Zenyatta Ventures Ltd.: Graphene Derived from Albany Graphite Continues to Show Considerable Promise as Cement Additive

written by Raj Shah | September 13, 2018

September 13, 2018 (Source) – Zenyatta Ventures Ltd. (TSXV: ZEN) is pleased to announce preliminary research findings from University of Toronto that point to significant improvements in the compressive and flexural strength of cement when graphene products derived from Albany Graphite are combined with the cement.

Including graphene in quantities of as little as 0.02% increased the compressive strength of cured cement paste by up to 39%, according to research conducted by Professor Daman Panesar and her team at University of Toronto's Department of Civil & Mineral Engineering, where she is one of the inaugural recipients of the Erwin Edward Hart Professorship in Civil Engineering. A broad objective of Prof. Panesar's research is to advance concrete technologies by investigating new types of concrete to reduce environmental impact, improve economic feasibility, achieve desired plastic and mechanical properties, and improve long-term durability performance. Although still at a preliminary stage, Prof. Panesar's work confirms and builds upon research that was previously conducted at Ben-Gurion University in Israel by Prof. Oren Regev and his team.

"These encouraging preliminary results strengthen the business case for using graphene in concrete," said Dr. Francis Dubé,

Zenyatta's Co-Chief Executive Officer and Head of Business Development. "With such a low graphene loading, Zenyatta may now be able to pursue the ready-mix concrete market which is much larger than the significantly smaller volume Ultra-High Performance concrete market." The ready-mix concrete market is estimated at US$500 Billion per year.

For the current round of research, three forms of Graphene-based materials – graphene, graphene oxide and reduced graphene oxide – were systematically tested. The three types of graphene material were mixed with cement in a range of concentrations, from 0.01% to 0.16% of the cement weight, and the results compared to a control specimen comprised of 100% Portland cement paste (without graphene).

Adding any of the three graphene materials improved both the compressive and flexural strength at 3, 14 and 28 days, by varying degrees. At the 28-day mark, the inclusion of graphene materials improved compressive and flexural strength by a maximum of 39% (for 0.02% graphene) and 84% (for 0.04% reduced graphene oxide), respectively, compared to the control cement paste. Furthermore, all three forms of graphene materials improved the cement paste's transport properties at 28 days. (Transport properties are related to the porosity of the resulting composite: The lower the porosity the better, as it reduces fluid flow through the material and potentially results in a higher durability.) The microstructural analysis and transport properties of 28-day old graphene-cement composites showed that the presence of graphene materials densified the composite microstructure.

The dispersion of the graphene is a key factor in achieving these results, and graphene derived from Zenyatta's unique Albany Graphite deposit has particularly good dispersion qualities. Previous research by Prof. Yoshihiko Arao

and Prof. Masatoshi Kubouchi at Japan's Tokyo Institute of Technology concluded "The optical absorbance of the Zenyatta graphene was 2-10 times better than the other three tested reference samples which demonstrate concentrated graphene dispersion."

Zenyatta will continue to work with Prof. Panesar and her team as they study in greater depth graphene-infused cement-based composites, including graphene dispersion techniques, repeatability of results, the long-term properties of graphene-cement composites as well as their performance in more complex cement-based systems such as mortar and concrete.

Prof. Panesar's research was supported by funding from the Government of Canada through the NSERC Engage Funding Program. Zenyatta also acknowledges the contributions of Prof. Aicheng Chen at University of Guelph who provided the graphene oxide and reduced graphene oxide for Prof. Panesar's research, and Prof. Giovanni Fanchini at Western University who provided the graphene – which were all produced from graphite samples provided by Zenyatta from its Albany deposit.

Mr. Peter Wood, P.Eng, P.Geo., Vice President of Zenyatta, is the "Qualified Person" for the purposes of National Instrument 43-101 and has reviewed, prepared and supervised the preparation of the technical information contained in this news release.

About Zenyatta

Zenyatta's Albany Graphite Project hosts a large and unique quality deposit of highly crystalline graphite. Independent labs in Japan, UK, Israel, USA and Canada have demonstrated that Zenyatta's Albany Graphite/Naturally Pure™ easily converts (exfoliates) to graphene using a variety of simple mechanical and chemical methods. The deposit is located in northern Ontario

just 30km north of the Trans-Canada Highway, near the communities of Constance Lake First Nation and Hearst. Important nearby infrastructure include hydro-power, natural gas pipeline, a rail line 50 km away and an all-weather road just 10 km from the deposit.

To find out more on Zenyatta Ventures Ltd., please visit our website at www.zenyatta.ca. A copy of this press release and all material documents with respect of the Company may be obtained on Zenyatta's SEDAR profile at www.sedar.ca.

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Panesar’s research and may not necessarily reflect the views of the University of Toronto researchers.