

# HPQ Proprietary Nano Silicon Manufacturing Process to Incorporate First Ever One Step Capability of Carbon Coating Nano Silicon Material as it is Produced

14.10.2020 | [GlobeNewswire](#)

MONTREAL, Oct. 14, 2020 - Innovative silicon solutions provider [HPQ Silicon Resources Inc.](#) (TSX-V: HPQ; FWB: UGE; Other OTC : URAGF) through its wholly owned subsidiary, HPQ Nano Silicon Powders inc (HPQ NANO), is pleased to announce that the *PUREVAP™ Nano Silicon Reactor* (NSiR) presently being developed with PyroGenesis Canada Inc. (TSX-V: PYR) will be incorporating the following additional capability in its design:

- Carbon coating the spherical nano silicon powders and nanowires as they are being created.

## ONE STEP CARBON COATING NANO SILICON POWDERS AND NANOWIRES POTENTIAL GAME CHANGER?

The Silicon coating concept was validated on Tesla Battery Day when:

*Musk also added that he would tackle one of the key downsides of using silicon inside anodes by coating the silicon with elastic polymer coating and holding the silicon together with elastic binders.*<sup>1</sup>

Presently, advance coating processes, like Atomic Layer Deposition-coating (ALD) require:

- An additional dedicated self-contained process for the coating of the material;
- Capex for the dedicated process equipment;
- Additional material handling (increasing contamination risk and operational costs).

Combining the carbon coating process into the same operation cycle that produces the silicon materials, the low-cost transformation of metallurgically produced Silicon into spherical silicon nano powders or nano wires, could be game changing for the industry.

## SILICON POTENTIAL FOR BATTERY ANODE MATERIAL BECOMES MAINSTREAM

Tesla's latest battery day presentation confirmed that the future of battery anodes will be Silicon. Tesla's plans on removing graphite from the anode<sup>2</sup>, points to the need for Innovative Silicon Solutions which HPQ is focused on, as Silicon only based anodes are not yet technically feasible - for now.

Presently, Silicon is used in a blended form with graphite and typically only represents around 5% by wt, which explains the limited performance improvements achieved to date. The primary hurdle to increasing Silicon anode content in Li-ion batteries is the mitigation of Silicon swelling and cracking during the lithiation phase<sup>3</sup> in order to achieve a cyclage stability comparable to graphite.

Ongoing R&D indicates that the two most promising avenues for resolving these issues are:

1. Going small, nanosizing the Silicon in order to eliminate its cracking during the lithiation phase;
2. Encapsulating the Silicon in order to manage its swelling and cracking

This is why HPQ NANO is looking forward to the December 2020 start of our first *PUREVAP™ NSiR* reactor and moving the Nano Silicon project to the validation phase, to resolve these issues.

*“The decision to proceed with this additional capability demonstrates HPQ NANO’s leadership in the space and reflects the infancy of Silicon anode technology development. HPQ continues to expand the attractiveness of our product line for renewable energy storage participants and electric vehicle manufacturers who continue to search for cost effective ways of increasing the Silicon contained in their batteries. Our belief that HPQ NANO *PUREVAP™ NSiR* will open up unique multibillion-dollar business opportunity for HPQ and PyroGenesis has never been stronger. Having the vision to add this additional capability to the process is another example of the value of our unique relationship with PyroGenesis, a Company with a long track record of taking high-tech industrial projects from proof of concept to global commercial scalability,”* said Bernard Tourillon, President and CEO HPQ Silicon. *“Silicon potential to meet energy storage demand is undeniable and generating massive investments, as well as, serious industry interest. We are very confident about the prospect of being one of the first companies coming to market with a low-cost scalable process that can encapsulate, in Carbon, the spherical Nano Silicon Powders and Nanowires that batteries and EV manufacturers are looking for.”*

#### About Silicon

Silicon (Si), also known as silicon metal, is one of today’s strategic materials needed to fulfil the Renewable Energy Revolution (RER) and the decarbonization of the economy presently under way. Silicon does not exist in its pure state; it must be extracted from quartz (SiO<sub>2</sub>), in what has historically been a capital and energy intensive process.

#### About HPQ Silicon

[HPQ Silicon Resources Inc.](#) (TSX-V: HPQ) is a Canadian producer of Innovative Silicon Solutions, based in Montreal, building a portfolio of unique high value specialty silicon products needed for the coming RER.

Working with PyroGenesis Canada Inc. (TSX-V: PYR), a high-tech company that designs, develops, manufactures and commercializes plasma - based processes, HPQ is developing:

- The *PUREVAP™ Quartz Reduction Reactors* (QRR), an innovative process (patent pending), which will permit the one step transformation of quartz (SiO<sub>2</sub>) into high purity silicon (Si) at reduced costs, energy input, and carbon footprint that will propagate its considerable renewable energy potential;
  - HPQ believes it will become the lowest cost (Capex and Opex) producer of silicon (Si) and high purity silicon metal (3N & 4N Si);
- Through its 100% owned subsidiary HPQ NANO Silicon Powders Inc, the *PUREVAP™ Nano Silicon Reactor (NSiR)*, a new proprietary process that can use different purities of silicon (Si) as feedstock, to make spherical silicon nanopowders and nanowires;
  - HPQ believes it can also become the lowest cost manufacturer of spherical Si nanopowders and silicon-based composites needed by manufacturers of next-generation lithium-ion batteries;
  - During the coming months, spherical Si nanopowders and nanowires silicon-based composite samples requested by industry participants and research institutions will be produced using *PUREVAP™ NSiR*.

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;
  - The collaboration will allow HPQ to become the lowest cost producer of porous silicon wafers for all-solid -state batteries and porous silicon powders for Li-ion batteries;
  - Develop the hydrogen generation potential of Silicon nanopowders for usage with the Gennao™ system;
  - Commercialize, exclusively in Canada, and non-exclusive in the U.S.A., the Gennao™ H2 system and the chemical powders required for the hydrolysis production of Hydrogen ("H2").

This News Release is available on the company's CEO Verified Discussion Forum, a moderated social media platform that enables civilized discussion and Q&A between Management and Shareholders.

*Disclaimers:*

*The Corporation's interest in developing the PUREVAP QRR and any projected capital or operating cost savings associated with its development should not be construed as being related to the establishing the economic viability or technical feasibility of any of the Company's Quartz Projects.*

*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 "forward-looking information" within the meaning of applicable securities laws. Forward-looking statements reflect the Company'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 Company with respect to future events and are subject to certain risks and uncertainties and other risks detailed from time-to-time in the Company's on-going filings with the security's regulatory authorities, which filings can be found at [www.sedar.com](http://www.sedar.com). Actual results, events, and performance may differ materially. Readers are cautioned not to place undue reliance on these forward-looking statements. The Company undertakes no obligation to publicly update or revise any forward-looking statements either as a result of new information, future events or otherwise, except as required by applicable securities laws.*

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<sup>1</sup> <http://m.koreaherald.com/amp/view.php?ud=20200923000846>

<sup>2</sup> NBCFM September 23, 2020 Research Flash

<sup>3</sup> The incorporation of lithium into an electrode in a lithium-ion battery [LINK]

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Die URL für diesen Artikel lautet:

<https://www.rohstoff-welt.de/news/364178--HPQ-Proprietary-Nano-Silicon-Manufacturing-Process-to-Incorporate-First-Ever-One-Step-Capability-of-Carbon-Co>

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