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Moving from hype to reality

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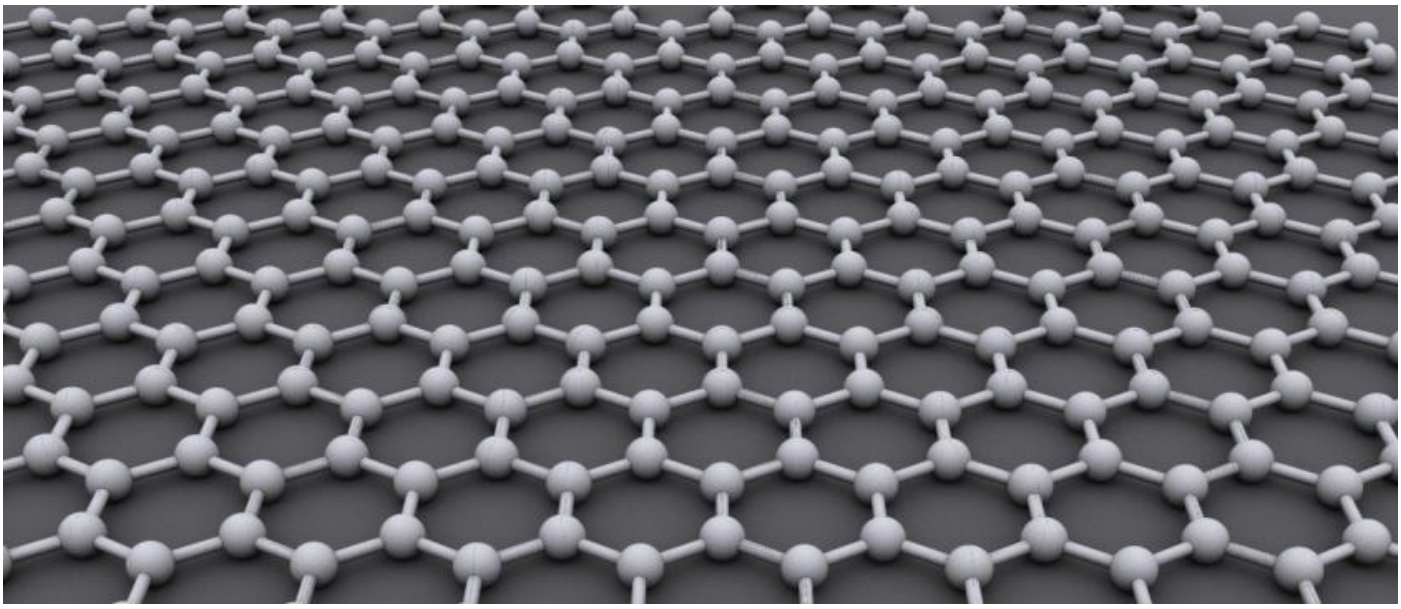

An Australian company is playing a key role in delivering commercial quantities of graphene.

Consisting of crystalline sheets of carbon as little as one atom thick, graphene has been hailed as the new two-dimensional super material – the subject of much hype in the science and engineering communities since the turn of the century when commercial production first became feasible.

Graphene's highly desirable properties include exceptional conductivity and flexibility, as well as the ability to transmit around 97% of white light. This has led to a wealth of research into applications of graphene, including flexible display screens. LG recently announced a transparent refrigerator door.

The main barrier to the wide-scale application of graphene is the cost and difficulty of extraction, and the absence of a high quality, affordable supply with adequate volume to support bulk manufacture.

This may be about to change. Swedish authorities have recently approved a graphite test mine, called the Vittangi project, to be operated by Australian-based mining company Talga Resources, which is also aiming to be the world's first producer of bulk low cost graphene.

According to Talga managing director Mark Thompson, the Vittangi ore is the highest grade discovered worldwide – allowing the company to trial an innovative production method that will

enable economic bulk extraction of high quality graphene.

Scientists Andre Geim and Konstantin Novoselov developed the earliest method of graphene extraction in 2004, using ordinary sticky tape to lift graphene from a block of graphite, which won them the 2010 Nobel Prize in Physics.

In the last decade, there has been much research and development into the production of graphene, but all have resulted in small output levels.

The exceptional quality of the Vittangi ore is enabling a one stage extraction process without milling or crushing, bypassing toxic chemical oxidation and reduction stages used in other methods of graphene production, and still producing graphene of a superior quality. The business plan is to produce up to 7,000 t a year.

Although the exact nature of the process is a closely guarded trade secret, Talga has published material that states that an electrical current is used to extract both graphene and graphite from the uncrushed ore.

While the full scale facility will be located in Sweden, Talga will trial their process in a demonstration plant located in Germany, where the company works with two German universities – the University of Jena and University of Dresden. The partnership provides the capability and equipment necessary to perform analytical measurement of material down to one atom in thickness. It is anticipated that graphene test samples will be available in the last quarter of 2015 with full scale production in the next two to three years.

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