

ASX Announcement

31 October 2017



first graphite
Australia's leading graphene company

September Quarterly Activities Review

Advanced materials company, First Graphite Limited (FGR) is pleased to report on another significant quarter in the Company's development.

HIGHLIGHTS

- Appointment of Advanced Materials Advisor, Dr Andy Goodwin
- Construction of the graphene production facility is on schedule and below budget
- Positive test results for graphene additive in thermoplastics
- Excellent test results and economics on FireStop™ fire retardant
- Successful generation of graphene in proof of concept tests
- Testing suitability of FGR graphene for concrete enhancement
- Name changing to First Graphene Limited to better reflect the focus of the company

Appointment of Dr Andy Goodwin

It was announced on 18 September, that FGR had significantly added to its graphene credentials with the appointment of Dr Andy Goodwin as a Senior Consultant to the Company. For the last five years Dr Goodwin has been Business Director, Advanced Materials Division, at Thomas Swan & Co Limited in Consett UK. Dr Goodwin has been primarily responsible for development and commercialisation of graphene products. Not only will Dr Goodwin be of great assistance to First Graphite as it prepares to take its products to the market, but his location in the UK will give the Company a valuable presence and capability in the important, expanding market for graphene in Europe.

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Figure 1: Dr Andy Goodwin during his visit to Perth

Progress with the Commercial Graphene Facility

All orders for the construction and equipment have been placed with suppliers. The steel fabrication work has been completed (see Figure 2). The suppliers of the new graphene cell and fume extraction equipment have nearly completed its construction (see Figure 3 & 4) and it will be progressively installed during the December Quarter.

The facility is on schedule to have construction completed by the end of calendar 2017.

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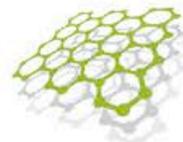
Figure 2: Completed steel frame work – Henderson



Figure 3: Production Cell Nearing Completion

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Figure 4: Cross Flow Scrubber ready for installation

Graphene for Fire Retardants in Thermoplastics

Background

Early in 2017, FGR was approached by a major European plastic masterbatching company which had previously undertaken 1,300 hours of independent research and demonstrated that graphene provides superior fire retardancy in thermoplastics. A key benefit is the replacement of current, toxic retardant materials.

Recent Test Work

Test work has confirmed the FGR graphene works to the highest standard and is very suitable for use in the fire retardant mixture. A second round of testing is now in progress on a modified version of the FGR graphene to see if the results can be further improved.

FGR is optimistic that at the completion of the current tests it will prove its graphene is suitable for the masterbatch and this will lead to a new revenue stream from fire retardant additives to the thermoplastics industry.

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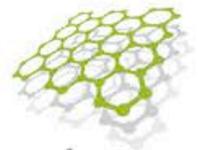
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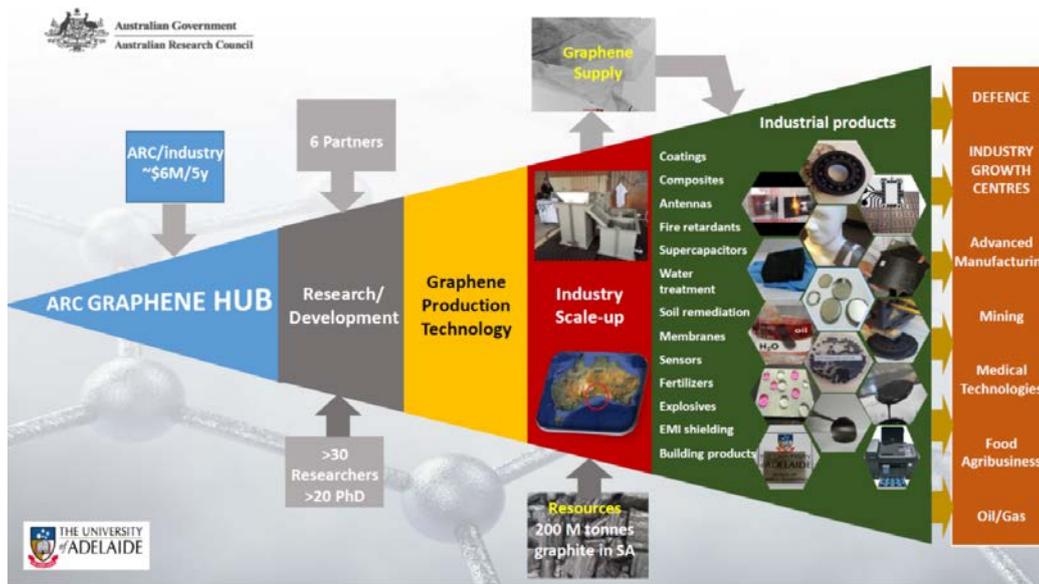


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The University of Adelaide (UoA)

In June 2017, FGR signed up as the **lead industry partner** in the Australian Research Council (ARC) Research Hub for Graphene Enabled Industry, designed to bring together scientists and industry for the development of applications for commercialisation. The following slides have been lifted from a paper presented by Prof. Dusan Losic at the GraphChina 2017 conference in China. Figure 5 demonstrates the scope of the ARC Graphene Research Hub. Figures 6 and 7 are also slides from Prof. Losic's presentation.



The first National Integrated program on translation of graphene research \$6M funding, 4 universities and 6 Industry partners, > 30 researchers, >20 PhD

Figure 5: Showing the scope of the Hub.

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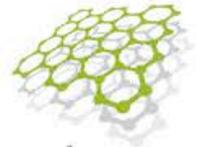
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“Jumbo” pristine graphene (ECR) by electrochemical process: new type of graphene with unique properties

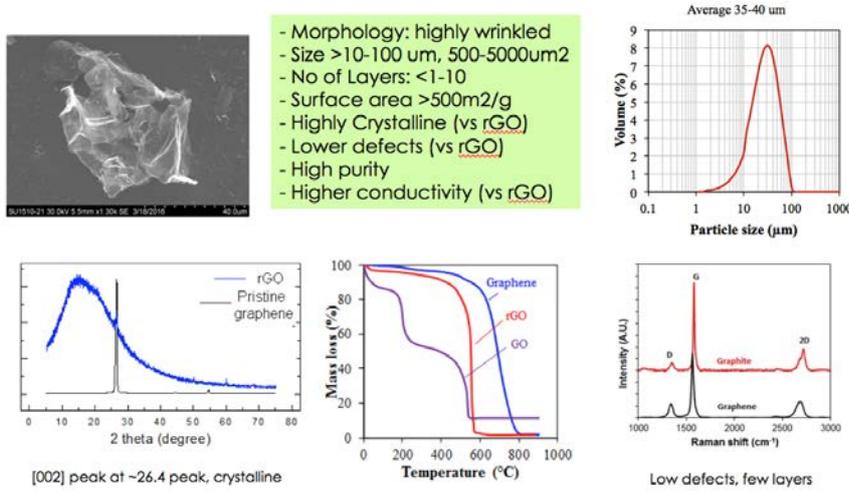
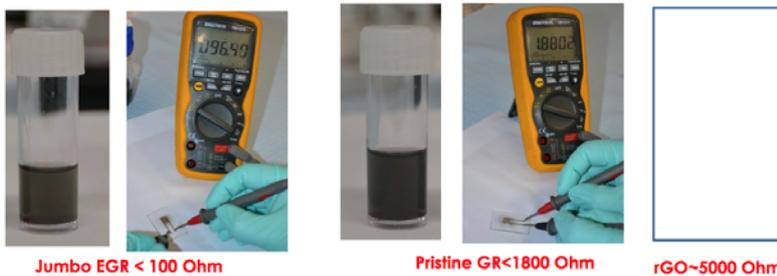


Figure 6: Showing the characteristics of FGR graphene as tested by UoA.

Outstanding conductivity of “Jumbo” pristine graphene (ECR)



Applications of EGR

- Additive manufacturing (3D /2D printing): **high conductivity**
- Composites materials: **high surface area**
- Protective coatings: **high surface area, barrier properties**
- Fire retardants: **high surface area, barrier properties**
- Conductive inks/paints (thin films): **high conductivity**
- EMI/radiation shielding, antennas etc: **shielding properties**
- Sensors and devices: **high conductivity**

Figure 7: Showing the superior conductivity characteristics of FGR graphene

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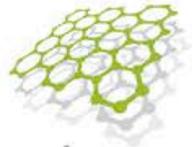
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Recent Progress

The UoA has reported extensive test work on FireStop™ using FGR's graphene as the primary ingredient, confirming it is well suited for the purpose. Test work has involved bench scale tests for the preparation of FireStop™ solutions at different graphene concentration levels. All results have been very positive to date with the large platelet size of the FGR graphene offering useful advantages.

Different coating thicknesses are being evaluated and initial results show that FireStop™ coatings are effective at only 33% of the thickness of competitor products. This has obvious commercial advantages, particularly if effectiveness is achieved with only one coat. Early stage analysis has shown the cost of FireStop™ is significantly less than competitor products making it a preferred product both on technical and economic grounds.

Going forward, we will focus on the optimal mixture and application methods to achieve a product which will be sent to an independent organisation such as the CSIRO for third party testing. Field tests will be arranged on wooden structures coated with FireStop™ and compared with non-treated structures and on those treated with existing fire retardant products.

The outstanding features of FireStop™ will be verified by independent testing and government certification making it a compelling product for building materials, such as cladding. Not only will FGR benefit from selling its graphene products, but it will also earn revenue from licencing the application IP to third party manufacturers of retardants.

These developments are of particular value at a time when many standard industry fire retardants contain halogenated materials and these are being phased out for environmental reasons.

A video showing the effectiveness of the retardant can be viewed on the following You Tube links: <https://youtu.be/v82SrC72R0s>.

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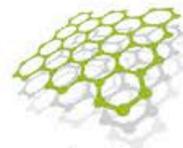
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A recent report by Global Market Insights, Inc. states the non-halogenated flame retardants market will surpass US\$3.4bn by 2024. Strong construction output with increasing spending on safety equipment in both commercial and residential sectors will drive the global fire door market growth to more than US\$16bn by 2014, as the focus on fire safety and prevention of flame spreading intensifies.

Concrete, Thermoplastics and Coatings

Other research work has been focusing on the application of graphene in thermoplastics, coatings and concrete. Previously, the UoA had tested graphene oxide (GO) for use in concrete with the attraction being the hydrophilic nature of graphene oxide, which helped it combine with concrete materials. Very low concentrations of GO were demonstrated to improve performance in the range of 30-60% but as the concentration levels increased to 0.5 wt% the performance reduces due to aggregation of the GO materials.

The UoA is now testing FGR graphene, starting with concentrations of 0.1wt%, with the aim of making "smart cement" with better mechanical performance which would address the concerns of cracking and corrosion. Further, the introduction of conductive graphene flakes may provide conductivity for better monitoring the health of concrete structures.

The concrete admixtures market is estimated to be worth US\$18.10bn by 2020. The drivers identified for the concrete admixtures demand are growing infrastructure requirements in developing economies, improving economics of construction, and shifting preferences of population towards urbanisation.¹

Polymers and Coatings

Scientists around the world have been working on functionalising graphene and developing applications in the fields of thermoplastics and coatings. As previously mentioned the challenge with thermoplastics is to achieve homogeneous distributions. Coatings involve a complex formulation of materials depending upon which market is being targeted: domestic and commercial paints, anti-corrosive surfaces or other coatings such as marine anti-fouling paints. The UoA is working with FGR and other Hub partners to advance products in these fields for use in industry.

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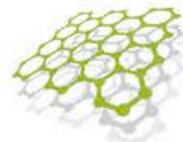
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¹ <http://www.marketsandmarkets.com/PressReleases/concrete-admixtures.asp>



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The global market for Electroactive Polymers (EAP's) is projected to reach US\$5.2bn by 2022, driven by developments in the field of electrochemistry and focus on sustainable development of intelligent materials.²

Flinders University – The Vortex Fluidic Device

Background

FGR has been working with Flinders on a number of fronts and has been benefiting from different strands of research and expertise which complement those offered by the UoA. A strategic decision was made to purchase up to a 70% interest in the company owning IP associated with the Vortex Fluidic Device (VFD) which was of initial attraction due to its ability to produce graphene from raw graphite and flake graphite concentrates. Thus, it was seen as a potential alternative to our electrochemical exfoliation method. It can also be used as a secondary process step to enhance and functionalise graphene products from the Graphene Cell.

As the Company learns more of the capabilities of the VFD it is beginning to understand the significance of this exciting technology for applications throughout many aspects of industry that go well beyond graphite and graphene. It is capable of accelerating and increasing the efficiencies of chemical and biochemical reactions which would otherwise be difficult to achieve. It has the potential to redefine organic chemistry. As such it is an example of the advanced science and technology which FGR has been developing in pursuit of commercial gain.

Swinburne University – The BEST Battery

Background

Graphene has the ability to significantly enhance existing chemical batteries when it is added to graphite in the anodes with performance improvements of 20% or greater being readily achieved. While FGR is capable of supplying graphene to these companies we have also chosen to advance a novel energy storage device which will deliver a generational change over chemical batteries and existing supercapacitors.

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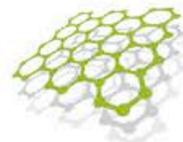
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² http://www.strategyr.com/MarketResearch/Conductive_Polymers_Market_Trends.asp



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Technical Aspects of the BEST Battery

The BEST Battery is based on principle of creating nanopores within stacks of reduced graphene oxide structures. and those nanopores are the key to increasing the energy density. The electrolyte is stored in the nanopores and the nanopores are created with a unique laser patterning technique, where the spatial accuracy of the laser is in the region of one micron.

Additionally, the conventional sandwich design of supercapacitors has been replaced with an interdigital design that rearranges anodes and cathodes in a plane, thereby delivering a much shorter ionic path.

Expressed simply, electricity will not be generated via chemical reactions that come with a range of operating and safety issues. Instead, energy will be stored through capture in the unique nanopore structure in a very quick process. The release of this energy will occur at a controlled rate through the use of a switching mechanism delivering the desired power level for a specified time frame to match the needs of the device being powered.

While there are numerous other research groups attempting a breakthrough in the field of supercapacitors and there is a generally held view that these energy storage products will at some point supersede chemical batteries, FGR understands that the Swinburne sourced technology is one of the most simple and advanced. In reality the market will be large enough to accommodate a range of supercapacitor based batteries, just as there is a large range of chemical battery products in the market today. The important point is that FGR has a seat at this table.

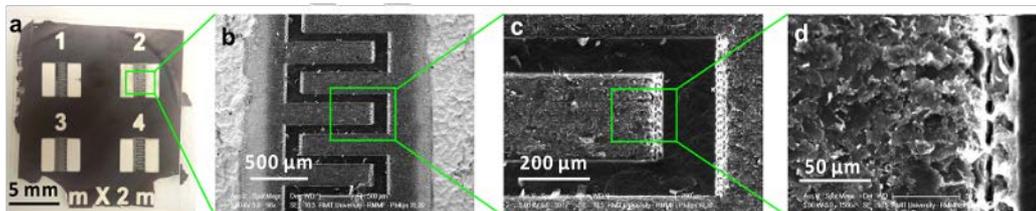


Figure 8: (a) Photo of fabricated GO supercapacitors. (b) - (d) Scanning electron microscopic (SEM) images of one of the supercapacitor

Recent Progress

Test work with a water-based electrolyte (1 volt working window) has enabled energy density of 0.02 Wh/cm³, which has already exceeded all commercial supercapacitors and the Li thin-film battery. Progression to an ionic liquid (3.5 volt working window) has the potential to further enhance the energy density.

The first few months of the project have involved the recruitment of advanced material scientists and the ordering of equipment needed to produce larger scale versions of the BEST Battery™. A number of devices

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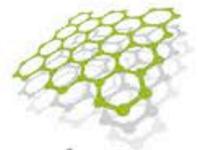
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have been made to demonstrate some of the basic principles of the Battery, with positive results.

Good progress has been made with the construction of a working prototype BEST Battery™ that will be presented at the international IDTechEx Conference on Sana Clara, California in November. Swinburne scientists will accompany FGR personnel in showcasing the product for the first time.

The full release from 23 October 2017 is available on the Company's website on the link below.

<https://www.firstgraphite.com.au/investor-relations/asx-announcements>

Sri Lankan Graphite Development Work

Aluketiya

During the quarter **Aluketiya Shaft H** drive and shaft development continued to expose previously targeted veins and follow the mine plan to establish multiple levels for future graphite extraction.

Underground pump stations and dam construction have been established on the H037041 level drive adjacent to historical pumping facilities.

Ore extraction was limited to the veins intersected while developing the drives and deepening the shaft to the next target drive level. Development will continue during the December quarter, sinking the shaft to the 42 Level for drive H042273, to the 44 Level for drive H044019 and then the 48 Level for drive H048033 and set up the lower level veins for future production.

Shaft J continues to develop the access drive J026113 to establish access to further mineralisation highlighted following completion of the recent drilling campaign. This upper level drive is being extended further over December Quarter and will access further veins in combination with lower level drives to create stoping blocks for future extraction.

J Shaft continues to be deepened to provide access to multiple lower level production drives between RL38 to RL49 and an additional three development drives, J030164, J038087 and J049099. Drive J030164 will complement current drive J026113, forming the lower access to the graphite plane defined by ALK13 and further mineralisation highlighted in recent drilling.

Graphite mined during development from both Shaft H and J shafts is being transported and stored at the company warehouse ready for sorting and packaging at a later date.

Exploration

Aluketiya Geology

During the September Quarter a further 1,646 m of HQ3 was completed to provide further vein information for mine planning purposes at Aluketiya.

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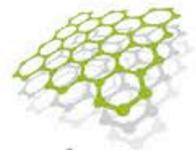
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Further details of this quarter's activities can be found in previous ASX releases as detailed below;

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

"This has been a very most significant quarter for the Company's development. The work on the Commercial Graphene Facility is a major step forward for the Company. Subsequent announcements outlined in the Graphene Technology Update last week demonstrate the continuing progress on advanced material developments.

The December quarter will build on the advances made in this September quarter."

The December Quarter Program

FGR has made a positive start to the December Quarter, which includes:

- Construction continuing at the Commercial Graphene Production facility, which will be officially opened by Mr Josh Wilson MP, Federal Member for Fremantle, on 23 November 2017.
- Attendance at IDTechEx in Santa Clara, together with the Company's three university partners in November.
- Advances in graphene based fire retardant technology.
- Continuing development of BEST battery.

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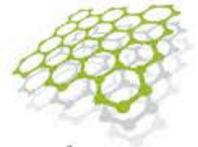
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Significant September Quarter Announcement		
Date	Subject Matter	URL Link
17 July 2017	FGR Tier 1 Partner in Graphene Hub	17-07-2017-FGR Tier 1 Partner in Graphene Hub
28 July 2017	Graphene-Based Fire-Retardant Technology Advancing Well	28-07-2017-Graphene-Based Fire-Retardant Technology Advancing Well
18 September 2017	First Graphite Appoints Advanced Materials Expert	18-09-2017-First Graphite Appoints Advanced Materials Expert
29 September 2017	Annual Report to Shareholders	29-09-2017-Annual-Report-to-Shareholders

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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 will 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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