

PUREVAP™ : A Nano Reactor for Producing Nanomaterials for Next-gen Li-ion Batteries

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HPQ Silicon Resources Inc., a resource company providing high purity silicon metal, and PyroGenesis Canada Inc., a leading company in the design, development, manufacture, and commercialization of advanced plasma processes and products, announced that they jointly developed an innovative low-cost production process – called PUREVAP™ process which takes place in a silicon metal nano reactor – for producing spherical silicon metal nanopowders and silicon nanowires required for the next generation of Lithium-ion Si batteries.

HPQ Silicon Resources Inc. ([HPQ](#)) would like to update shareholders on the steps being undertaken by HPQ and PyroGenesis [Canada](#) Inc. ([PyroGenesis](#)) to advance the development of a new low-cost manufacturing process that can produce the Spherical Silicon Metal (Si) Nano-Powders and Si Nanowires needed for the next generation of Lithium-ion (Li-ion) Si batteries.

BUILT ON 5 YEARS OF PUREVAP™ QUARTZ REDUCTION REACTOR (QRR) DEVELOPMENT KNOW-HOW

After the successful GEN2 PUREVAP™ QRR [proof of concept test](#), PyroGenesis finalized the engineering designs and the plans required to upgrade a PUREVAP™ QRR into a PUREVAP™ reactor that can transform melted silicon metal into spherical [Nano-Powders](#) and [Nanowires](#). As a result of this work, a new provisional patent application was filed to protect this new process.

DEVELOPING THE PUREVAP™ SILICON METAL NANO REACTOR (SiNR)

The new PUREVAP™ process is a Silicon Metal Nano Reactor, (PUREVAP™ SiNR), that incorporates the PUREVAP™ QRR (patent pending) unique capability of removing impurities from Silicon Metal (Si) into a novel proprietary process that allows different purities of Si feedstock to be melted into liquid Si. This liquid Si can then be synthesized into the Spherical

Silicon Metal Nano Powders and Nanowires sought after by Corporations looking into building the next generation of Lithium-ion batteries.

“The PUREVAP™ SiNR opens up a unique multibillion-dollar business opportunity for HPQ and PyroGenesis. PyroGenesis has a long track record of taking high-tech industrial projects from proof of concept to global commercial scalability, so we are very confident about the prospect of being one of the first companies coming to market with a low-cost process that makes the spherical Silicon Metal Nano-Powders and Nanowires that next-generation Li-ion battery manufacturers are seeking,” said Bernard Tourillon, President and CEO HPQ Silicon. “Silicon Metal’s potential to meet energy storage demand is undeniable and generating massive investments, as well as, serious industry interest, so our timing could not be better.”



From Silicon Metal (Si) to Spherical Nanopowders (HPQ Silicon).

GEN2 PUREVAP™ QRR CONVERTED INTO A PROOF OF COMMERCIAL SCALABILITY PUREVAP™ SINR

The quickest way to demonstrate the capabilities of the PUREVAP™ SiNR process is to upgrade the existing GEN2 PUREVAP™ QRR into PUREVAP™ SiNR testbed, run a series of tests to confirm the scalability, the low-cost nature of the process and its feedstock flexibility.

During these tests, Spherical Silicon Metal Nano-Powders and Nanowires samples will be produced and sent to either research centers for independent valuation or made available to potential end-users looking at manufacturing next-generation Li-ion batteries. Successful tests will demonstrate the process flexibility in making a range of advanced Silicon Metal materials.

The preliminary timeline is for the reactor conversion to be completed over the next coming months, with a goal of being able to have samples ready in this fiscal year.

SPHERICAL Si NANO POWDERS AND NANOWIRES KEY TO HIGHER ENERGY DENSITY LI-ION BATTERIES

Spherical Silicon Metal Nano-Powders and Si Nanowires have been [identified](#) as key elements that will allow the manufacture of high-performance Li-ion batteries using Silicon Metal (Si) anodes needed to deliver on the [research](#) promises of an almost tenfold (10x) increase in the specific capacity of the anode, inducing a 20-40% gain in the energy density of Li-ion batteries.

Current manufacturing methods for Silicon Metal Nano-Powders are expensive, not very scalable and not commercially feasible with US\$ 30,000/kg¹ selling prices while manufacturing Silicon Metal Nanowires is so prohibitive that only government-funded special projects can afford them.

“The opportunities that are being developed with the PUREVAP™ process is nothing short of intoxicating,” said M. P Peter Pascali, President and CEO of PyroGenesis [Canada](#) Inc. “We never thought, when we first embarked on this project, that we would be developing game-changing technology sought after by the Lithium-ion battery market. We are looking forward to successfully incorporating and upgrading the PUREVAP QRR™ into the PUREVAP™ Nano reactor to produce Spherical Silicon Metal (Si) Nano-Powders and Si Nanowires needed for the next generation of Lithium-ion (Li-ion) Si batteries.”

Read the [original article](#) on HPQ Silicon.