

ASX Announcement

28 July 2017

Graphene-Based Fire Retardant Technology Advancing Well



Highlights

- FGR holds the worldwide licence agreement with The University of Adelaide to exploit the development of a graphene-based fire retardant technology.
- Continuing test work is proving this new generation product to be superior to existing fire retardants in the areas of;
 - Self extinguishing ability;
 - Suppression of toxic and flammable volatiles;
 - Oxygen barrier effect; and
 - Retention of mechanical strength of structure.
- Prospective uses include coatings on walls, papers, wood, houses, construction materials, fabrics and uniforms and military hardware.

First Graphite (ASX: FGR) is pleased to provide an update on the progress with the graphene-based fire retardant technology being undertaken with the University of Adelaide. The technology was made available to the Company and will be developed by the University as part of FGR's position as a founding partner in the Australian Research Council (ARC) Research Hub for Graphene Enabled Industry Transformation which is funded by the Australian Government, through the ARC's *Industrial Transformation Research Hubs* scheme. It is believed that this technology offers the Company significant earnings potential whilst also generating strong demand for its graphene production.

Fire-Retardants

Fire is a devastating disaster for our society, costing lives, damaging the environment and causing economic loss. In the United States alone economic loss from fire is estimated at US\$600 billion per annum, or approximately 2.1% of GDP. In Australia, the numbers are estimated at \$15 billion or 1.3% of GDP.

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ASX Symbol

FGR, FGROB



Fire retardants currently used throughout industry rely on toxic halogen organic-based fire retardants. These create environmental problems such as soil and water pollution. Many are mutagenic and carcinogenic and have been banned in some countries. Industry is actively looking for better alternatives.

One of the main causes of damage by fire on many materials is the intumescent effect, whereby these materials swell on exposure to heat, thereby causing expansion and a destruction of the structural integrity of the material. This material starts to break down, causing the release of flammable and toxic gases. As the processes continues there is an increasing danger of structural collapse even with the use of existing retardants which may slow down the reactions. The test work with graphene has demonstrated an effective barrier to oxygen in the first instance, which is one of the three key elements needed for a fire. The restricting of a fire's access to oxygen reduces its intensity and limits the generation of heat, thereby minimising the intumescent effect.

Having proven graphene-based retardants work well, work is continuing with the practical aspects of applying these coatings and optimising developed formulations. Importantly, as it comes down to ease of use, the graphene based retardant can be easily applied with a spray or a brush. Its flexibility makes it suitable in the protection of cellulosic, plastics and polymers. It is effective and fit for purpose in significantly smaller concentrations than existing retardants. It is not difficult to manufacture and does not require expensive capital equipment.

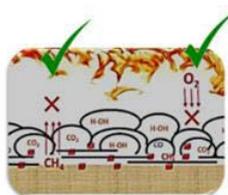
As well as economic benefits offered to manufacturers and end users, this new generation of fire-retardants offers better fire-protection and strong environmental benefits to society. Fires will generate less gases and pollution and the carcinogenic and mutagenic effects of existing retardants will be circumvented.

There appears to be no obvious impediments to the commercialisation of these new type of fire-retardants once government standards and ratings are satisfied. Different application and materials will be subject to varying compliance regimes depending upon whether the retardant is used for consumer products or those that have implications for building codes. Each state and each country will have its own set of rules.

A graphene based fire-retardant could become the new generation of fire resistive coatings and fire retardants. The graphene technology would provide a four fold benefit.

Benefits Offered by the New Technology

1. Oxygen barrier effect and water vapour release – which would mitigate flammability
2. Self extinguishing ability – so it would not be a flame propagator
3. Restraining structural collapse – the mechanical strength of graphene would assist in maintaining integrity
4. Toxic and flammable volatiles suppression – which would assist rescue efforts



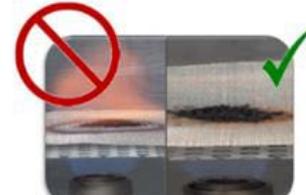
Oxygen barrier effect and water vapor release
(Mitigating flammability)



Toxic and flammable volatiles suppression
(Easy rescue)



Restraining structural collapse
(Mechanical strength)



Self-extinguishing ability
(No flame-propagation)



The development of two product lines will be the focus of the FGR and University of Adelaide work as part of the Australian Research Council (ARC) Research Hub for Graphene Enabled Industry Transformation program.

1. Graphene paints for fire resistive coatings – this includes wall papers, fibres, wood fences and building cladding.



2. Fire resistive engineered wood – which includes particle-board, chip board and gyproc wall material.



A video demonstrating the benefit of the graphene based fire retardant can be viewed on the Company's YouTube channel at <https://youtu.be/v82SrC72R0s>. The butane flame, at approximately 3,000° C, is applied to the wood, one untreated and one treated with the graphene fire retardant. The results are dramatic.



Commenting on this update, FGR's Managing Director Craig McGuckin said

"The recent tragic events at Grenfell Tower in Kensington, and the subsequent disclosure that many buildings in the UK, and here in Australia, are clad with flammable material has focussed attention on fire retardant materials. FGR is well placed with the advanced research at the University of Adelaide and ARC Graphene Research Hub to look to deliver a product which will provide considerable social benefits. We are very pleased to be at the cutting edge of this transformative development"

About First Graphite Ltd (ASX: FGR)

First Graphite produces high quality graphene from high grade Sri Lankan vein graphite.

First Graphite seeks to develop graphene production methods and acquire graphene related intellectual property which can provide further revenue related opportunities.

About Graphene

Graphene, the well-publicised and now famous two-dimensional carbon allotrope, is as versatile a material as any discovered on Earth. Its amazing properties as the lightest and strongest material, compared with its ability to conduct heat and electricity better than anything else, mean it can be integrated into a huge number of applications. Initially this will mean graphene is used to help improve the performance and efficiency of current materials and substances, but in the future, it could also be developed in conjunction with other two-dimensional (2D) crystals to create some even more amazing compounds to suit an even wider range of applications.

One area of research which is being very highly studied is energy storage. Currently, scientists are working on enhancing the capabilities of lithium ion batteries (by incorporating graphene as an anode) to offer much higher storage capacities with much better longevity and charge rate. Also, graphene is being studied and developed to be used in the manufacture of supercapacitors which are able to be charged very quickly, yet also be able to store a large amount of electricity.

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