

# **Zenyatta Ventures announces Ballard Power collaboration – initial test results positive.**

**Zenyatta Ventures Ltd. {TSX.V: ZEN}** has announced a collaboration with TSX listed fuel cell developer Ballard Power.

Initial tests on Albany produced graphite have proved positive.

## **PRESS RELEASE**

***Zenyatta Ventures and Ballard Power Collaborate on Fuel Cell Technology Related to Energy Storage; Testing by Ballard on Albany Graphite Exhibited High Thermal and Corrosion Resistance Properties***

THUNDER BAY, ON, Aug 12, 2015 **Zenyatta Ventures Ltd. {TSX.V: ZEN}** is pleased to announce that it plans to collaborate with **Ballard Power Systems Inc. {TSX: BLD}** on high purity graphite required in components of fuel cell technology. A first step screening process on Zenyatta's Albany graphite confirmed its suitability for use in the bipolar plate ("BPP") and gas diffusion layer ("GDL") for fuel cells. High thermal stability and corrosion resistance is critical in the performance of these components in fuel cells. This research into fuel cell innovation was supported by technical, advisory services and a financial contribution from the National Research Council of Canada Industrial Research Assistance Program (NRC-IRAP).

## Highlights:

- – Zenyatta graphite exhibits high thermal stability and corrosion resistance under Ballard testing;
- Early testing shows Albany graphite to be suitable for BPP and GDL fuel cell components;
- Zenyatta and Ballard plan to build components and further test these in fuel cells.

Dr. Rajesh Bashyam, Senior Research Scientist, R&D for Ballard stated, *"Thermogravimetric Analysis (TGA) results showed that all Albany graphite samples had high thermal stability under the Ballard standard TGA protocol. Under this protocol most forms of graphite undergo complete thermal decomposition at around 860 degrees C to lose all carbon. On the other hand, Zenyatta's Albany graphite samples only lost 60 – 65% even at 1000 degrees C. The detailed investigation clearly indicated that the Albany graphite exhibits excellent thermal stability and this can be used advantageously in the sub-components of fuel cells, in particular as the gas diffusion layer material. Also, corrosion resistance is an important requirement for an electrically conductive material like graphite used as a component material in fuel cells. Our testing results revealed that Zenyatta graphite samples of a certain particle size were found to be more corrosion resistant than typical graphite."*

The initial test screening was conducted by Ballard for purity, particle size, corrosion resistance, thermal stability and other desirable properties for use in fuel cells. These tests revealed Zenyatta's Albany graphite material to be suitable for use in hydrogen fuel cells with further advanced testing planned. Testing results were obtained from a lab-scale sample provided by SGS Canada Inc. ('SGS') solely for the purpose of providing early evaluation on the suitability and effectiveness of Albany graphite in these component

applications.

Dr. Bharat Chahar, VP of Market Development for Zenyatta stated, *"We are very pleased with these results from the Ballard testing. The purity and particle size of the Albany graphite material provided was already in the range needed for fuel cell applications, and therefore no further milling or purification was needed. Due to simple mineralogy, high crystallinity and desirable particle size distribution, Zenyatta's Albany graphite has shown first screening specification ranges needed for the hydrogen fuel cell components. While further tests are ongoing to verify other performance characteristics, this initial feedback on results is extremely encouraging and quite promising for our upcoming advanced testing."*

Zenyatta commenced a market development program several months ago to initiate validation of Albany graphite in high purity graphite applications. Since the start of this program, the Company has had detailed conversations with more than 35 graphite end-users, academic labs and third party testing facilities in Europe, North America and Asia under confidentiality agreements.

Many of these organizations requested a specified amount of purified Albany graphite produced at the SGS site during the development of a process flow sheet. The samples produced at SGS are experimental in nature and may differ slightly from batch to batch and may also differ from the final product in the future. However these samples are representative of the product that could be processed and provide a good initial assessment and guidance for the potential of Albany graphite for various applications.

The goal of these initial samples was to screen Albany graphite for suitable applications while gathering feedback from the end-users and testing facilities to improve the overall properties for high value applications. The Company is now starting to receive feedback from several end-users and independent labs, some of which received repeat samples. Information from this initial test program will be used to further define the Company's product and market strategy and set the stage for next steps in development.

Zenyatta plans to provide its stakeholders with brief periodic updates on the progress as meaningful information becomes available on the market and business development.

Fuel cells and batteries are used in energy conversion and storage applications. A battery as an energy storage device will stop producing electrical energy when the chemical reactants are consumed and then needs to be recharged. The fuel cell is an energy conversion device and will produce electrical energy as long as the fuel and the oxidant are fed to the electrodes. There are many types of fuel cells used in various end-use applications including transportation, industrial equipment, stationary power generation, back-up power, aerospace and defense. Various fuel cell technologies have been developed to convert many different fuels to electricity at high efficiencies. While fuel cells were first developed in 1960's for niche applications such as generation of power for space vehicles, a large amount of R&D has been conducted over the last fifty years and resulted in much wider use of this technology. It is now considered a "green technology" for use in many applications. Since the fuel cells can be designed to use different forms of fuel, this is one of

the leading technologies for sustainable generation of power in small to medium sized industrial applications.

Graphite for this market has to meet many challenging performance characteristics before it can be used in a Fuel Cell. The traditional graphite material used in bipolar plates is usually purified using expensive hydrofluoric ('HF') chemical or thermal processes. Zenyatta has developed an innovative purification system on its unique graphite material that does not require use of these traditional and environmentally damaging processes.

Graphite is used in the bipolar plate as an electrically and thermally conductive additive. Bipolar plates, which are a major component of fuel cells, are made from high purity graphite. These plates need to be impermeable to gases, have good electrical conductivity, high strength, low weight, good resistance to corrosion and should be easy to manufacture in large quantities.

**Graphite must be high-grade (> 99.9% C) with low impurities with a viable, low cost purification process.** Smaller amounts of graphite or carbon materials are used in the gas diffusion layers and the membrane electrode assembly of fuel cells, as a catalyst support, as coatings for the bi-polar plates, and in solid oxide fuel cell (SOFC) components. Gas diffusion layers use high purity, fine graphite powders for controlled porosity and low electrical resistance.

***Based on research and dialogue with end-users, at this point in time, Zenyatta expects to have a targeted market***

***application segmentation which includes 20-25% for high purity graphite in Fuel Cell products, 25-30% in Lithium-ion batteries, 25-30% in powder metallurgy and 15-30% from other applications.***

The Company is in discussion with end-users on other types of high purity applications that could possibly change the market segmentation. Markets for fuel cells using hydrogen as fuel are growing rapidly and high performance graphite is a significant component of these fuel cells.

More information on the hydrogen fuel cells and their end-use markets is available on Zenyatta's web site.

Dr. Bharat Chahar, P.E., VP Market Development for Zenyatta, is a Qualified Person for the purposes of National Instrument 43-101 and has reviewed, prepared and supervised the preparation of the technical information in this news release.

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