and development to expand 50% or more, depending on both growth in our Solésence line of products, and related technologies. This expense growth will be dependent upon the success we have in developing new products, which adds significantly to outside testing fees to both enhance product development and comply with regulatory requirements.

Selling, general and administrative expense increased to \$3,896,000 in 2021, compared to \$2,934,000 in 2020. The net increase was primarily attributed to an increase in compensation expense and headcount, including consultants, and increases in marketing and trade show expense, which began again in late 2021. We expect 2022 expenses in this area to be higher, potentially as much as 30% to 35%, if growth continues as planned. We will be expanding our selling and marketing efforts, and parts of our administrative functions, including related staffing additions. The extent to which this increase occurs will be dependent upon growth.

Interest expense was \$1,154,000 in 2021, compared to \$496,000 in 2020, due largely to the remaining discount-related interest expense, amounting to \$814,000, taken on an accelerated basis in May 2021 at the early conversion of our \$2,000,000 Convertible Note. The balance of interest expense for 2020 and 2021 related to interest paid relating to our revolving line of credit for working capital funding, and finance leases and term loans supporting some of our equipment.

In Company-wide operations, we believe inflation has not had a material effect on our operations or financial position for 2021, although we have seen increases in our costs broadly, beginning in the fourth quarter. We expect 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 2022 and beyond. We will apply our best efforts to pass through any significant cost increases to our customers. If we are unable to pass through any increases due to contractual limitations or conditions in our markets specifically, this could reduce margins and net income.

Liquidity and Capital Resources

Cash, cash proceeds and use of cash for 2021 and 2020 were:

	For the year ended December 31,	
	2021	2020
Total cash	\$ 657,000	\$ 957,000
Cash provided by (used in) operating activities	2,321,000	(2,061,000)
Net cash (used in) investing activities	(1,874,000)	(878,000)
Net cash (used in) provided by financing activities	(747,000)	2,702,000

The \$4,382,000 year-over-year increase in cash provided by operating activities for the year ended December 31, 2021 was mainly due to the Company generating \$2,320,000 in net income in 2021 compared to \$989,000 in 2020. Cash capital expenditures amounted to approximately \$1,874,000 and \$878,000 for the years ended December 31, 2021 and 2020, respectively. We did not dispose of or sell any assets during 2021 or 2020.

On April 17, 2020, we received a loan of \$952,000 from the Libertyville Bank and Trust Company (“Libertyville”) under the Paycheck Protection Program (the “PPP”). This loan was forgiven by the Small Business Administration (“SBA”) in February 2021. These funds specifically were used to absorb a portion of the Company’s salary and benefit costs.

The Company maintains a credit agreement with Libertyville which most recently served the primary purpose of insuring that it met its cash balance requirements at quarter end relating to a contract with the Company’s largest customer. Outstanding borrowings were \$500,000 on this line of credit as of December 31, 2020. On December 21, 2021, this facility was converted for use support our obligations under our newly leased manufacturing and warehouse space in Bolingbrook, Illinois. This credit agreement has a maturity of December 22, 2022.

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, 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 “A/R 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 a maturity of March 31, 2020, as amended. On March 23, 2020, the Company and Beachcorp, LLC executed the First Amendment to our Master Agreement that extended the maturities of both the Term Loan and the A/R Revolver Facility to March 31, 2021. Effective September 8, 2020, the Company and Beachcorp, LLC executed the Second Amendment to our Master Agreement that expanded the limit on the A/R Revolver Facility from \$2,000,000 to \$2,750,000. On December 23, 2020, the Company and Beachcorp, LLC executed the Third Amendment to our Master Agreement that expanded the limit on the A/R Revolver Facility from \$2,750,000 to \$4,000,000 and extended the maturities of both the Term Loan and the A/R Revolver Facility to March 31, 2022. Effective April 21, 2021 the Company and Beachcorp, LLC executed the Fourth Amendment to our Master Agreement that expanded the limit on the A/R Revolver Facility from \$4,000,000 to \$6,000,000, changed the interest rate to fully floating and reduced the rate to the prime rate plus 2%, also extending the maturity of the A/R Revolver Facility to March 31, 2023. This amendment also increased the amount of the Term Loan from \$500,000 to \$1,000,000, changed the interest rate to fully floating and reduced the rate to the prime rate plus 2%. The maturity of the Term Loan remained March 31, 2022.

The Term Loan and A/R 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 restricted the Company's ability to incur additional indebtedness during the terms of the Term Loan, the Revolver Facility, and the Convertible Promissory Note.

In November 2019, we entered in to a 2% Convertible Promissory Note in the original principal amount of \$2,000,000. The maturity date of this note was May 15, 2024, and was payable to our investor at that time in cash, or through conversion of the rights to purchase up to 10,000,000 unregistered shares of the Company's common stock at \$0.20 per share. Our investor chose to exercise his conversion rights effective May 7, 2021.

On December 31, 2021, the balances on the Term Loan and the Convertible Promissory Note were \$1,000,000 and \$0, respectively, and the balance on the Revolver Facility was \$1,351,000. On December 31, 2020, the balances on the Term Loan and the Convertible Promissory Note were \$500,000 and \$2,000,000, respectively, and the balance on the A/R Revolver Facility was \$2,155,000.

On April 17, 2020, we received a loan of \$952,000 from Libertyville under the PPP. Under the PPP, the Company could apply for forgiveness of the amount due on the loan in an amount equal to the sum of the following costs incurred during the 24-week period beginning on the date of the first disbursement of the Loan: (a) payroll costs, (b) any payment of interest on a covered obligation (which shall not include any prepayment of or payment of principal on a covered mortgage obligation), (c) any payment on a covered rent obligation, and (d) any covered utility payment, calculated in accordance with the terms of the CARES Act. The principal amount of the PPP Note would have accrued interest at the rate of 1.00% per year. Management applied for loan forgiveness in February 2021 and the loan was forgiven shortly thereafter during the first quarter of 2021. Under the terms of the PPP loan, it could be subject to audit for six years from the date of forgiveness. If any portion of the PPP loan were to be deemed ineligible, the Company could be required to repay the funds. On December 31, 2021, the balance under the PPP note was \$0.

On January 28, 2022, to support the working capital demands created by the commercial growth of the Company and its wholly owned subsidiary, Solésence, LLC, the Company entered into (i) an Amended and Restated Business Loan Agreement (the "A&R Loan Agreement"), which amends and restates the Master Agreement, (ii) a Business Loan Agreement (the "New Term Loan Agreement") with Strandler, LLC, (iii) a Business Loan Agreement (the "New Revolving Loan Agreement" and together with the A&R Loan Agreement and the New Term Loan Agreement, the "Loan Agreements") with Beachcorp, LLC, and (iv) three promissory notes in order to evidence the loans pursuant to the Loan Agreements (the "Notes"). Beachcorp, LLC and Strandler, LLC are affiliates of Mr. Bradford T. Whitmore, who beneficially owns a majority of the Company's common stock and is the brother of Ms. R. Janet Whitmore, a director of the Company and the chair of the Company's board of directors.

The Loan Agreements change the terms of both the Company's asset-based revolving loan facility (the "A/R Revolver Facility") and the secured advance (the "Term Loan", which was assigned from Beachcorp, LLC to Strandler, LLC) under the Master Agreement and provide a new asset-based revolving loan facility based on inventory (the "Inventory Facility"). The maximum borrowing amount under the A/R Revolver Facility increases from \$6,000,000 to \$8,000,000, with a borrowing base consisting of qualified accounts receivable of the Company. The maximum borrowing amount under the Inventory Facility is \$4,000,000, with a borrowing base consisting of up to 50% of the value of qualified inventory of the Company. The Loan Agreements also extend the date for which all principal and accrued interest under the A/R Revolver Facility and the Term Loan are due from March 31, 2023 and March 31, 2022, respectively, to March 31, 2024, which is also the maturity date for the Inventory Facility. The Loan Agreements reduce interest on outstanding borrowings under the A/R Revolver Facility and the Term Loan from the prime rate plus 2% and 5.25% per year, to a floating rate equal to the prime rate plus 0.75%, which is also the interest rate for borrowings under the Inventory Facility. The amount of the Term Loan remains \$1,000,000. The A/R Revolver Facility, the Inventory Facility and the Term Loan are all secured by all the unencumbered assets of the Company and subordinated to the Company's revolving line of credit with Libertyville Bank & Trust.

For more information regarding the New Business Loan Agreement, see Note 3 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 required 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 could 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. We were in compliance with these covenants at December 31, 2020. This financial trigger was removed when the Company achieved cumulative net earnings in excess of \$1.5 million, as defined, during the second quarter of 2021. This supply agreement and its covenants are more fully described in Note 12, and our line of credit is more fully described in Note 3, to our Financial Statements referred to in Part II, Item 8, of this Annual Report on Form 10-K.

Our actual future capital requirements in 2022 and beyond will depend on many factors, including customer acceptance of our current and potential finished Solésence products, APIs sold as ingredients in to the skin health markets, medical diagnostics ingredients, and other 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 these products and ingredients. 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 2022 will be between \$4 million and \$8 million, to be funded by profit from operations, our existing loans and lines of credit, and possible new debt financing. 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 expect our capital expenditures may fall below the lower end of the range. Similarly, substantial success in business development projects may cause the actual 2022 capital investment to exceed the top of this range.

The Company currently has two areas within its strategic plan that will result in material cash requirements that could have an impact on operations. We have several operating leases (see note 6 to the financial statements) for our facilities that require us to increase our cash outlays for facilities expenses significantly beginning in 2022. The new 260,000 square foot facility we leased in December 2021 exceeds our current needs for space considerably. We are growing rapidly and continue to expect significant growth going forward. We will also consolidate some of our facilities to mitigate costs. Our view was that a lack of space would have hindered our ability to continue to grow, as well as making it difficult to satisfy existing customer demands on a timely basis if we couldn't expand our production footprint. We have estimated our future growth through a combination of industry experience, customer feedback, market intelligence, and our successful history in commercializing new products. Sales of our Solésence products have roughly tripled between 2019 and 2021, and tripled again in 2021 to have reached \$18 million annually. We expect this growth to continue, albeit at less than a multiple of each year's sales going forward. Many of these estimates are qualitative in nature, but are informed by experience. If we were to not grow more than incrementally in 2022 and 2023, we would need to re-evaluate our expansion strategy in light of the increases in our facilities costs that extend for as much as ten years in to the future. Similarly, our capital spending plan for 2022 will amount to between \$4 million and \$8 million. We expect our capital spending to increase further in 2023 and 2024. At December 31, 2021, our commitments to equipment suppliers relate mainly to the \$1.1 million of construction in progress, much of which reflects deposits on to-be-delivered equipment. We estimate the unpaid committed capital relating to capital spending to be less than \$1 million as of December 31, 2021.

We have federal net operating loss carryforwards for tax purposes of approximately \$62 million on December 31, 2021. Because the Company may experience "ownership changes" within the meaning of the U.S. Internal Revenue Code ("IRC") in connection with any future equity offerings, future utilization of this carryforward may be subject to certain limitations as defined by the IRC. If not utilized, \$57 million of this loss carryforward will expire between 2022 and 2037. Given changes to the IRC, net operating loss carryforwards generated after January 1, 2018 do not expire, therefore, \$5 million in net operating losses generated since January 1, 2018 do not expire. We have Illinois net loss deduction carryforwards for tax purposes of approximately \$21 million on December 31, 2021. Due to the provisions of Illinois Public Act 102-0669 signed November 16, 2021, Illinois net loss deductions expire between 2029 and 2039.

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.

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-20 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.

Through the course of our evaluation of our internal control over financial reporting, we advised our Board of Directors that we had identified a material weakness as defined under standards established by the Public Company Accounting Oversight Board (United States). A material weakness is a deficiency, or combination of deficiencies, in internal control over financial reporting, such that there is a reasonable possibility that a material misstatement of the Company's annual or interim financial statements will not be prevented or detected on a timely basis. The material weakness we identified is discussed in "Internal Control Over Financial Reporting" below. Our Chief Executive Officer, Chief Financial Officer (which roles are currently filled by the same person), and Chief Operating Officer have concluded that as a result of the material weakness, as of the end of the period covered by this Annual Report on Form 10-K, our Disclosure Controls were not effective.

Notwithstanding such material weakness in internal control over financial reporting, our management concluded that our consolidated financial statements in this Annual Report on Form 10-K present fairly, in all material respects, the Company's financial position, results of operations and cash flows as of the dates, and for the periods presented, in conformity with U.S. generally accepted accounting principles ("U.S. GAAP"), and include certain amounts based on management's judgment and best estimates. Other financial information presented is consistent with the financial statements.

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. 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, 2021. 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 ("COSO"). Because of the material weakness described above, management concluded that, as of December 31, 2021 our internal control over financial reporting was not effective based on the criteria established in Internal Control-Integrated Framework issued by COSO.

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) (which roles are currently filled by the same person), and our Chief Operating Officer, concluded that there is a material weakness in our internal control over financial reporting. The above material weakness identified did not result in a material misstatement of our previously issued financial statements, nor does management believe that it had any effect on the accuracy of the Company's financial statements for the current reporting period, however, it could result in a misstatement of our account balances or disclosures that would result in a material misstatement of our annual or interim financial statements that would not be prevented or detected.

Management has identified a material weakness in the way the Company tracks and accounts for its inventory. Controls were not effectively designed, documented, and maintained to verify that the existence of all inventories subject to physical inventory counts were correctly counted, and our process for compiling and communicating inventory data to ensure accurate reporting in our financial statements was not effective, including inadequate verification for completeness and accuracy of key reports used to review and monitor inventory balances. A consequence of this was that the process of conducting a full physical inventory required an inordinate amount of time to establish an accurate valuation.

Remediation Activities. In order to address the material weakness in internal control over financial reporting described above, management, with direction from the Audit Committee, has begun the process of remediation to address control deficiencies that led to the material weakness. Specifically, management will:

- Continue discussions with third party experts, then engage one of them to assist management in completing a comprehensive risk assessment to identify, design and implement best practices for its supply chain and inventory control policies; and
- Begin reviewing and enhancing business policies, procedures, and related internal controls to standardize business processes throughout the organization.

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, 2021 that has materially affected, or is reasonably likely to materially affect, the Company's internal control over financial reporting.

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.

Item 9B. Other Information

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	Director Since	Term Expires	Class
R. Janet Whitmore	67	Chair of the Board of Directors	2003	2022	I
Laura M. Beres	38	Director	2020	2022	I
Richard W. Siegel, Ph.D.	84	Director	1989	2023	II
Jess A. Jankowski	56	President, Chief Executive Officer, Chief Financial Officer, and Director	2009	2024	III

Ms. Whitmore joined the board in November 2003. She is a former director of Silverleaf Resorts, Inc., where she served as Chair 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, and herself beneficially owned approximately 3% of the outstanding shares of our common stock as of March 31, 2022. Mr. Whitmore, together with his affiliates Strandler, LLC, Grace Brothers, Ltd. and Grace Investments, Ltd., beneficially owned approximately 62% of the outstanding shares of our common stock as of March 31, 2022. He is also the manager of Beachcorp, LLC. The Company has entered into loan agreements with both Beachcorp, LLC, and Strandler, LLC.

Ms. Beres has served as a director of the Company since October 2020. She has spent her career in corporate strategy and operations in retail and consumer industries, transforming programs and building new organizational and market-facing capabilities. Ms. Beres currently serves as Vice President, Enterprise Transformation at Ulta Beauty, where she leads the company's investment portfolio, aimed at accelerating growth and the company's strategic goals. She established and led the Conscious Beauty program, a holistic project that offers enhanced transparency and choice around clean ingredients and sustainability. Previously, she has worked at Deloitte Consulting, advising primarily on growth and transformation strategies in Consumer-Packaged Goods, with additional leadership roles in the CMO practice, developing and executing strategies on large global accounts. Ms. Beres started her career working in the financial services, focused on small and middle market companies, with responsibilities including commercial lending and credit evaluation, and credit transaction negotiation. She earned her M.B.A. from The University of Chicago Booth School of Business, and has a B.S. in Finance and B.A. in Oboe Performance from Butler University. Ms. Beres has also served on Associate and Auxiliary Boards for non-profit organizations in Chicago, as well as the Board of Directors for Chicago Youth Symphony Orchestras. We believe that Ms. Beres' broad strategic experience in CPG, and specific experience with cosmetics, along with her strong financial background makes her 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 was the Robert W. Hunt Professor in Materials Science and Engineering at Rensselaer Polytechnic Institute from June 1995 until his retirement from RPI at the end of 2021, 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. Jankowski joined the board in February 2009. He has served as the Company’s President and Chief Executive Officer since that time. He is currently serving as the Company’s Chief Financial Officer, in addition to his existing role. 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, the markets in which it competes, along with his financial and management expertise, makes him a valuable member of our Board of Directors.

Meetings of the Board and Committees During the year ended December 31, 2021, the Board of Directors (“BOD”) held eleven meetings. All directors attended all meetings of the BOD and related committee meetings in 2021.

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 current members of the Audit and Finance Committee are Ms. Whitmore (Chair), Ms. Beres, and Dr. Siegel. The members of the Compensation Committee are Ms. Whitmore (Chair), Ms. Beres, and Dr. Siegel. The members of the Nominating and Corporate Governance Committee are Ms. Whitmore (Chair), Ms. Beres, and Dr. Siegel.

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 six meetings during 2021. The Board of Directors has determined that Ms. Whitmore is an “audit committee financial expert” as described in applicable SEC rules. The Board of Directors has not determined affirmatively that Ms. Whitmore is independent under the Nasdaq Stock Market rules, but such rules are inapplicable to the Company because the Company is no longer listed on Nasdaq.

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 2019 Equity Compensation Plan (the “2019 Equity Plan”), determining the number of options, if any, to be granted to the Company’s employees and consultants pursuant to the 2019 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 four meetings during 2021. Each member of the Compensation Committee 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. The Nominating and Corporate Governance Committee held two meetings during 2021.

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 board Chair 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 Board Chair are held by two individuals – Ms. Whitmore serves as Chair and Mr. Jankowski serves as CEO. Ms. Whitmore brings extensive experience in corporate leadership from her own working experience and from a number of boards on which she has served in the past, and Mr. Jankowski is expected to benefit from that experience. The Board of Directors believes this to be the most appropriate structure for the Company at this time. Under our Corporate Governance Principles, in the event that the Chair 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	60	Chief Operating Officer

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, and became the Company’s Chief Operating Officer in December 2019. 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 Bachelor of Science in chemical engineering from Carnegie Mellon University and an M.B.A. from the University of Chicago Booth School of Business.

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 and Cureton 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.

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, 2021 and 2020.

Name and Principal Position	Year	Salary (\$)	Bonus (\$ (1))	Option Awards (\$ (2))	Non-Equity Incentive Plan Compensation (\$ (3))	All Other Compensation (\$ (4))	Total (\$)
Jess Jankowski	2021	\$ 319,410	\$ —	\$ 234,580	\$ —	\$ 30,321	\$ 584,311
Chief Executive Officer	2020	\$ 319,250	\$ 79,813	\$ 24,876	\$ —	\$ 18,147	\$ 442,086
Kevin Cureton	2021	\$ 269,325	\$ —	\$ 234,580	\$ —	\$ 20,109	\$ 524,014
Chief Operating Officer	2020	\$ 247,500	\$ 60,750	\$ 24,876	\$ —	\$ 11,846	\$ 344,972

(1) Any amounts earned during 2021 and 2020 would typically have been paid in early-to-mid 2022 and 2021, respectively. Bonus compensation is driven by Company performance against its goals as ultimately determined by the Compensation Committee of the Board of Directors (“Compensation Committee”). 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. Management met a number of its performance milestones in 2021, which will be fully evaluated by the Compensation Committee and paid, to whatever extent is deemed appropriate, during the second quarter of 2022. Although the Solésence business achieved many critical milestones in 2020, the Compensation Committee felt that 2020 performance goals could not be judged properly until first quarter 2021 performance was complete. The bonuses for 2020 performance were paid during the second quarter of 2021.

- (2) The amounts in this column represent the aggregate grant date fair value of awards granted in 2021 and 2020 in accordance with FASB ASC Topic 718. See Note 11 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 \$15,242 during 2021 and \$4,305 during 2020), and the value of the Company portion of the health and life insurance. Health insurance benefits are the same for all employees. Life insurance is provided to all employees in the amount of the employee's annual base salary, capped at a maximum of \$150,000.

Employment Agreements

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

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

Mr. Jankowski will be eligible for such stock options and other equity compensation as the Board deems appropriate, subject to the provisions of the 2019 Equity Compensation 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 2019 Equity Compensation. 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 2019 Equity Compensation 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), then, subject to Mr. Cureton signing, without revoking, a separation agreement and release in a form acceptable to us, 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 2019 Equity Compensation Plan. A signing bonus of \$25,000 was paid upon Mr. Cureton's acceptance of employment.

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, 2021.

Name	Option Awards				Stock Awards	
	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	98,000	-0-	\$ 0.30	08/07/22		
	90,000	-0-	\$ 0.42	02/14/23		
	90,000	-0-	\$ 0.52	02/13/24		
	81,000	-0-	\$ 0.44	02/18/25		
	69,000	-0-	\$ 0.42	02/23/26		
	81,000	-0-	\$ 0.68	02/21/27		
	90,000	-0-	\$ 0.82	05/23/28		
	11,000	5,500(1)	\$ 0.51	05/22/29		
	30,000	60,000(2)	\$ 0.45	06/18/27		
	-0-	90,000(3)	\$ 4.17	12/28/28	—	—
Kevin Cureton	25,000	-0-	\$ 0.52	02/13/24		
	50,000	-0-	\$ 0.44	02/18/25		
	43,500	-0-	\$ 0.42	02/23/26		
	50,000	-0-	\$ 0.68	02/21/27		
	80,000	-0-	\$ 0.82	05/23/28		
	11,000	5,500(1)	\$ 0.51	05/22/29		
	30,000	60,000(2)	\$ 0.45	06/18/27		
	-0-	90,000(3)	\$ 4.17	12/28/28	—	—

(1) These grants expiring May 22, 2029 vest in three equal installments on May 22, 2020, 2021, and 2022.

(2) These grants expiring June 18, 2027 vest in three equal installments on June 18, 2021, 2022, and 2023.

(3) These grants expiring December 28, 2028 vest in three equal installments on December 28, 2022, 2023, and 2024.

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 2019 Equity Compensation 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	Change In	Involuntary
	Company Without	Control	Termination In
	Cause (1)(4)	(2)(4)	Connection With
			or
			Following a
			Change In
			Control (3)(4)
Jess Jankowski	\$ 319,250	\$ 279,095	\$ 917,595
Kevin Cureton	\$ 135,000	\$ 279,095	\$ 414,095

- (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, 2021, including the value of any stock options that would have accelerated vesting in connection with such termination.
- (2) This amount represents an estimate of the value that would have been received under the 2019 Equity Compensation Plan had a change in control occurred as of December 31, 2021, and the executive officers benefited from an acceleration of vesting in the 2019 Equity Compensation Plan awards, as described above.
- (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, 2021 in connection with a change in control on this date.
- (4) In all three columns, for purposes of calculating the value of the acceleration of vesting of equity-based awards relating to a change in control on December 31, 2021, the closing price of our common stock as of December 31, 2021, was used. The amount represents the difference between the exercise price of any unvested options and \$4.40.

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 2021, we paid quarterly compensation to the Chairman of the Board of Directors, for an annual total of \$24,000. Our other three Outside Directors, Ms. Beres, Dr. Siegel, and Mr. Vincent were each paid quarterly compensation for an annual total of \$18,000. This compensation was made solely for services performed by each in their capacities as directors. Dr. Siegel also served on a Scientific Advisory Board, with two other non-employee scientists, for which he was paid \$4,500 in 2021. These meetings are held on an ad-hoc basis and remuneration is currently made to all three non-employee members at \$1,000 per meeting attended.

During the fourth quarter of 2021, we granted our then Outside Directors stock options totaling 50,000 shares under the 2019 Equity Plan, as follows: the Chairman of the Board of Directors received stock options to purchase 20,000 shares of our common stock, while the other two of the then Outside Directors received stock options to purchase 15,000 shares of our common stock. Our current Outside Directors had the following shares of our common stock underlying stock options (both vested and unvested) outstanding as of December 31, 2021: Ms. Whitmore: 131,100 shares; Ms. Beres 25,000 shares; and Dr. Siegel: 121,100 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. In November 2019, the 2010 Equity Plan was consolidated in to the 2019 Equity Compensation Plan.

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

Name	2021 Outside Director Compensation		
	Fees Earned or Paid in		Total (\$)
	Cash (\$)	Option Awards (\$)(1)	
R. Janet Whitmore	\$ 24,000	\$ 52,129	\$ 76,129
Laura M. Beres	\$ 18,000	\$ 39,097	\$ 57,097
Dr. Richard Siegel	\$ 18,000	\$ 39,097	\$ 57,097
George A. Vincent III	\$ 18,000	\$ —	\$ 18,000

(1) The amounts in this column represent the aggregate grant date fair value of awards granted in fiscal 2021 in accordance with FASB ASC Topic 718. See Note 11 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 2019 Equity Compensation Plan (the “2019 Equity Plan”) and our 2010 Equity Compensation Plan (the “2010 Equity Plan”) on December 31, 2021. The 2019 Equity Plan replaced the 2010 Equity 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	3,193,000	\$ 1.18	1,888,000
Plans Not Approved by Shareholders	None	\$ —	None

SECURITY OWNERSHIP OF MANAGEMENT AND PRINCIPAL STOCKHOLDERS

The following table sets forth, as of March 31, 2022 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 named executive officers and directors as a group. There were 48,893,573 shares of common stock outstanding as of March 31, 2022.

Name	Number of Shares Beneficially Owned (1)	Percent of Shares Beneficially Owned
Bradford T. Whitmore	30,278,154 (2)	61.93%
R Janet Whitmore	1,564,821 (3)	3.19%
Jess A. Jankowski	705,500 (4)	1.42%
Richard W. Siegel, Ph.D.	485,938 (5)	*
Kevin Cureton	345,821 (6)	*
Beres, Laura M	3,333 (7)	*
All current executive officers and directors as a group (5 persons)	3,105,413 (8)	6.21%

*Denotes beneficial ownership of less than one percent.

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

- (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 601,410 shares of common stock held by Grace Investments, Ltd., 7,731,573 shares held by Strandler, LLC, and 21,893,717 shares held by Bradford T. Whitmore, as well as 51,454 shares held by his daughter. Mr. Whitmore is a general partner of Grace Investments, Ltd., and manager of Strandler, LLC. In such capacities, Mr. Whitmore shares voting and investment power with respect to the shares of common stock held by the Grace Investments, Ltd., and Strandler, LLC. This information is based on information reported on a Form 4 filed on December 23, 2021 with the SEC. The address of the stockholder is 1603 Orrington Avenue, Suite 900, Evanston, Illinois 60201.
- (3) Includes Ms. Whitmore's 97,766 shares of common stock issuable upon exercise of options exercisable currently or within 60 days of March 31, 2022.
- (4) Includes Mr. Jankowski's 645,500 shares of common stock issuable upon exercise of options exercisable currently or within 60 days of March 31, 2022, as well as 1,000 shares held by his spouse.
- (5) Includes Dr. Siegel's 96,100 shares of common stock issuable upon exercise of options exercisable currently or within 60 days of March 31, 2022.
- (6) Includes Mr. Cureton's 295,000 shares of common stock issuable upon exercise of options exercisable currently or within 60 days of March 31, 2022.
- (7) Includes Ms. Beres' 3,333 shares of common stock issuable upon exercise of options exercisable currently or within 60 days of March 31, 2022.
- (8) Includes all current executive officers and directors as a group's 1,137,699 shares of common stock issuable upon exercise of options exercisable currently or within 60 days of March 31, 2022.

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

We have engaged in a series of debt transactions with Bradford T. Whitmore since January 1, 2020. One of these was for debt with a conversion provision that resulted in the issuance of common shares in May, 2021. Together with his affiliates Grace Brothers, Ltd., Grace Investments, Ltd. and Strandler, LLC, Mr. Whitmore beneficially owned approximately 62% of the outstanding shares of our common stock as of March 31, 2022. Mr. Whitmore is the brother of R. Janet Whitmore, who has been the Chair of the Board of Directors since November 19, 2019 and one of our directors since 2003, and who is also a stockholder. Through his affiliate Beachcorp, LLC, Mr. Whitmore is also a substantial lender to the Company under the Business Loan Agreement, dated November 16, 2018 (see Note 3 to our financial statements included in this Annual Report on Form 10-K).

On November 13, 2019, we entered into a Securities Purchase Agreement (the "SPA") with Mr. Whitmore pursuant to which he agreed to purchase a Convertible Note (see below) from the Company for \$2,000,000 and otherwise including representations, warranties and covenants which are customary for similar transactions. The transactions contemplated by the SPA closed on November 20, 2019. At the closing of the SPA on November 20, 2019, the Company sold to Mr. Whitmore, and Mr. Whitmore purchased from the Company, a 2% Secured Convertible Promissory Note in the original principal amount of \$2,000,000 (the "Convertible Note"), the principal amount of which is payable to the order of Mr. Whitmore and his registered assigns and successors in a single payment on May 15, 2024 (the "Maturity Date"). The principal amount of the Convertible Note accrues interest at the rate of 2.0% per year, which interest is payable semi-annually on the 15th day of May and November, commencing on May 15, 2020. The principal amount and, at the holder's option, accrued interest under the Convertible Note is convertible at the holder's option into additional shares of the Company's common stock in whole or in part and from time to time up to the Maturity Date at a conversion price of \$0.20 per share. The obligations under the Convertible Note were secured by a security interest in all of the Company's personal property pursuant to a Commercial Security Agreement among Mr. Whitmore, the Company and Soléance, LLC, the Company's sole subsidiary. The SPA also amended the Common Stock Purchase Agreement, dated May 13, 2019, between the Company and Mr. Whitmore to add the shares of common stock issuable upon conversion of the Convertible Note to the registration rights granted therein. Mr. Whitmore chose to exercise his conversion rights effective May 7, 2021, requesting that any accrued interest be paid him in the form of shares. In addition to the 10,000,000 shares issued upon conversion, the Company issued 95,555 shares of additional stock to Mr. Whitmore in lieu of cash for the \$19,000 in accrued interest owed at May 7, 2021.

Director Independence. The Board of Directors has determined that the following Company directors are “independent” as that term is defined in the rules and regulations of the SEC and the Nasdaq Stock Market: Ms. Beres and Dr. Siegel. Though we are no longer listed on Nasdaq, our Board of Directors used the Nasdaq listing standards in making its independence determinations. Under the Nasdaq Stock Market rules, the Company would qualify as a “controlled company” because of the direct and indirect ownership of Bradford T. Whitmore. As a controlled company, the Company would be exempt from the requirements under those rules to have a majority of independent directors, to have an independent compensation committee, or to have independent director oversight of director nominations.

The Board of Directors has established an Audit and Finance Committee, Compensation Committee and Nominating and Corporate Governance Committee (the “Standing Committees”). Ms. Whitmore, Ms. Beres, and Dr. Siegel are members of the Standing Committees, and Ms. Whitmore serves as Chair of each committee.

Item 14. Principal Accounting 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, 2021 and 2020 was approximately \$253,000 and \$169,000, respectively. Audit services include the auditing of financial statements and quarterly reviews.

Audit Related Fees. There were \$13,000 and \$0 in audit related fees billed by RSM for the years ended December 31, 2021 and 2020, respectively, 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.

Our independent registered public accounting firm is RSM US LLP, Chicago, IL, Auditor ID: 49

Tax Fees. There were no fees billed by our principal accountant for tax related services for the fiscal years ended December 31, 2021 and 2020.

All Other Fees. Other than those fees described above, during the fiscal years ended December 31, 2021 and 2020, 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 Independent Registered Public Accounting Firm
Consolidated Balance Sheets as of December 31, 2021 and 2020
Consolidated Statements of Operations for the Years Ended December 31, 2021 and 2020
Consolidated Statements of Stockholders' Equity for the Years Ended December 31, 2021 and 2020
Consolidated Statements of Cash Flows for the Years Ended December 31, 2021 and 2020

Notes to Consolidated 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

Shareholders and the Board of Directors
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, 2021 and 2020, 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, 2021 and 2020, 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.

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.

Critical Audit Matter

The critical audit matter communicated below is a matter arising from the current period audit of the financial statements that was communicated or required to be communicated to the audit committee and that: (1) relates to accounts or disclosures that are material to the financial statements and (2) involved our especially challenging, subjective or complex judgments. The communication of a critical audit matter does not alter in any way our opinion on the financial statements, taken as a whole, and we are not, by communicating the critical audit matter below, providing separate opinions on the critical audit matter or on the accounts or disclosures to which they relate.

Going Concern

The Company believes that cash from operations and cash on hand, in addition to unused borrowing capacity, will be adequate to fund operating plans and required debt repayments within one year after the date that the financial statements are issued (or within one year after the date that the financial statements are available to be issued when applicable), therefore there is not substantial doubt regarding the Company's ability to continue as a going concern.

We identified the evaluation of the Company's ability to continue as a going concern as a critical audit matter because of certain significant assumptions management makes when estimating future cash flows. These estimates are subject to significant estimation and execution uncertainty regarding the Company's future cash flows and the risk of bias in management's judgements and assumptions in estimating these cash flows. Auditing these assumptions involved a high degree of auditor judgment and an increase in audit effort due to the impact of these assumptions on the determination of the degree of doubt regarding the ability of the entity to continue as a going concern.

Our audit procedures related to testing management's assessment of the ability of the Company to continue as a going concern included the following, among others:

- We evaluated the forecasted revenues and operating expenses, as well as management's assumptions related to sources and uses of cash for reasonableness. This testing included:
 - Evaluating the impact of the Company's existing financing arrangements on their ability to continue as a going concern, including inspecting amendments to financing arrangements subsequent to December 31, 2021, but prior to the issuance of the financial statements.
 - Developing an understanding of management's expectations for future changes in revenue and expenses through discussions with management and review of budgets.
 - Comparing forecasted revenues and expenses to historical results.
- We evaluated that the disclosures included in the Form 10-K were complete and accurate and in accordance with generally accepted accounting principles in the United States of America.

/s/ RSM US LLP

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

Chicago, Illinois

March 31, 2022

NANOPHASE TECHNOLOGIES CORPORATION

CONSOLIDATED BALANCE SHEETS

	As of December 31,	
	2021	2020
	(in thousands except share and per share data)	
ASSETS		
Current assets:		
Cash	\$ 657	\$ 957
Trade accounts receivable, less allowance for doubtful accounts of \$60 for December 31, 2021, and \$9 for 2020	3,937	2,932
Inventories, net	6,095	4,340
Prepaid expenses and other current assets	910	606
Total current assets	<u>11,599</u>	<u>8,835</u>
Equipment and leasehold improvements, net	4,712	2,868
Operating leases, right of use	12,075	1,827
Other assets, net	8	10
Total Current Assets	<u>\$ 28,394</u>	<u>\$ 13,540</u>
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current liabilities:		
Line of credit, bank	\$ —	\$ 500
Line of credit, related party	1,351	2,155
Current portion of long-term debt, related party	—	500
Current portion of finance lease obligations	105	177
Current portion of operating lease obligations	1,983	431
Accounts payable	3,566	2,126
Current portion of deferred revenue	783	411
Accrued expenses	946	484
Total current liabilities	<u>8,734</u>	<u>6,784</u>
Long-term portion of finance lease obligations	6	110
Long-term portion of operating lease obligations	10,306	1,651
Long-term debt, related party	1,000	—
Long-term convertible loan, related party	—	1,097
PPP Loan (SBA)	—	952
Long-term portion of deferred revenue	661	—
Asset retirement obligations	222	214
Total long-term liabilities	<u>12,195</u>	<u>4,024</u>
Contingent liabilities	<u>—</u>	<u>—</u>
Stockholders' equity:		
Preferred stock, \$.01 par value, 24,088 shares authorized, and no shares issued and outstanding	—	—
Common stock, \$.01 par value, 55,000,000 shares authorized; 48,893,573 and 38,221,292 shares issued and outstanding on December 31, 2021 and December 31, 2020, respectively	489	382
Additional paid-in capital	104,423	102,117
Accumulated deficit	(97,447)	(99,767)
Total stockholders' equity	<u>7,465</u>	<u>2,732</u>
Total liabilities and shareholder's equity	<u>\$ 28,394</u>	<u>\$ 13,540</u>

(See accompanying Notes to Consolidated Financial Statements)

NANOPHASE TECHNOLOGIES CORPORATION
CONSOLIDATED STATEMENTS OF OPERATIONS

	Years ended December 31,	
	2021	2020
	(in thousands except share and per share data)	
Revenue:		
Product revenue	\$ 29,325	\$ 16,422
Other revenue	150	701
Total revenue	29,475	17,123
Operating expense:		
Cost of revenue	20,785	11,133
Gross profit	8,690	5,990
Research and development expense	2,235	1,571
Selling, general and administrative expense	3,896	2,934
Income from operations	2,559	1,485
Interest expense	(1,154)	(496)
Other income, net	952	—
Income before provision for income taxes	2,357	989
Provision for income taxes	37	—
Net income	\$ 2,320	\$ 989
Net income per share-basic	\$ 0.05	\$ 0.03
Weighted average number of basic common shares outstanding	45,021,173	38,158,586
Net income per share-diluted	\$ 0.05	\$ 0.03
Weighted average number of diluted common shares outstanding	47,039,173	38,545,586

(See accompanying Notes to Consolidated Financial Statements)

NANOPHASE TECHNOLOGIES CORPORATION

CONSOLIDATED STATEMENTS OF STOCKHOLDERS' EQUITY
(in thousands except share data)

Description	Preferred Stock		Common Stock		Additional Paid-in Capital	Accumulated Deficit	Total
	Shares	Amount	Shares	Amount			
Balance on December 31, 2019	—	\$ —	38,136,792	\$ 381	\$ 101,886	\$ (100,756)	\$ 1,511
Stock option exercises	—	—	84,500	\$ 1	36	—	37
Stock-based compensation	—	—	—	—	195	—	195
Net income for the year ended December 31, 2020	—	—	—	—	—	989	989
Balance on December 31, 2020	—	\$ —	38,221,292	\$ 382	\$ 102,117	\$ (99,767)	\$ 2,732
Issuances of shares and stock option exercises	—	—	576,726	\$ 6	\$ 228	—	234
Exercise of conversion rights – convertible loan, related party	—	—	10,095,555	101	1,918	—	2,019
Stock-based compensation	—	—	—	—	160	—	160
Net income for the year ended December 31, 2021	—	—	—	—	—	2,320	2,320
Balance on December 31, 2021	—	\$ —	48,893,573	\$ 489	\$ 104,423	\$ (97,447)	\$ 7,465

(See accompanying Notes to Consolidated Financial Statements)

NANOPHASE TECHNOLOGIES CORPORATION
CONSOLIDATED STATEMENTS OF CASH FLOWS

	Years ended December 31,	
	2021	2020
	(in thousands)	
Operating activities:		
Net Income	\$ 2,320	\$ 989
Adjustments to reconcile net income to cash provided by (used in) operating activities:		
Depreciation and amortization	454	358
Gain on forgiveness of PPP loan	(952)	—
Amortization of debt discount	903	267
Share-based compensation	160	195
Changes in assets and liabilities related to operations:		
Trade accounts receivable	(1,005)	(1,962)
Inventories	(1,755)	(1,786)
Prepaid expenses and other assets	(304)	(339)
Accounts payable	1,026	295
Deferred Revenue	1,033	(164)
Accrued expenses	481	113
Other long-term assets and liabilities	(40)	(27)
Net cash used in operating activities	<u>2,321</u>	<u>(2,061)</u>
Investing activities:		
Acquisition of equipment and leasehold improvements	(1,874)	(878)
Net cash used in investing activities	<u>(1,874)</u>	<u>(878)</u>
Financing activities:		
Principal payment on finance leases	(177)	(218)
Proceeds from line of credit, bank	500	2,000
Payments to the line of credit, bank	(1,000)	(2,000)
Proceeds from PPP / SBA loan	—	952
Proceeds from line of credit, Beachcorp LLC	24,750	14,515
Payments to line of credit, Beachcorp LLC	(25,554)	(12,584)
Proceeds from related party term loan	500	—
Proceeds from exercise of stock options	234	37
Net cash (used in) provided by financing activities	<u>(747)</u>	<u>2,702</u>
Decrease in cash	(300)	(237)
Cash at beginning of period	957	1,194
Cash at end of period	<u>\$ 657</u>	<u>\$ 957</u>
Supplemental cash flow information:		
Interest paid	<u>\$ 218</u>	<u>\$ 178</u>
Supplemental non-cash investing and financing activities:		
Accounts payable incurred for the purchase of equipment and leasehold improvements	\$ 414	\$ 83
Conversion of \$2M convertible loan, related party	2,000	—
Interest paid via stock issuance, convertible loan, related party	19	—
Right of use asset acquired through operating lease	10,505	—

(See accompanying Notes to Consolidated Financial Statements)

NANOPHASE TECHNOLOGIES CORPORATION

NOTES TO CONSOLIDATED 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 science-driven company which, along with its wholly owned subsidiary, Solésence, LLC (our “Solésence beauty science subsidiary”), is focused in various beauty- and life-science markets. Using consumer health as our end-goal and science and innovation to guide the path, skin health and medical diagnostics combined currently make up the great majority of our business and drive our forward growth strategy. We offer engineered materials, formulation development and commercial manufacturing through an integrated family of technologies. Our expertise in materials engineering allows us to effectively coat and disperse particles on a nano and “non-nano” scale for use in a variety of skin health markets, including for use in sunscreens as active ingredients and as fully developed prestige skin care and cosmetics products, marketed and sold through our Solésence beauty science subsidiary. In terms of our life sciences focus, we have seen current conditions significantly increase demand for our medical diagnostics ingredients, as testing for various viruses, most notably COVID-19, has become a critical use of our technology. Additionally, we continue to sell products in legacy markets, including architectural coatings, industrial coating applications, abrasion-resistant additives, plastics additives, and surface finishing technologies (polishing) applications, all of which, along with medical diagnostics, fall into the advanced materials product category.

We target markets, primarily related to skin health products and ingredients, as well as diagnostic life sciences ingredients where we believe our materials and products offer practical and competitive minerals-based solutions. We traditionally work closely with current customers in these target markets to identify their material and performance requirements. We market our materials to various end-use applications manufacturers, and our Solésence® 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. Active Stress Defense™ now refers to a suite of three proprietary technologies — Original Active Stress Defense™, Kleair™, and Bloom™ — all three of which either utilize a unique and proprietary, mineral-based technology or work synergistically with one of our unique and proprietary, mineral-based technologies to improve performance and/or aesthetics. Our ongoing innovation efforts include new IP in areas that advance environmental protection, align with market needs, and complement our existing technologies. Through the creation of our Solésence beauty science subsidiary, we utilize our technology suite to manufacture and sell fully developed solutions to targeted customers in the skin care industry, typically in prestige skin care and cosmetics markets, 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 materials to customers overseas and have been working to expand our reach within foreign markets. 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 Consolidated Statements of Operations, as it does not represent revenue directly from the sale of our products.

The Company has recorded positive net income and positive cash flow from operations in 2021. We have also significantly improved our borrowing flexibility and capacity in early 2022, as discussed in Note 3. Based upon our financial performance, as well as our current liquidity and available borrowing capacity, there is not substantial doubt regarding the Company's ability to continue as a going concern.

(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, 2021 consists of funds borrowed from our Revolving Line of Credit, which is 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. Cash is held at a federally insured institution, but our cash balances at times exceed insured limits. The Company has not experienced any losses related to these statutory limits.

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 an average cost 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. Based upon our analysis, there were no impairment charges recognized in either period presented.

Deferred Revenue

The Company records a contract liability for development projects due to the contractual billing of these projects not always aligning with revenue recognition. In addition, it is now the Company's policy to frequently require deposits relating to the initial production of our Solésence products. Of the total \$1,444 in deferred revenue reported in 2021, approximately 70% is comprised of prepayment received from our medical diagnostics application customer for purchase orders to be filled in 2022 and 2023, 25% related to prepayments received from new customers as per Company policy, and the remaining 5% related to prepayments from a product development agreement with a personal care ingredient customer.

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:

	2021	2020
Balance, beginning	\$ 214	\$ 206
Accretion of liability due to passage of time	8	8
Amortization of asset due to passage of time	—	—
Balance, ending	<u>\$ 222</u>	<u>\$ 214</u>

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, any cash equivalents, accounts receivable, accounts payable and accrued expenses, along with any short term and long-term borrowings as described in Note 3. There were no financial instruments adjusted to fair value on December 31, 2021 and 2020.

Product Revenue

Revenues are recognized 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. When our ingredients and finished products are shipped, with control being transferred at the shipping point almost universally, is the point in time at which we recognize the related revenue.

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.

Contract balances for the year ended December 31, 2021 is as follows:

	Accounts Receivable, net	Contract Assets	Contract Liabilities
Balance, beginning	\$ 2,932	\$ —	\$ 411
Balance, ending	3,937	—	1,444

Contract balances for the year ended December 31, 2020 is as follows:

	Accounts Receivable, net	Contract Assets	Contract Liabilities
Balance, beginning	\$ 970	\$ —	\$ 575
Balance, ending	2,932	—	411

Revenue recognized in the reporting period that was included in the contract liability balance at the beginning of the period was \$260 and \$468 for the years ended December 31, 2021 and 2020, respectively.

Other Revenue

Other revenue may include revenue from technology license fees and paid development projects. Technology license fees and paid development projects are recognized over time when the obligations under the agreed upon contractual arrangements are performed on our part. Revenue recognized over time was \$150 and \$701 for the years ended December 31, 2021 and 2020, respectively.

Research and Development Expenses

Research and development expenses are recognized as expense when incurred.

Income Taxes

We account for income taxes using the liability method. As such, deferred income taxes reflect the net tax effects of temporary differences between the carrying amounts of assets and liabilities for financial reporting purposes and the amounts used for income tax purposes. Deferred tax assets and liabilities are calculated using the enacted tax rates and laws that are expected to be in effect when the anticipated reversal of these differences is scheduled to occur. Deferred tax assets are reduced by a valuation allowance when, in the opinion of management, it is more likely than not that some 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, 2021, and 2020, we had no liability for unrecognized tax benefits.

Earnings Per Share

Options to purchase approximately 2,018,000 shares of common stock that were outstanding as of December 31, 2021 were included in the computation of earnings per share for the year ended December 31, 2021. Options to purchase approximately 387,000 shares of common stock that were outstanding as of December 31, 2020 were included in the computation of earnings per share for the year ended December 31, 2020.

Earnings applicable to common stock and common stock shares used in the calculation of basic and diluted earnings per share are as follows:

	<u>Years Ended December 31,</u>	
	<u>2021</u>	<u>2020</u>
<u>Numerator: (in Thousands)</u>		
Net income	\$ 2,320	\$ 989
<u>Denominator:</u>		
Weighted average number of basic common shares outstanding	45,021,173	38,158,586
Weighted average additional shares assuming conversion of in-the-money stock options to common shares	2,018,000	387,000
Weighted average number of diluted common shares outstanding	47,039,173	38,545,586
<u>Basic earnings per common share:</u>		
Net income per share – basic	\$ 0.05	\$ 0.03
<u>Diluted earnings per common share:</u>		
Net income per share – diluted	\$ 0.05	\$ 0.03

New Accounting Pronouncements

In June 2016, the FASB issued ASU 2016-13, “Measurement of Credit Losses on Financial Instruments,” which replaces existing incurred loss impairment guidance and establishes a single allowance framework for financial assets carried at amortized cost. The effective date for our adoption (as amended) of this updated Standard will be January 1, 2023. The Company is currently evaluating the impact of the adoption of this standard on the consolidated financial statements.

(3) Notes and Lines of Credit

Notes and lines of credit consist of the following:

	Rate	As of December 31,			
		2021		2020	
		Available	Outstanding Balance	Available	Outstanding Balance
Libertyville Bank & Trust ⁽¹⁾	4.25%	\$ 30	\$ —	\$ 30	\$ —
Libertyville Bank & Trust ⁽²⁾	4.25%	n/a	n/a	500	500
Libertyville Bank & Trust ⁽²⁾	4.25%	500	—	n/a	n/a
Beachcorp, LLC ⁽³⁾	5.25%	3,467	1,351	2,776	2,155
Beachcorp, LLC ⁽³⁾	5.25%	\$ 1,000	\$ 1,000	\$ 500	\$ 500
Secured convertible promissory note ⁽⁴⁾	2.00%	—	—	2,000	1,097
PPP Loan / Libertyville promissory note ⁽⁵⁾	1.00%	—	—	952	952
Beachcorp, LLC ⁽⁶⁾	4.00%	n/a	n/a	n/a	n/a
Beachcorp, LLC ⁽⁷⁾	4.00%	n/a	n/a	n/a	n/a
Strandler, LLC ⁽⁸⁾	4.00%	n/a	n/a	n/a	n/a

1) Since July 2014, we have maintained a bank-issued letter of credit for up to \$30 in borrowings, with interest at the prime rate plus 1%, to support our obligations under our Romeoville, Illinois facility lease agreement. No borrowings have been incurred under this promissory note. It is our intention to renew this note annually. Because there were no amounts outstanding on the note at any time during 2021 or 2020, we have recorded no related liability on our balance sheet.

- 2) The Company maintains a credit agreement with Libertyville which most recently served the primary purpose of insuring that it met its cash balance requirements at quarter end relating to a contract with the Company's largest customer. Outstanding borrowings were \$500 on this line of credit as of December 31, 2020. Interest on drawn balances was at the prime rate plus 1%. On December 21, 2021, the existing credit agreement with Libertyville was converted for use to support our obligations under our newly leased manufacturing and warehouse space in Bolingbrook, Illinois. Interest on drawn balances will be at the prime rate plus 1%. This credit agreement has a maturity of December 22, 2022. We expect to renew this agreement annually, as the lease requires. This credit agreement is secured by all the unencumbered assets of the Company, and has superior collateral rights to those credit facilities with Beachcorp, LLC and Strandler, LLC.
- 3) 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 to be disbursed in a single advance (the "Term Loan") with a fixed annual interest rate of 8.25%, payable quarterly, and with principal due on December 31, 2020; and an asset-based revolving loan facility for the Company of up to \$2,000 (the "A/R 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 a maturity of March 31, 2020, as amended. On March 23, 2020, the Company and Beachcorp, LLC executed the First Amendment to our Master Agreement that extended the maturities of both the Term Loan and the A/R Revolver Facility to March 31, 2021. Effective September 8, 2020, the Company and Beachcorp, LLC executed the Second Amendment to our Master Agreement that expanded the limit on the A/R Revolver Facility from \$2,000 to \$2,750. On December 23, 2020, the Company and Beachcorp, LLC executed the Third Amendment to our Master Agreement that expanded the limit on the A/R Revolver Facility from \$2,750 to \$4,000 and extended the maturities of both the Term Loan and the A/R Revolver Facility to March 31, 2022. Effective April 21, 2021 the Company and Beachcorp, LLC executed the Fourth Amendment to our Master Agreement that expanded the limit on the A/R Revolver Facility from \$4,000 to \$6,000, changed the interest rate to fully floating and reduced the rate to the prime rate plus 2%, also extending the maturity of the A/R Revolver Facility to March 31, 2023. This amendment also increased the amount of the Term Loan from \$500 to \$1,000, changed the interest rate to fully floating and reduced the rate to the prime rate plus 2%. The maturity of the Term Loan remained March 31, 2022. The Term Loan and A/R 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 A/R Revolver Facility.
- 4) On November 20, 2019, we entered into a 2% Secured Convertible Promissory Note with Bradford T. Whitmore in the principal amount of \$2,000 (the "Convertible Note"). The principal amount was payable in a single payment on May 15, 2024 (the "Maturity Date"). The principal amount of the Convertible Note accrued interest at the rate of 2.0% per year, which interest was payable semi-annually on the 15th day of May and November, commencing on May 15, 2020. The principal amount and, at the holder's option, accrued interest under the Convertible Note was convertible at the holder's option into additional shares of the Company's common stock in whole or in part and from time to time up to the Maturity Date at a conversion price of \$0.20 per share. The convertible note contained a beneficial conversion feature since the Company's stock was trading at \$0.32 per share on the date the Company entered into the agreement. The intrinsic value of the beneficial conversion feature was \$1.2 million on November 20, 2019 and was recorded as a discount on the convertible note. The discount was to be accreted to the convertible note over the life of the note using the straight-line method. The offset to these discounts was interest expense. The Company recognized amortized interest expense relating to this discount of \$267 in 2020. Upon exercise of the conversion right in 2021, the acceleration of the remaining discount, in addition to the amortization of interest in 2021 prior to the conversion, amounted to \$903, all of which was recognized as interest expense. Mr. Whitmore chose to exercise his conversion rights effective May 7, 2021, with any interest to be paid in the form of shares, as allowed in the Convertible Note. In addition to the 10,000,000 shares issued upon conversion, the Company issued 95,555 shares of additional stock to Mr. Whitmore in lieu of cash for the \$19 in accrued interest owed at May 7, 2021. The note and related interest obligations were paid in full and cancelled in May, 2021 via conversion.
- 5) On April 17, 2020, we entered into a Promissory Note (the "PPP Note"), dated as of April 16, 2020, in favor of Libertyville in the principal amount of \$952 for our loan under the Paycheck Protection Program ("PPP"). The Company was allowed to apply for forgiveness of the amount due on the PPP Note in an amount equal to the sum of the following costs incurred during the 24-week period beginning on the date of the first disbursement of the loan: (a) payroll costs, (b) any payment of interest on a covered obligation (which shall not include any prepayment of or payment of principal on a covered mortgage obligation), (c) any payment on a covered rent obligation, and (d) any covered utility payment, calculated in accordance with the terms of the CARES Act. The principal amount of the PPP Note would have accrued interest at the rate of 1.00% per year. The Company applied for, and received, PPP forgiveness during the first quarter of 2021. Under the terms of the PPP loan, it is subject to audit for six years from the date of forgiveness. If any portion of the PPP loan were to be deemed ineligible, the Company could be required to repay the funds. On December 31, 2021, the balance under the PPP note was \$0.

- 6) On January 28, 2022 the Company entered into an Amended and Restated Business Loan Agreement (the “A&R Loan Agreement”), which amends and restates the Master Agreement between the Company and Beachcorp, LLC, and a new promissory note in order to evidence the A/R Revolver facility, including an amendment to expand the limit on the A/R Revolver Facility from \$6,000 to \$8,000, reduce the interest rate to the prime rate plus 0.75%, and extend the maturity of the A/R Revolver Facility to March 31, 2024.
- 7) On January 28, 2022 the Company entered into the A&R Loan Agreement and a new revolving loan agreement (“Inventory Facility”) with Beachcorp, LLC, and a new promissory note in order to evidence the Inventory Facility. The maximum borrowing amount under the Inventory Facility is \$4,000, with a borrowing base consisting of up to 50% of the value of qualified inventory of the Company. The interest rate for the Inventory Revolver is at the prime rate plus 0.75%, and it matures on March 31, 2024.
- 8) On January 28, 2022 the Company entered into an additional Business Loan Agreement (the “New Term Loan Agreement”) with Strandler, LLC, which effectively transferred or assigned the Term Loan to Strandler, LLC from Beachcorp, LLC. Interest on the New Term Loan is at the prime rate plus 0.75%, and it matures on March 31, 2024. Strandler, LLC is also an affiliate of Bradford T. Whitmore.

Related party interest expense consists of the following:

	<u>Twelve Months Ended December 31,</u>	
	<u>2021</u>	<u>2020</u>
Interest expense, related parties	\$ 1,129	\$ 452

Accrued interest consists of the following:

	<u>As of December 31,</u>	
	<u>2021</u>	<u>2020</u>
Accrued interest expense, related parties	\$ 13	\$ 20

Outstanding balances associated with related parties are as follows:

	<u>As of December 31,</u>	
	<u>2021</u>	<u>2020</u>
Beachcorp, LLC	\$ 2,351	\$ 2,655
Secured convertible promissory note	—	1,097
Strandler, LLC	n/a	n/a

Beachcorp, LLC and Strandler, LLC are affiliates of Mr. Bradford T. Whitmore, who beneficially owns a majority of the Company’s common stock and is the brother of Ms. R. Janet Whitmore, a director of the Company and the chair of the Company’s board of directors. The A/R Revolver Facility, the Inventory Facility and the New Term Loan are all secured by all the unencumbered assets of the Company and subordinated to the Company’s credit facility with Libertyville Bank & Trust.

(4) Inventories

Inventories consist of the following:

	<u>As of December 31,</u>	
	<u>2021</u>	<u>2020</u>
Raw materials	\$ 4,819	\$ 2,825
Finished goods	1,682	1,545
	6,501	4,370
Allowance for excess quantities	(406)	(30)
	<u>\$ 6,095</u>	<u>\$ 4,340</u>

(5) Equipment and Leasehold Improvements

Equipment and leasehold improvements consist of the following:

	<u>As of December 31,</u>	
	<u>2021</u>	<u>2020</u>
Machinery and equipment	\$ 18,289	\$ 16,758
Office equipment	961	870
Office furniture	110	110

Leasehold improvements	4,900	4,850
Construction in progress	<u>1,062</u>	<u>445</u>
	25,322	23,033
Less: Accumulated depreciation and amortization	<u>(20,610)</u>	<u>(20,165)</u>
	<u>\$ 4,712</u>	<u>\$ 2,868</u>

Depreciation expense was \$444 and \$348, for the years ended December 31, 2021 and 2020, respectively.

(6) Lease Commitments

The Company's operating lease portfolio is comprised of operating leases for office, warehouse space and equipment. Certain of the Company's leases include one or more options to renew or terminate the lease at the Company's discretion. The Company regularly evaluates the renewal and termination options and when they are reasonably certain of exercise, includes the renewal or termination option in our lease term. During the first seven months of the term of our newly leased building, we have subleased a portion of the unused floorspace on a temporary basis. This sublease may convert to a month-to-month lease upon expiration.

As of December 31, 2021, the ROU asset had a balance of \$12,075 which is included in the "Operating lease right-of-use assets" line item of these consolidated financial statements and current and non-current lease liabilities related to the ROU asset of \$1,983 and \$10,306, respectively. As of December 31, 2020, the ROU asset had a balance of \$1,827 which is included in the "Operating lease right-of-use assets" line item of these consolidated financial statements and current and non-current lease liabilities related to the ROU asset of \$431 and \$1,651, respectively. These amounts are included in the "Current portion of operating lease obligations" and "Long-term portion of operating lease obligations" line items of these consolidated financial statements. The discount rates used for leases accounted for under ASC 842 are based on an interest rate yield curve developed for the leases in the Company's portfolio.

The office leases contain variable lease payments which consist primarily of rent escalations based on an established index or rate and taxes, insurance, and common area or other maintenance costs, which are paid based on actual costs incurred by the lessor. The Company has elected to utilize the available practical expedient to not separate lease and non-lease components.

Quantitative information regarding the Company's leases is as follows:

	<u>Twelve Months Ended December 31, 2021</u>	<u>Twelve Months Ended December 31, 2020</u>
Components of lease cost		
Finance lease cost components:		
Amortization of finance lease assets	\$ 52	\$ 70
Interest on finance lease liabilities	18	36
Total finance lease costs	<u>70</u>	<u>106</u>
Operating lease cost components:		
Operating lease cost	554	565
Variable lease cost	134	146
Short-term lease cost	49	33
Total operating lease costs	<u>737</u>	<u>744</u>
Total lease cost:	<u>\$ 807</u>	<u>\$ 850</u>

Supplemental cash flow information related to leases is as follows for the years ended December 31, 2021 and 2020:

	<u>2021</u>	<u>2020</u>
Cash paid for amounts included in the measurement of lease liabilities:		
Operating cash outflow from operating leases	\$ 741	\$ 690
Lease liabilities arising from obtaining right-of-use assets	10,505	—
Weighted-average remaining lease term-finance leases (in years)	0.7	1.4
Weighted-average remaining lease term-operating leases (in years)	9.5	3.2
Weighted-average discount rate-finance leases	9.3%	9.3%
Weighted-average discount rate-operating leases	7.5%	14.3%

The future maturities of the Company's finance and operating leases as of December 31, 2021 are as follows:

	Finance Leases	Operating Leases	Total
2022	\$ 109	\$ 1,456	\$ 1,565
2023	6	2,099	2,105
2024	—	2,025	2,025
2025	—	1,470	1,470
2026	—	1,468	1,468
Thereafter	—	8,668	8,668
Total payments	\$ 115	\$ 17,186	\$ 17,301
Less amounts representing interest	(4)	(4,897)	(4,901)
Total minimum payments required	<u>\$ 111</u>	<u>\$ 12,289</u>	<u>\$ 12,400</u>

The future maturities of the Company's finance and operating leases as of December 31, 2020 were as follows:

	Finance Leases	Operating Leases	Total
2021	\$ 196	\$ 701	\$ 897
2022	109	720	829
2023	5	705	710
2024	—	595	595
2025	—	1	1
Thereafter	—	—	—
Total payments	\$ 310	\$ 2,722	\$ 3,032
Less amounts representing interest	(23)	(640)	(663)
Total minimum payments required	<u>\$ 287</u>	<u>\$ 2,082</u>	<u>\$ 2,369</u>

(7) Accrued Expenses

Accrued expenses consist of the following:

	<u>As of December 31,</u>	
	<u>2021</u>	<u>2020</u>
Accrued payroll and related expenses	\$ 471	\$ 315
Accrued accounts payable	320	122
Tenant Security Deposit / Advance Rent	122	—
Other	33	47
Total	<u>\$ 946</u>	<u>\$ 484</u>

(8) Income Taxes

Our net income tax provision, including both current and deferred, related to U.S. federal and state income taxes, is \$37. This is due to a change in law for the state of Illinois limiting the use of net loss deductions to \$100 each year for tax years ending on or after December 31, 2021, and before December 31, 2024. Our current federal and deferred tax expenses are zero.

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, 2021 and 2020 is as follows:

	2021	2020
Income tax credit at statutory rates	\$ 495	\$ 208
Nondeductible expenses	—	5
Tax Exempt Income - PPP Loan	(271)	—
Permanent Tax Deduction Stock Options Exercised	(63)	—
State income tax, net of federal benefits	177	74
Expiration of NOL & Credits	899	2,543
Tax basis in excess of book Convertible Debt	—	—
Expiration of Stock Options	92	122
Other	2	(7)
Change in valuation allowance	(1,294)	(2,945)
	<u>\$ 37</u>	<u>—</u>

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,	
	2021	2020
Deferred tax liabilities:		
Excess tax basis convertible debt	\$ —	(257)
Total deferred tax liabilities	—	(257)
Deferred tax assets:		
Net operating loss carryforwards	\$ 14,566	\$ 15,597
Inventory and other allowances	148	23
Charitable contribution & other carryforwards	—	9
Excess (tax) book depreciation	31	375
Excess (tax) book amortization	63	61
Share-based compensation	308	624
Other accrued costs	161	138
Total deferred tax assets	15,277	16,827
Less: Valuation allowance	(15,277)	(16,570)
Deferred income taxes	<u>\$ —</u>	<u>\$ —</u>

The valuation allowance decreased approximately \$1.3 million and \$6.4 million for the years ended December 31, 2021 and 2020, respectively (net of approximately \$1 million and \$6.3 million for the years ended December 31, 2021 and 2020, respectively, for expiring net operating loss carryforwards and credits) due principally to the change in the net operating loss carryforward and uncertainty as to whether future taxable income will be generated prior to the expiration of the carryforward period. Under the Internal Revenue Code, certain ownership changes, including the prior issuance of preferred stock and our public offering of common stock, may subject us to annual limitations on the utilization of our net operating loss carryforward. As of December 31, 2021, it has been determined that we are not subject to annual limitations on the utilization of our net operating loss carryforward.

We have federal net operating loss carryforwards for tax purposes of approximately \$62 million on December 31, 2021. \$57 million expire between 2022 and 2037. All net operating loss carryforwards generated after January 1, 2018 do not expire. Therefore, \$5 million in net operating losses generated since January 1, 2018 do not expire. We have Illinois net loss deduction carryforwards for tax purposes of approximately \$21 million on December 31, 2021. Due to the provisions of Illinois Public Act 102-0669 signed November 16, 2021, Illinois net loss deductions expire between 2029 and 2039.

(9) Capital Stock

As of December 31, 2021, and 2020, we had 24,088 authorized but unissued shares of preferred stock. In addition, as of December 31, 2020, we had 10,000,000 authorized but unissued shares of common stock reserved to meet the conversion requirement of the Convertible Note discussed in Note 3. These shares were issued at the conversion of this note in May of 2021.

(10) Stock Options and Stock Grants

We have entered into stock option agreements with certain officers, employees and directors. The stock options granted prior to the adoption of the 2019 Equity Compensation Plan (the "2019 Plan") on November 19, 2019 generally expire ten years from the date of grant. Future options to be granted under the 2019 Plan will expire seven 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.

	Years ended December 31,	
	2021	2020
Share-based compensation expense	\$ 160	\$ 195
Remaining unrecognized compensation expense	\$ 1,581	
Remaining weighted average-period, expense recognition (years)	2.9	

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 is based on the daily market rate changes of our stock. The active shares granted prior to fiscal 2020 had a contractual life of 10 years as dictated by the 2010 Plan. 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 over the requisite service period.

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,	
	2021	2020
Weighted-average risk-free interest rates:	1.4%	0.5%
Dividend yield:	0%	0%
Weighted-average expected life (years) of the option:	5	5
Weighted-average expected stock price volatility:	115%	95%
Weighted-average fair value of the options granted:	\$ 2.59	\$ 0.28

Additional disclosures for options granted for all years presented:

	Years Ended December 31,	
	2021	2020
Vesting period (years) of shares granted in period	3	3
Contractual life (years) of shares granted in period	7	7
Estimated forfeitures	4%	4%

The following table summarizes the option activity for our employees and directors during the year ended December 31, 2021:

Options	Shares (Rounded)	Weighted Average Exercise Price per Share	Weighted Average Remaining Contractual Term (Years)	Aggregate Intrinsic Value (000s)
Outstanding on January 1, 2021	3,412,686	\$ 0.57	—	—
Granted	567,500	\$ 4.14	—	—
Exercised	(535,100)	\$ 0.44	—	—
Forfeited or expired	(251,870)	\$ 1.09	—	—
Outstanding on December 31, 2021	<u>3,193,216</u>	\$ 1.18	5.1	\$ 10,267
Exercisable on December 31, 2021	<u>2,189,378</u>	\$ 0.56	4.4	\$ 8,405
Shares available for grant	<u>1,887,500</u>			

The aggregate intrinsic value in the table above is based on our closing stock price of \$4.40 on the last business day for the year ended December 31, 2021.

	Years ended December 31,	
	2021	2020
Shares exercised	535,100	84,500
Total intrinsic value	\$ 1,169	\$ 10
Cash received	\$ 234	\$ 37

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, 2021 and 2020.

(11) 401(k) Profit-Sharing Plan

We have a 401(k) profit-sharing plan covering substantially all employees who meet defined service requirements. During 2020, we maintained a Company contribution program, in which 10% of the first 8% of any employee’s was matched (for a match of up to 0.8% of a participant’s salary). In 2021, we implemented a new Company match program, in which the Company matches the first 3% of eligible pay that any employee contributes on a dollar-for-dollar basis. Contributions made in 2021 and 2020 aggregated to \$107 and \$21, respectively.

(12) Significant Customers and Contingencies

We had five significant customers for the year ended December 31, 2021.

Customer #	Product Category	For the years ended December 31,	
		2021	2020
1	Personal Care Ingredients	26%	30%
2	Solésence®	19%	14%
3	Solésence®	15%	11%
4	Solésence®	10%	5%
5	Advanced Materials (Medical Diagnostics customer)	8%	20%
	Total	78%	80%

Accounts receivable balances for these five customers were approximately:

Customer #	Product Category	For the years ended December 31,	
		2021	2020
1	Personal Care Ingredients	\$ 641	\$ 381
2	Solésence®	534	342
3	Solésence®	1,048	116
4	Solésence®	239	863
5	Advanced Materials (Medical Diagnostics customer)	-0-	735
	Total	\$ 2,462	\$ 2,437

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. 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.

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.

(13) Business Segmentation and Geographical Distribution

Revenue from international sources approximated \$3,236 and \$3,714 for the years ended December 31, 2021 and 2020, respectively. As part of our revenue from international sources, we recognized approximately \$2,335 and \$3,450 in product revenue from German companies, in the aggregate, for the years ended December 31, 2021 and 2020, 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 2021 and 2020 by category are as follows:

Product Category	For the years ended December 31	
	2021	2020
Solésence	\$ 18,175	\$ 6,737
Personal Care Ingredients	7,739	5,536
Advanced Materials	3,561	4,850
Total Sales	<u>\$ 29,475</u>	<u>\$ 17,123</u>

(14) Contingencies

In December 2019, a novel strain of coronavirus (SARS-CoV-2) emerged in Wuhan, Hubei Province, China, which was proclaimed by the World Health Organization to have been the cause of a global pandemic (COVID-19). COVID-19 has been followed by a series of variants that have also impacted our operations, but to a lesser extent than the initial strain. Some of the raw materials that are critical to the production of our products and parts that are critical to the operation of our equipment are sourced from single suppliers, suppliers from China and Korea, and in some cases, a single supplier from China. Although operations of our third-party suppliers were disrupted to a certain extent in 2020 from the pandemic, particularly related to receiving packaging for our Solésence products on a timely basis, we are currently seeing a more limited impact relating to COVID-19 on our suppliers. The biggest challenge in 2021 and during the beginning of 2022 related to the pandemic is now slowdowns in production and shipping due to capacity limitations which seems to be a function of company's inability to keep up with renewed market demand. We typically maintain no less than one month's supply of raw materials and parts that are sourced from sole suppliers and make efforts to identify additional suppliers who may be able to provide such raw materials or parts. During 2021, shortages of labor, which may have been related to COVID-19, created challenges to the Company as we navigated a rapidly growing business under these conditions.

The Company is aware that such changes in its business as a result of COVID-19-related changes to our economy could occur, but is uncertain of the impacts of those changes on its consolidated statements of position, operations, or cash flows. The Company's management believes any resulting cessations, reductions, and disruptions in its customers' and suppliers' operations would probably be temporary; however, the Company's management also believes the duration and, hence, the potential impact of such cessations, reductions, and disruptions is currently unknowable. As a result, we are unable to estimate the potential impact on our business as of the date of this filing.

EXHIBIT INDEX

Exhibit Number

- [2.1](#) 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\(i\).5](#) Fourth 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 November 22, 2019.
- [3\(i\).6](#) Sixth Amendment to the Certificate of Incorporation of the Company.
- [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.
- [4.8](#) Common Stock Purchase Agreement, dated May 13, 2019, between the Company and Bradford T. Whitmore, incorporated by reference to Exhibit 4.1 of the Company's Quarterly Report on Form 10-Q filed May 15, 2019.
- [4.9](#) Securities Purchase Agreement, dated November 13, 2019, between the Company and Bradford T. Whitmore, incorporated by reference to Exhibit 4.1 of the Company's Quarterly Report on Form 10-Q filed November 14, 2019.
- [4.10](#) Commercial Security Agreement, dated November 20, 2019, between the Company, Solésence, LLC and Bradford T. Whitmore, incorporated by reference to Exhibit 4.2 of the Company's Quarterly Report on Form 10-Q filed November 14, 2019.

- [4.11](#) 2% Second Secured Convertible Note, dated November 20, 2019, made by the Company and payable to the order of Bradford T. Whitmore, incorporated by reference to Exhibit 4.3 of the Company's Quarterly Report on Form 10-Q filed November 14, 2019.
- [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*](#) Amendment No. 4 to Zinc Oxide Supply Agreement, dated as of January 1, 2019 and entered into on March 11, 2019, between the Company and BASF Corporation, incorporated by reference to Exhibit 10.1 of the Company's Quarterly Report on Form 10-Q filed May 15, 2019.

- [10.15](#) 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.
- [10.16*](#) 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.
- [10.24*](#) 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](#) First Amendment to Supply Agreement, dated May 21, 2018, by and between Nanophase Technologies Corporation and Hallstar Ester Solutions Corporation (formerly known as Ester Solutions Company), incorporated by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K filed May 25, 2018.
- [10.27](#) Joint Development Agreement, dated as of July 31, 2019, between the Company and Sumitomo Corporation of Americas, incorporated by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K filed August 2, 2019.
- [10.28](#) Joint Development & Supply Agreement, dated December 12, 2016, by and between Solésence, LLC and Colorescience Inc., incorporated by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K filed May 24, 2018.
- [10.29](#) Amended and Restated Joint Development & Supply Agreement, executed by Solésence, LLC on May 18, 2018, by and between Solésence, LLC and Colorescience Inc., incorporated by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K filed May 24, 2018.
- [10.30](#) 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.

- [10.31](#) 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.
- [10.32](#) 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.
- [10.33](#) 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.
- [10.34](#) 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.
- [10.35](#) 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.
- [10.36](#) Business Loan Agreement, executed by the Company on March 22, 2019, between the Company and Libertyville Bank and Trust Company, incorporated by reference to the Exhibit 10.32 of the Company's Annual Report on Form 10-K for the year ended December 31, 2018.
- [10.37](#) Change in Terms Agreement, executed by the Company on March 22, 2019, between the Company and Libertyville Bank and Trust Company, incorporated by reference to the Exhibit 10.33 of the Company's Annual Report on Form 10-K for the year ended December 31, 2018.
- [10.38](#) Business Loan Agreement, dated November 16, 2018, between the Company and Beachcorp, LLC, incorporated by reference to the Company's Quarterly Report on Form 10-Q filed November 19, 2018.
- [10.39](#) Promissory Note, dated November 19, 2018, made by the Company and payable to the order of Beachcorp, LLC to evidence a term loan in the original principal amount of up to \$500,000, incorporated by reference to the Company's Quarterly Report on Form 10-Q filed November 19, 2018.
- [10.40](#) Promissory Note, dated November 19, 2018, made by the Company and payable to the order of Beachcorp, LLC to evidence revolving borrowings in a principal amount of up to \$2,000,000, incorporated by reference to the Company's Quarterly Report on Form 10-Q filed November 19, 2018.
- [10.41](#) First Amendment to Business Loan Agreement, dated March 23, 2020, between the Company and Beachcorp, LLC, incorporated by reference to the Company's Annual Report on Form 10-K filed March 30, 2020.
- [10.42](#) Fourth Amendment to Business Loan Agreement, dated April 21, 2021, between the Company and Beachcorp, LLC, incorporated by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K filed April 21, 2021.
- [10.43](#) Business Loan Agreement, dated January 28, 2022, between the Company and Beachcorp, LLC, incorporated by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K filed February 2, 2022.
- [10.44](#) Business Loan Agreement, dated January 28, 2022, between the Company and Strandler, LLC, incorporated by reference to Exhibit 10.2 to the Company's Current Report on Form 8-K filed February 2, 2022.
- [10.45](#) Amended and Restated Business Loan Agreement, dated January 28, 2022, between the Company and Beachcorp, LLC, incorporated by reference to Exhibit 10.3 to the Company's Current Report on Form 8-K filed February 2, 2022.
- [10.46](#) Replacement Promissory Note, dated January 28, 2022, made by the Company and payable to the order of Beachcorp, LLC to evidence revolving borrowings in a principal amount of up to \$8,000,000, incorporated by reference to Exhibit 10.4 to the Company's Current Report on Form 8-K filed February 2, 2022.

- [10.47](#) Promissory Note, dated January 28, 2022, made by the Company and payable to the order of Strandler, LLC to evidence a term loan in the original principal amount of up to \$1,000,000, incorporated by reference to Exhibit 10.5 to the Company's Current Report on Form 8-K filed February 2, 2022.
- [10.48](#) Promissory Note, dated January 28, 2022, made by the Company and payable to the order of Beachcorp, LLC to evidence revolving borrowings in a principal amount of up to \$4,000,000, incorporated by reference to Exhibit 10.6 to the Company's Current Report on Form 8-K filed February 2, 2022.
- [10.49](#) 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. +
- [10.50](#) 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. +
- [10.51](#) 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). +
- [10.52](#) 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.+
- [10.53](#) 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.+
- [10.54](#) 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.+
- [10.55](#) Nanophase Technologies Corporation 2019 Equity Compensation Plan, incorporated by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K filed November 22, 2019.+
- [10.56](#) 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.
- [10.57](#) 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.
- [10.58*](#) 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.
- [10.59*](#) 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.
- [10.60](#) 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.
- [10.61*](#) Exclusive Supply Agreement, effective April 1, 2021, between Solesence, LLC and Ilia Beauty, Inc., incorporated by reference to Exhibit 10.1 of the Current Report on Form 8-K filed June 14, 2021.
- [10.62*](#) Lease, effective December 1, 2021, between the Company and FR JH 10, LLC, incorporated by reference to Exhibit 10.1 of the Company's Current Report on Form 8-K filed December 9, 2021.
- [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 31st day of March, 2022.

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 31st day of March, 2022.

Signature	Title
<u>/s/ Jess A. Jankowski</u> Jess A. Jankowski	President, Chief Executive Officer (principal executive officer, principal financial officer, and principal accounting officer) and Director
<u>/s/ R. Janet Whitmore</u> R. Janet Whitmore	Chair of the Board of Directors
<u>/s/ Laura M. Beres</u> Laura M. Beres	Director
<u>/s/ Richard W. Siegel</u> Richard W. Siegel	Director

SUBSIDIARY OF NANOPHASE TECHNOLOGIES CORPORATION

(as of December 31, 2021)

Name

Jurisdiction of Formation

Solésence, LLC

Delaware

Consent of Independent Registered Public Accounting Firm

We consent to the incorporation by reference in the Registration Statements (No. 's 333-53445, No. 333-74170, No. 333-119466, No. 333-150765, No. 333-187649, and No. 333-255357) on Form S-8 and Registration Statements (No. 333-90326, No. 333-112130, No. 333-116224, No. 333-140461, No. 333-143153, and No. 333-163363) on Form S-3 of Nanophase Technologies Corporation of our report dated March 31, 2022, relating to the consolidated financial statements of Nanophase Technologies Corporation, appearing in this Annual Report on Form 10-K of Nanophase Technologies Corporation for the year ended December 31, 2021.

/s/ RSM US LLP

Chicago, Illinois
March 31, 2022

**Certification of the Chief Executive Officer
Pursuant to
Rules 13a-14(a) and 15d-14(a) under the Exchange Act**

I, Jess A. Jankowski, certify that:

1. I have reviewed this annual report on Form 10-K of Nanophase Technologies Corporation;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15(d)-15(f)) for the registrant and have:
 - (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
 - (b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;
 - (c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
 - (d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of registrant's board of directors (or persons performing the equivalent function):
 - (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and
 - (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: March 31, 2022

/s/ JESS A. JANKOWSKI

Jess A. Jankowski
President and Chief Executive Officer
(Principal Executive Officer)

**Certification of the Chief Financial Officer
Pursuant to
Rules 13a-14(a) and 15d-14(a) under the Exchange Act**

I, Jess Jankowski, certify that:

1. I have reviewed this annual report on Form 10-K of Nanophase Technologies Corporation;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15(d)-15(f)) for the registrant and have:
 - (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
 - (b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;
 - (c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
 - (d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of registrant's board of directors (or persons performing the equivalent function):
 - (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and
 - (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: March 31, 2022

/s/ JESS A. JANKOWSKI

Jess A. Jankowski
President, Chief Executive Officer, and Chief Financial Officer
(Principal Financial Officer)

**Certification Pursuant to 18 U.S.C. Section 1350
(as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002)**

In connection with this annual report of Nanophase Technologies Corporation (the “Company”) on Form 10-K for the year ending December 31, 2020 as filed with the Securities and Exchange Commission on the date hereof (the “Report”), I, Jess A. Jankowski, President and Chief Executive Officer of the Company, certify, pursuant to 18 U.S.C. § 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that, to my knowledge:

1. The Report fully complies with the requirements of section 13(a) or 15(d) of the Securities Exchange Act of 1934; and
2. The information contained in the Report fairly presents, in all material respects, the financial condition and result of operations of the Company.

Date: March 31, 2022

/s/ JESS A. JANKOWSKI

Jess A. Jankowski
President, Chief Executive Officer, and Chief Financial Officer