



PyroGenesis Confirms Successful Production of Nano Silicon Material

MONTREAL, QUEBEC (GlobeNewswire – August 5th, 2021) - PyroGenesis Canada Inc. (<http://pyrogenesis.com>) (TSX: PYR) (NASDAQ: PYR) (FRA: 8PY), a high-tech company (hereinafter referred to as the “Company” or “PyroGenesis”), that designs, develops, manufactures and commercializes advanced plasma processes and sustainable solutions which reduce greenhouse gases (GHG), is pleased to confirm, that further to HPQ Silicon Resources Inc’s press release of earlier today¹, the Company has successfully produced Nano Silicon materials with its PUREVAP™ Nano Silicon Reactor (“NSIR”) for HPQ Nano Silicon Powders Inc (“HPQ NANO” or the “Client”), a wholly owned subsidiary of HPQ Silicon Resources Inc (TSX-V: HPQ) (OTCQX: HPQFF) (FWB: UGE).

PyroGenesis is currently working with HPQ, and/or HPQ subsidiaries, in the following three broadly defined projects:

1. Converting Silica (Quartz, SiO₂) into high purity silicon using PUREVAP™ QRR,
2. Converting Silicon (Si) into Nano Silicon powders using PUREVAP™ NSIR. The goal is to increase performance and storage capacity (highly sought-after characteristics in many industries but specifically EV) in lithium-ion batteries by replacing graphite with these nano silicon powders, and
3. Converting Silica (Quartz, SiO₂) quartz into fumed silica.

The successful milestone announced today by HPQ relates to the conversion of silicon into Nano Silicon powders (project #2 above). After experiencing certain delays relating to unexpected operating issues, PyroGenesis’ engineering team has been able to successfully produce nano silicon materials, and this represents a significant confirmation of the original assumptions underlying this project.

The next major milestone is to optimize the process and have a third-party evaluation of powder characteristics, after which orders can be delivered to various entities who have been waiting to receive samples.

“Notwithstanding certain unexpected operating challenges, the results today are indeed a significant milestone as it validates our original assumptions and provides further evidence that we are on the right path,” said P. Peter Pascali, CEO and Chair of PyroGenesis. “Although there

¹ <https://www.globenewswire.com/news-release/2021/08/05/2275911/0/en/HPQ-Gen-1-Nano-Silicon-Reactor-Successfully-Produces-First-Sample-of-Nano-Silicon-Material.html>

may be challenges ahead, and no outcome can be guaranteed, words cannot adequately describe the excitement at PyroGenesis of potentially being able to address significant challenges facing the development of lithium-ion batteries for the EV market, and others. For example, by 2030, it is estimated that anodes may contain up to 30% silicon in automotive applications as compared to today where silicon is barely used in these applications.²”

Research³ indicates that replacing graphite with nano silicon powders could allow for the manufacturing of high-performance Li-ion batteries with the capability of delivering an almost tenfold (10x) increase in anode capacity, inducing a 20-40% gain in the energy density of the next generation of Li-Ion batteries. The Li-ion battery market size is estimated to grow from USD 44.2 billion in 2020 to USD 94.4 billion by 2025, equivalent to a CAGR of 16.4%.⁴

PyroGenesis also confirms that it is now moving forward with the next phase of the project which consists (i) designing and manufacturing a semi-continuous process system with a commercial production capacity of at least 500 kg/month (approx. 6 MT/year) of nano silicon powders, and (ii) validating commercial scalability.

“PyroGenesis’ last major milestone, prior to the delivery of its first nano silicon sample, is the completion of an optimization process on the samples produced”, said Mr. Pierre Carabin, CTO and Chief Strategist of PyroGenesis. “The optimization process will, amongst other things, (i) improve product quality and consistency, (ii) evaluate the chemical characteristics, and (iii) perform microscopic and particle size distribution analysis.”

As previously disclosed, PyroGenesis has entered into an agreement with HPQ NANO in which, amongst other things, PyroGenesis benefits from (i) a 10% royalty (“Royalty”) on HPQ NANO’s future sales (with set minimums), and (ii) the option to convert this Royalty at any time into a 50% ownership in HPQ NANO.

About PyroGenesis Canada Inc.

PyroGenesis Canada Inc., a high-tech company, is a leader in the design, development, manufacture and commercialization of advanced plasma processes and sustainable solutions which reduce greenhouse gases (GHG) and are economically attractive alternatives to conventional “dirty” processes. PyroGenesis has created proprietary, patented and advanced plasma technologies that are being vetted and adopted by multiple multibillion dollar industry leaders in four massive markets: iron ore pelletization, aluminum, waste management, and additive manufacturing. With a team of experienced engineers, scientists and technicians working out of

² <https://roskill.com/news/silicon-porsche-looking-at-silicon-in-ev-battery-anode/>

³ <https://cen.acs.org/materials/energy-storage/battery-materials-world-anodes-time/97/i14>

⁴ <https://www.marketsandmarkets.com/Market-Reports/lithium-ion-battery-market-49714593.html#:~:text=Lithium%2DIon%20Battery%20Market%20size,at%20a%20CAGR%20of%2016.4%25.>

its Montreal office, and its 3,800 m² and 2,940 m² manufacturing facilities, PyroGenesis maintains its competitive advantage by remaining at the forefront of technology development and commercialization. The operations are ISO 9001:2015 and AS9100D certified, having been ISO certified since 1997. For more information, please visit: www.pyrogenesis.com.

About HPQ Silicon

HPQ Silicon Resources Inc. (TSX-V: HPQ) (OTCQX: HPQFF) (FWB: UGE), is a Canadian producer of Innovative Silicon Solutions, based in Montreal, building a portfolio of unique high value specialty silicon products. Working with PyroGenesis, HPQ is developing:

- The PUREVAP™ “Quartz Reduction Reactors” (QRR), an innovative process (patent pending), which will permit the one step transformation of quartz (SiO₂) into high purity silicon (Si) at reduced costs, energy input, and carbon footprint that will propagate its considerable renewable energy potential;
- The PUREVAP™ Nano Silicon Reactor (NSiR), a new proprietary process that can use different purities of silicon (Si) as feedstock, to make spherical Silicon Nano powders and nanowires; HPQ is also working with industry leader Apollon Solar of France to use their patented process and develop a capability to produce commercially porous silicon (Si) wafers and porous silicon (Si) powders.
- A new plasma-based process that will allow a direct conversion of Quartz into Fumed silica, therefore removing the usage of hazardous chemical in the production of Fumed silica and eliminating the Hydrogen Chloride Gas (HCl) associated with its manufacturing.

This press release contains certain forward-looking statements, including, without limitation, statements containing the words "may", "plan", "will", "estimate", "continue", "anticipate", "intend", "expect", "in the process" and other similar expressions which constitute "forwardlooking information" within the meaning of applicable securities laws. Forward-looking statements reflect the Corporation's current expectation and assumptions and are subject to a number of risks and uncertainties that could cause actual results to differ materially from those anticipated. These forward-looking statements involve risks and uncertainties including, but not limited to, our expectations regarding the acceptance of our products by the market, our strategy to develop new products and enhance the capabilities of existing products, our strategy with respect to research and development, the impact of competitive products and pricing, new product development, and uncertainties related to the regulatory approval process. Such statements reflect the current views of the Corporation with respect to future events and are subject to certain risks and uncertainties and other risks detailed from time-to-time in the Corporation's ongoing filings

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