



PyroGenesis Completes First Series of Tests for the PUREVAP™ Process; Results Exceed Expectations

MONTREAL, QUEBEC--(Marketwired – September 29, 2016) - PyroGenesis Canada Inc. (<http://pyrogenesis.com>) (TSX-V: PYR) (OTCQB: PYRNF), a company (the “Company” or “PyroGenesis”) that designs, develops, manufactures and commercializes plasma waste-to-energy systems and plasma torch products, is pleased to announce today that it has completed the first series of laboratory scale testing of the PUREVAP™ process, and has provided a summary of these results to its client, HPQ Silicon Resources Inc. (“HPQ”).

The PUREVAP™ process is a process being developed by PyroGenesis in which quartz is transformed into a solar grade metal suitable for solar panel applications, in one-step, which effectively eliminates significant overheads thereby creating a simple, pure and cheap alternate to that currently available. If successful, management believes this process would have a significant impact on the solar industry; however there are significant commercial applications at lower purity¹ levels as well (i.e. above 99.9%).

In 2014, the silicon metal, solar grade silicon metal and electronic grade silicon metal markets combined formed a US \$12B per year industry and world consumption of metallurgical grade silicon metal topped 2.25 million tonnes over the same period, exceeding US \$6B in revenues². Propelled by increased demand for photovoltaic (PV) solar panels systems, metallurgical grade silicon metal consumption is expected to grow by over six percent (6%) per annum³.

The Company is currently engaged by HPQ in a second phase of testing (“Phase 2”), geared towards generating and collecting data which can be used for the commercial scale-up of the PUREVAP™ process. This Phase 2 testing is expected to be completed within the next six (6) months and is valued at CDN\$120,000. Separately, as previously announced on August 2, 2016, PyroGenesis is also engaged by HPQ under a CDN\$8,260,000 contract for, amongst other things, the design, fabrication, assembly, commissioning and testing of a 200 metric tonne (MT) per year PUREVAP™ pilot system to produce silicon metal directly from quartz.

The results being announced today were obtained during “Phase 1 - Proof-of-Concept Metallurgical Tests” (“Phase 1”), which was comprised of 15 tests. Of these tests, 5 produced samples of a size significant enough to be analyzed.

An overview of the test results of this Phase 1 are described below, highlights of which we provide as follows:

¹ Dosaj, Vishu, Michael Kroupa, and Reinaldo Bittar. "Silicon and silicon alloys, chemical and metallurgical." *Kirk-Othmer Encyclopedia of Chemical Technology* (2005).

² Roskill: Silicon and Ferrosilicon: Global Industry Markets & Outlook report (2014).

³ Roskill: Silicon and Ferrosilicon: Global Industry Markets & Outlook report (2014).

- a) Analysis confirms that the PUREVAP™ Process is capable of producing high purity silicon metal.

Glow Discharge Mass Spectrometry ('GDMS') analysis confirms purity levels as high as 99.97% (3N+) was attained.

Of note, this analysis also reflected a high level of sulphur present in almost all the test results. The observation that sulfur increased in concentration, despite it being an easy element to vaporize, seems to indicate that the carbon used for the test may have been contaminated, thus affecting results. We believe the current results, without sulphur impurities, would have produced purity levels as high as 99.991% (4N+).

"This issue of sulfur contamination, we believe, originates from the fact that there was high variability in the quality of carbon used for the tests, therefore contaminating the samples produced," said Pierre Carabin, Director of Engineering of PyroGenesis. "We strongly expect this issue will be addressed by merely selecting a carbon source with less variability and lower sulfur content."

- b) Analysis also confirms that the PUREVAP™ process can remove boron and other key impurities from the final material produced.

Of note, removal efficiency for aluminum, boron, calcium and phosphorous were consistently high, between 67 and 97%. Boron, which negatively impacts the electrical properties of photovoltaic solar systems, is one of the most difficult impurities to remove from silicon metal, and its removal is an important step in producing solar grade silicon metal. This is a very significant development and has been achieved ahead of schedule.

"Achieving significant removal of impurities is a major milestone on our road to transforming quartz (SiO₂) into silicon metal (Si)," said P. Peter Pascali, President and CEO of PyroGenesis, "and it increases the probability that the PUREVAP™ process will eventually become the gold standard for the production of high purity silicon metal."



First nuggets of silicon
metal produced during test
#15

Additionally, ramping up the PUREVAP™ process during this Phase 1 resulted in test #15 producing meaningful sizes of pure silicon metal nuggets, which we expect will make future analysis simpler and quicker, thereby reducing turnaround times during the current Phase 2 series of tests.

“We are clearly breaking new ground in a very exciting industry where the initial results are very promising,” said Mr. Pascali. “Key milestones are being reached and the path towards higher purity levels is becoming ever clearer. We do not expect the future to be without its challenges, but so far, the results produced are better than what we had anticipated.”

Overview of the Test Results for Phase 1*:

Test #	Date	Description	Result	SEM Analysis Confirms Reading of 100 % Si	Trace Metallic Impurities [ppm wt]	Implied Purity in %
1	16-03-29	First test hot test	No sample produced	N/A	N/A	N/A
2	16-04-07	Increased power input	Sample produced	N/A	N/A	N/A
3	16-04-08	Reduced heat losses	Test Failure	N/A	N/A	N/A
4	16-04-15	Changed electrode tip	Test Failure	N/A	N/A	N/A
5	16-04-20	New electrode sealing	Test Failure	N/A	N/A	N/A
6	16-05-09	New electrode design	Sample produced	YES	1,100.82	99.88
7	16-05-10	Additional Insulation	Sample produced	YES	763.02	99.92
8	16-05-13	Changed C particle size	Test Failure	N/A	N/A	N/A
9	16-05-13	Pre-dried carbon source	Sample produced	YES	271.85	99.97
10	16-05-25	Changed base design	Sample produced	YES	314.93	99.97
11	16-05-30	Changed base design	No sample produced	N/A	N/A	N/A
12	16-06-16	Smaller Quartz	No sample	N/A	N/A	N/A

		particle size	produced			
13	16-07-05	Mixture of quartz	Traces of metal produced	N/A	N/A	N/A
14	16-07-13	Reproduce previous test	Traces of metal produced	N/A	N/A	N/A
15	16-07-22	Improve heat losses	First Nugget Size Sample Ever produced	YES	909.04	99.91

**Summary of test results achieved during the Proof-of-Concept Metallurgical testing program*

Testing Methodology:

The SEM (scanning electron micrographs)-EDX analysis was completed at the INRS - ETE laboratory in Quebec City.

SEM used are Carl Zeiss EVO® 50 smart SEM, equipped with a range of imaging detectors, including: an Everhart-Thornley Secondary Electron Detector, for topographic image.

About PyroGenesis Canada Inc.

PyroGenesis Canada Inc. is the world leader in the design, development, manufacture and commercialization of advanced plasma processes. We provide engineering and manufacturing expertise, cutting-edge contract research, as well as turnkey process equipment packages to the defense, metallurgical, mining, advanced materials (including 3D printing), oil & gas, and environmental industries. With a team of experienced engineers, scientists and technicians working out of our Montreal office and our 3,800 m² manufacturing facility, PyroGenesis maintains its competitive advantage by remaining at the forefront of technology development and commercialization. Our core competencies allow PyroGenesis to lead the way in providing innovative plasma torches, plasma waste processes, high-temperature metallurgical processes, and engineering services to the global marketplace. Our operations are ISO 9001:2008 certified, and have been since 1997. PyroGenesis is a publicly-traded Canadian company on the TSX Venture Exchange (Ticker Symbol: PYR) and on the OTCQB Marketplace (Ticker Symbol: PYRNF). For more information, please visit www.pyrogenesis.com

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