



**NANO ONE MATERIALS CORP.**

**INTERIM MANAGEMENT DISCUSSION**

**AND**

**ANALYSIS – QUARTERLY HIGHLIGHTS**

**FOR THE PERIOD ENDED JUNE 30, 2017**

## INTERIM MANAGEMENT DISCUSSION AND ANALYSIS – QUARTERLY HIGHLIGHTS

The following Interim Management Discussion and Analysis – Quarterly Highlights (“Quarterly Highlights”) of Nano One Materials Corp. (“Nano One” or the “Company”) has been prepared to provide material updates to the business operations, liquidity and capital resources of the Company since its last management discussion & analysis, being the Management Discussion & Analysis (“Annual MD&A”) for the fiscal year ended December 31, 2016. This Quarterly Highlights does not provide a general update to the Annual MD&A, or reflect any non-material events since the date of the Annual MD&A.

This Quarterly Highlights has been prepared in compliance with the requirements of section 2.2.1 of Form 51-102F1, in accordance with National Instrument 51-102 – Continuous Disclosure Obligations. This Quarterly Highlights should be read in conjunction with the Annual MD&A, the audited financial statements of the Company for the years ended December 31, 2016 and 2015 and the unaudited condensed interim financial statements for the six months ended June 30, 2017, together with the notes thereto. In the opinion of management, all adjustments (which consist only of normal recurring adjustments) considered necessary for a fair presentation have been included. The results for the six months ended June 30, 2017 are not necessarily indicative of the results that may be expected for any future period. Information contained herein is presented as at August 17, 2017 (the “Report Date”), unless otherwise indicated.

The unaudited condensed interim financial statements for the six months ended June 30, 2017, including comparatives, have been prepared in accordance with International Accounts Standards (“IAS”) 34, “Interim Financial Reporting” using accounting policies consistent with International Financial Reporting Standards (“IFRS”) as issued by the International Accounting Standards Board (“IASB”) and Interpretations issued by the International Financial Reporting Interpretations Committee (“IFRIC”).

External auditors, appointed by the shareholders, have not audited or reviewed the financial statements for the six month period ended June 30, 2017 and did not perform the tests deemed necessary to enable them to express an opinion on these unaudited condensed interim financial statements.

For the purposes of preparing this Quarterly Highlights, management, in conjunction with the Board of Directors, considers the materiality of information. Information is considered material if: (i) such information results in, or would reasonably be expected to result in, a significant change in the market price or value of Nano One’s common shares; or (ii) there is a substantial likelihood that a reasonable investor would consider it important in making an investment decision; or (iii) it would significantly alter the total mix of information available to investors. Management, in conjunction with the Board of Directors, evaluates materiality with reference to all relevant circumstances, including potential market sensitivity.

Additional information relevant to the Company’s activities can be found on SEDAR at [www.sedar.com](http://www.sedar.com) and the Company’s website at [www.nanoone.ca](http://www.nanoone.ca). All dollar amounts included therein and in the following Quarterly Highlights are in Canadian dollars, the reporting and functional currency of the Company, except where noted.

## FORWARD LOOKING STATEMENTS

Certain statements contained in this Quarterly Highlights may constitute “forward-looking statements”. Such term is defined in applicable securities laws. The forward-looking information includes, without limitation, the success of research and development activities and other similar statements concerning anticipated future events, conditions or results that are not historical facts. These statements reflect management’s current estimates, beliefs, intentions and expectations; they are not guarantees of future performance. The Company cautions that all forward-looking information is inherently uncertain and that actual performance may be affected by a number of material factors, many of which are beyond the Company’s control. Such factors include, among others, risks relating to research and development; the Company’s intellectual property applications being approved, the Company’s ability to protect its proprietary rights from unauthorized use or disclosure, the ability of the Company to obtain additional financing; the Company’s limited operating history; the need to comply with environmental and governmental regulations; fluctuations in currency exchange rates; operating hazards and risks; competition; and other risks and uncertainties. Although the Company has attempted to identify important factors that could

cause actual actions, events or results to differ materially from those described in forward-looking information, there may be other factors that cause actions, events or results not to be as anticipated, estimated or intended. Accordingly, actual future events, conditions and results may differ materially from the estimates, beliefs, intentions and expectations expressed or implied in the forward-looking information. All statements are made as of the Report Date and, except as required by law, the Company is under no obligation to update or alter any forward-looking information.

## OVERVIEW

The Company was incorporated on November 5, 1987. The Company is engaged in developing novel, scalable and low-cost processing technology for the production of high performance nano-structured materials. Nano One's mission is to establish its patent pending technology as a leading platform for the global production of a new generation of nano-structured composite materials. Nano One is building a portfolio of intellectual property and technology "know-how" for applications in markets that include energy storage, specialty ceramics, pharmaceutical, semiconductors, aerospace, dental, catalysts and communications. The technology simplifies the assembly of complex formulations of organic and inorganic ceramic powders and is suited to growth markets where the commercialization of advanced materials is inhibited by costly and entrenched industrial fabrication methods. Nano One's first market is lithium-ion cathode materials in the energy storage sector, where its advantageous technology can bring sustainable differentiation and value to early adopters.

## OVERALL PERFORMANCE

The Company has no revenues, so its ability to ensure continuing operations is its ability to obtain necessary financing to complete the development of novel, scalable and low-cost processing technology for the production of high performance nano-structured materials.

Nano One's innovative processing technology can be used to produce materials used in a wide range of markets. Nano One's first addressable market is cathode materials of lithium ion rechargeable batteries for electric vehicles (EV) and energy storage systems (ESS). There is growing demand in the lithium ion battery market for more cost effective and higher performance energy storage solutions. Nano One is well positioned to address these needs with its patented and patent pending technology and anticipates growth potential for the technology in many other materials markets that include energy storage, dental, catalysts, specialty ceramics, pharmaceutical, semiconductors, agriculture, aerospace and communications.

Nano One has developed a new method of producing high performance cathode materials, which uses equipment and simple methods that are known to scale in a wide range of industrial applications. The process can produce longer lasting composite materials using lower cost feedstock and simpler processing. Nano One's patented technology is a flexible manufacturing platform that enables lithium carbonate (or hydroxide) to be used as feedstock alongside other raw materials such as nickel, manganese, cobalt, iron, phosphate and/or aluminum. It is a water based process operating at mild pH and temperature that easily forms the energy storing cathode materials used in lithium ion batteries.

The process consists of three stages, and the major innovations lie in the first stage where a special mode of combining reactants controls crystal nucleation and growth of particles. Nucleation is the self-assembly of molecules into an organized structure. The desired nano-scale or superfine structure is formed in the first stage of the production cycle and eliminates many steps common to the dominant industrial processes.

The underlying structure and morphology of the materials is preserved through a wide range of thermal processing steps, eliminating the need for long and repeated firings and indicative of a robust and long lasting material. The process produces materials with stable phase composition and high porosity, but which is configurable to meet a variety of density requirements.

The presence of nano-structures early in the process and prior to calcination (i.e. heating to high temperature) simplifies processing and is advantageous for performance, throughput and scale-up. Characterization of the materials by electron microscope and x-ray characterizes the size, the composition and the kind of structure,

providing evidence of a robust structure that withstands the rigours of drying and calcination and maintains the integrity of its advantageous structure through thousands of charge cycles.

Typically, synthesis of nano-materials at the benchscale are performed in small quantities anywhere from milligrams to grams of material. Subsequent scale-up from these small quantities often leads to detrimental changes in thermodynamics (heat, temperature, energy, work) and reaction kinetics (reaction rates and chemical change). Nano One recognizes that synthesis of materials must begin at a larger scale where the properties of the system are much closer to production conditions. For this reason, Nano One designed a 6-litre bench scale reactor that is capable of producing up to 150 grams per hour (150 g/hr) or 3 kilograms per day (3 kg/day), with drying and firing stages easily scaled to match. At this scale, there is sufficient volume to emulate the thermodynamic and reaction kinetics expected in pilot and full-scale production.

### **Pilot Plant Project**

In 2016, Nano One, NORAM Engineering and Constructors Ltd. (“NORAM”) and B.C. Research Inc. (“BCRI”) entered into a collaboration agreement whereby the parties will design, procure, construct, optimize and operate a pilot production plant. The goal of the pilot plant is to simulate full scale production of lithium ion cathode materials, showcase Nano One’s patented technology and demonstrate the cost, scalability, performance and novelty of Nano One’s technology to strategic industry players. The pilot plant will be capable of producing ten (10) kilogram batches of various lithium mixed metal cathode materials that are strategically important to electric vehicle, grid storage and consumer electronic batteries. The procurement and construction phase of the pilot project began on June 1, 2016. The construction and commissioning of the pilot plant has been completed.

A scaled-up production of lithium ion cathode materials that meet Nano One’s processing and battery capacity targets has been demonstrated. Preliminary analysis of the pilot scale process is consistent with the chemistry and operating parameters developed in the laboratory. Evaluations of the pilot produced cathode materials shows crystallinity, elemental composition and battery capacity in line with Nano One’s laboratory scale process and materials.

The pilot plant project is being supported by grants of up to \$2.08M from Sustainable Development Technology Canada (“SDTC”) and up to \$1.9M (\$679,233 claimed) from the Automotive Supplier Innovation Program (“ASIP”), a program of Innovation, Science and Economic Development Canada (“ISED”).

SDTC funds will be payable in installments over the three (3) phases of the project, namely: “build”, “commission” and “validation” with a 10% holdback awarded upon completion of the project in mid-2018. The funds are dispersed at the beginning of each phase, and are subject to Nano One meeting milestones and having matching funds in place. The Company has received the initial instalment of \$488,994 for the first phase of a lithium battery materials pilot plant project. As of the Report Date, the Company received \$624,028 for the second phase of the pilot plant project.

ASIP funds will be applied to the three project phases described above with an additional phase 4 validation of materials specific to the electric vehicle market. A total of \$315,032 (2016 - \$Nil) was claimed by the Company during the period ending June 30, 2017 and was received as of the Report Date.

Effective June 1, 2016, Nano One entered into a support agreement with the National Research of Canada Industrial Research Assistance Program (“NRC-IRAP”). NRC-IRAP is supporting Nano One’s project to develop High Voltage Cobalt Free Cathode Materials and will contribute up to \$222,857 (claimed - \$145,603) in non-dilutive and non-repayable funds between June 1, 2016 and November 30, 2017. Under the terms of the agreement, NRC-IRAP has agreed to reimburse the Company for 80% of salaries paid to Company employees and 50% of supported contractor fees involved in this pilot facility. The objective of the project is to develop, optimize and demonstrate Nano One’s patented processing technology for the synthesis of High Voltage Cobalt Free Cathode Material, commonly known as HV-Spinel, as a cathode material in lithium ion batteries. Under this project, Nano One will be optimizing process conditions in preparation for strategic evaluation and scaled up production in the Pilot Plant. A total of \$68,503 (2016 - \$Nil) was claimed by the Company during the period ending June 30, 2017.

Effective June 5, 2017, the Company entered into an agreement with NRC-IRAP whereby NRC-IRAP will fund a non-repayable contribution of up to \$8,400 (claimed - \$2,640). The contribution is funded by the Youth Employment Strategy of the Government of Canada. Under the terms of the agreement, NRC-IRAP has agreed to reimburse the Company 100% of salaries paid to a process engineering assistant between the ages of 15 to 30. A total of \$2,640 was claimed by the Company during the period ended June 30, 2017. Subsequent to the period ended June 30, 2017, the Company received \$2,640.

Total government assistance recognized for the period ended June 30, 2017 was \$586,340 (2016 - \$25,103). The amount is offset against research and development expense on the statement of loss and comprehensive loss.

**LIQUIDITY AND FINANCIAL CONDITION**

The Company has not yet realized profitable operations and has relied on non-operational sources of financing to fund operations. The ability of the Company to achieve its objectives, meet its ongoing obligations and recover its investments in granted and pending patents, and other assets will depend on management’s ability to successfully execute its business plan, achieve profitable operations and obtain additional financing, if or when required. There is no assurance that these initiatives will be successful.

Loss and comprehensive loss for the period ended June 30, 2017 decreased by \$293,577. The change was primarily due to the following:

- General and administrative costs of \$1,251,361 (2016 - \$1,483,294) decreased as follows:
  - Consulting decreased by \$26,838 primarily due to a decrease in consulting fee paid for corporate development consulting services and IT consulting services.
  - Salary and benefits increased by \$68,622 due to the hiring of employees.
  - Office and general, and rent increased by \$22,905 and \$12,632, respectively due to the Company moving locations and an overall increase in activity.
  - Shareholder communication and investor relations decreased by \$177,808 primarily due to an decrease in updates to the shareholder community.
  - Travel increased by \$31,966 due to an increase in meetings, seminars and conferences.
  - Research and development decreased by \$144,192 primarily due to the total government assistance recognized for the period ended June 30, 2017 of \$586,340 (2016 - \$25,103). The amount is offset against research and development expense on the statement of loss and comprehensive loss. There was an increase in research and development expenses due to the pilot plant project.

**Research and Development Expense for The Period Ended June 30, 2017 Compared To June 30, 2016:**

	Period Ended June 30, 2017	Period Ended June 30, 2016
Analytical services	\$ 4,106	\$ 245,939
Consulting	321,511	144,181
Depreciation	225,546	17,948
Government grant recovery	(586,340)	(25,103)
Lab rent	31,360	21,728
Office and lab expense	162,193	53,691
Salaries and benefits related to R&D	363,343	214,757
Travel	11,225	3,995
	\$ 532,944	\$ 677,136

- The Company recorded a non-cash share-based payments of \$125,352 (2016 – \$181,996) relating to the fair value to the current period.

Liquidity risk is the risk that the Company will not be able to meet its obligations associated with its financial liabilities. The Company has historically relied upon equity financings to satisfy its capital requirements and will continue to depend heavily upon equity capital to finance its activities. The Company’s approach to managing liquidity risk is to ensure that it will have sufficient liquidity to meet liabilities when due. The Company started 2017 with a working capital of \$2,342,719, and as at June 30, 2017, the Company had working capital of \$1,198,000. The decrease in the working capital of \$1,144,719 was primarily due to:

- 595,096 warrants with an exercise price of \$0.50 were exercised for gross proceeds of \$297,548;
- 1,099,684 warrants with an exercise price of \$0.50 were exercised for gross proceeds of \$549,841;
- total government assistance recognized \$586,340; and
- general and administrative costs of \$1,251,361
- decrease in deferred government grant of \$200,341
- purchase of equipment and pilot plant of \$978,576.

Recent developments in the capital markets have restricted access to debt and equity financing for many companies. As the Company has no significant income, cash balances will continue to decline as the Company utilizes these funds to conduct its operations, unless replenished by capital fundraising.

	June 30, 2017	December 31, 2016
Working capital	\$ 1,198,000	\$ 2,342,719
Deficit	(11,317,014)	(10,066,911)

**Events after the Reporting Date**

Subsequent to June 30, 2017, the Company issued 800,000 common shares pursuant to the exercise of stock options for gross proceeds of \$288,000.

The Company granted 150,000 stock options at \$1.15 per share expiring August 11, 2022.

Nano One has been issued U.S. Pat. No. 9,698,419. This patent expands Nano One’s propriety position to include the improvements in battery performance provided by the lithium ion cathode materials produced using Nano One’s process.

Nano One filed a patent relating to its innovative method of synthesizing Lithium Iron Phosphate (LFP) cathode material. The new process uses fewer steps with lower cost raw materials while eliminating waste streams, costly equipment and manufacturing complexities. LFP is considered the safest of all cathode materials in the lithium ion battery space. It is made from abundant sources of iron and phosphate, is cobalt-free, and has excellent cyclability, power and charging characteristics. It has been used extensively in electric vehicle batteries in China and will shift to applications where power, charging and longevity are most critical.

Nano One filed a patent related to yield improvements in its process for the manufacture of lithium metal oxide cathode materials for use in advanced lithium ion batteries. The process improvements in this patent application have been demonstrated in the lab. Nano One has been testing productivity concepts for some time in the lab. The pilot was designed and built to accommodate these concepts and demonstration of the elevated throughputs is expected this year. The technology was developed under the collaboration agreement between Nano One, NORAM and BCRI. Under the agreement, Nano One is assigned right, title and interest in arising intellectual property and accordingly a patent application has been filed with the U.S. Patent Office

**FUTURE PLANS**

Nano One will continue to develop, optimize and demonstrate the benefits of producing various cathode materials using its processing technology, for use in lithium ion batteries. Nano One will continue to develop High Voltage Cobalt Free Cathode Materials with the support of NRC-IRAP approved funding of up to \$222,857 towards further development.

Nano One will continue to collaborate with NORAM and BCRI to operate the 10-kilogram per day pilot plant to demonstrate the production of lithium ion battery cathode powders. The engineering design and specifications of equipment follow from commercial scale concepts developed by Nano One and NORAM. Nano One will continue to provide preliminary output and optimization of cathode materials. Nano One will also continue the evaluation of other next generation lithium-ion battery materials as dictated by commercial interests. Nano One intends to ramp up the internal testing requirements with test cell assembly and electrochemical characterization.

Nano One has collaborated with Simon Fraser University to advance the understanding of the physical and chemical characteristics of lithium ion batteries as they charge and discharge. The two-year collaboration with SFU will be supervised by Associate Professor Dr. Byron Gates and Dr. Stephen Campbell, with financial support from the Mitacs Elevate Postdoctoral Fellowship Program.

Nano One intends to leverage progress on these plans and approach potential strategic interests and key market pull players to collaborate as partners in the demonstration pilot.

**RELATED PARTY DISCLOSURES**

Key management personnel are the persons responsible for the planning, directing and controlling the activities of the Company and includes both executive and non-executive directors, and entities controlled by such persons. The Company considers all Directors and Officers of the Company to be key management personnel.

The following transactions were carried out with related parties:

**(a) Purchases of services**

	<b>June 30, 2017</b>	<b>June 30, 2016</b>
	\$	\$
Bedrock Capital Corp., an entity controlled by Paul Matysek, an executive director is an officer, for consulting fees	30,000	30,000
Sterling Pacific Capital, an entity controlled by John Lando, an executive director is an officer, for miscellaneous operating expenses	4,575	6,818
Center Cut Capital, an entity controlled by John Lando, an executive director is an officer, for employee benefits	11,418	15,246
	<b>45,993</b>	<b>52,064</b>

**(b) Key management compensation**

Key management includes directors (executive and non-executive), the Chief Executive Officer, President and Chief Financial Officer. The compensation paid or payable to key management for employee services is shown below:

	<b>June 30, 2017</b>	<b>June 30, 2016</b>
	\$	\$
Salary and benefits to the CFO	40,667	36,000
Salary and benefits to the President and Director	37,500	37,500
Salary and benefits to CEO and Director	62,500	62,500
Share-based payments to officers and directors	-	56,700
	<b>140,667</b>	<b>192,700</b>

## **RISK AND UNCERTAINTIES**

Risk is inherent in all business activities and cannot be entirely eliminated. Our goal is to enable the Company's business processes and opportunities by ensuring that the risks arising from our business activities, the markets and political environments in which we operate is mitigated. The risks and uncertainties described in the Annual MD&A for the year ended December 31, 2016 are considered by management to be the most important in the context of the Company's business and are substantially unchanged as of the Report Date. Those risks and uncertainties are not inclusive of all the risks and uncertainties the Company may be subject to and other risks may apply.