

# Grafoid enters the electric vehicle race with the Braille Battery acquisition

Grafoid Inc., part of Focus Graphite ('Focus', TSX.V: FMS | OTCQX: FCSMF | FSE: FKC), announced that it acquired 75% of Braille Battery (Braille), which has designs and manufactures lightweight Li-Ion batteries for the automotive market. The acquisition will allow Grafoid to gain a high profile platform through which to develop graphene, which will be used by Braille to improve the performance of their batteries. Braille has built its technology and reputation, supplying batteries to Formula One, NASCAR and Indy racing teams. Automobile racing subjects man and machine to high levels of stress. Apart from performance, these sports provide an ideal platform to test the limits of reliability for any given technology used in the cars. Braille's racing activity has given it an ideal experience to approach other sectors where reliability and performance are crucial, namely medical and military applications.



Braille Named the Official Battery of the Indy Lights series.

Braille is based in Florida and it has experience making both lead-acid batteries (AGM) of very high quality (not too heavy), studied for road racing competition and Li-ion batteries. In 2009, Nissan Motors recently chose Braille to develop a full on hybrid race car based on its popular family sedan, the Altima Hybrid. The standard car was trimmed in weight and the back seat replaced by a large big high-voltage battery. The mechanical engine was improved for power using a supercharger while the electric motor gained 20 kilowatts thanks to the larger capacity battery. The car was presented at the world famous SEMA Show in Las Vegas, taking part in other promotional events, including a crossing of the United States (One Lap of America). The car has retained its safety equipment, its bumpers are those of the production car, and it has a legal exhaust. Braille modified the car with an ecological outlook, using special materials such as non toxic paint (by DuPont), a roof covered with solar cells and many parts made of carbon fiber, such as the rear diffuser and spoiler. The advantage for Grafoid is that Braille has already acquired a reputation in using novel materials, making them available to the wider public in high visibility events. Braille, therefore, offers Grafoid an ideal platform, or a veritable showcase, for its MesoGraf™ ('Mesograf') material.

MesoGraf') represents an ideal platform for the industrialization and commercialization of graphene, bringing to market and to the public the world of graphene research with actual commercialization of the material. Until very recently, graphene has been prohibitively expensive for industrial use. Graphene is composed of only one layer of carbon atoms which must be isolated and then arranged in a honeycomb structure, which is the key to its high strength. For years since the discovery of graphene in 2004, laboratories have been trying to come up with an economically viable method to produce the material. Many have claimed 'revolutionary' discoveries to bring this material into a mass production cycle but little has actually developed. MesoGraf,

however, is much closer to becoming the elusive mass production graphene that so many have been trying to achieve.

MesoGraf was developed by Dr. Loh Kian Ping and Grafoid co-founder Dr. Gordon Chiu. The main difference between MesoGraf and all other attempts at developing a graphene material is that MesoGraf is finally able to offer the scalability that is needed to bring the material's potential to the market. A scalable graphene material implies that it can be made to address a large increase in users and applications without undue effort. Scalability has been the 'weak link' in graphene until now. MesoGraf will be derived using natural flake graphite ore from Focus's Lac Knife deposit in Quebec in a patented one-step process. Even this process is 'scalable' because, it can use any graphite ore with 10% or higher purity. Graphene will make its way in many electronic devices such as smartphones, tablets, connected devices, batteries or flexible displays. But it will also be used in the manufacturing of extremely durable structures in the civil engineering, aerospace and automotive sectors. Braille can serve as the platform to research and develop lighter and more efficient Mesograf based batteries with direct access to the growing electric and hybrid automobile sector. Until recently, Grafoid and its parent Focus Graphite have been involved in advanced applications for lithium iron phosphate (LiFeP) battery materials in partnership with Hydro-Québec and the development of graphene-based repayment cancer therapies in partnership with Calevia Inc.

Graphene, despite its one atom thickness and chicken wire structure, is extremely strong, perhaps the strongest material available today, and extremely conductive, which renders it ideal for use in countless applications from batteries to airframe composites and as cooling agents. Graphene has the potential to be used in applications representing all industrial sectors and its potential is seen as rivaling the role of silicon. However, unlike silicon, the new miracle

material is not mass produced yet, because it remains prohibitively expensive. MesoGraf has now filled this gap, setting the stage for all the various graphene innovations to come to market. Grafoid recently set up a special research facility in Kingston, Ontario, that was inaugurated on August 20. , Grafoid will promote – and benefit from – academic research and development through partnerships with other industries and academia, contributing to the growth of its business and benefit from the mutual transfer and of technology between universities and industry. While Grafoid develops the Mesograf and other graphene materials, its partner Focus Graphite is edging ever closer to the production stage at the Lac Knife project.

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## **Grafoid joins global technology leaders at ‘science park’ in Kingston**



Focus Graphite (TSXV: FMS; OTCQX: FCSMF; FSE: FKC) is developing one of the most important graphite projects in North America at Lac Knife, Quebec. Focus has already signed a 10-year strategic agreement for up to 40,000 tons per year (400,000 ton total) of graphite concentrate with a Chinese-based industrial consortium located in the port city of Dalian, Lianing Province, China; one of the China’s most important centers for trade and industry, and home to many of high-tech companies. Grafoid Inc. is Focus Graphite’s graphene research and

development partner, which has been cooperating with a number of companies worldwide to achieve a commercially viable graphene material.

It is not surprising, therefore, that Grafoid will join other Canadian and international (i.e. Thales, a major French aerospace and electronics conglomerate) advanced technology companies in setting up a research facility in Kingston, Ontario, to be inaugurated on August 20.

### *Why Kingston?*

Kingston is the home of Queen's University, which runs the 'Innovation Park'. The Park is intended to promote and enhance internationally recognized research programs, and new research in scientific activities that will also benefit from the contribution of doctoral students and postdoctoral fellows. The Park is designed such as to encourage opportunities for collaboration and interdisciplinary initiatives, building support for research and improve the execution of the search for national and international stakeholders and partners at local and global levels. This should ideally lead to securing funding and resources that will increase Grafoid's capacity and collaborative support research. Having established a presence at what the Canadian Government describes as a 'science park', that is by definition a business based on a university property, Grafoid will actually have the opportunity to promote – and benefit from – academic research and development through partnerships with other industries and academia, contributing to the growth of its business and encourage its development, benefiting from the mutual transfer and of technology between universities and industry. While Grafoid develops the mesograf and other graphene materials, its partner Focus Graphite is edging ever closer to the production stage at the Lac Knife project.

Grafoid is working with Altamat, a material specialist, to produce readily available 3D printing materials based on

Grafoid's proprietary 'MesoGraf' product, which consists of chemically treated graphite. The material has the highest tensile strength value ever calculated, boasting a structure that is comparable to that of diamonds. MesoGraf was developed by Dr. Loh Kian Ping and Grafoid co-founder Dr. Gordon Chiu. The main difference between MesoGraf and all other attempts at developing a graphene material is that MesoGraf is finally able to offer the scalability that is needed to bring the material's potential to the market. A scalable graphene material implies that it can be made to address a large increase in users and applications without undue effort. Scalability has been the 'weak link' in graphene until now. MesoGraf will be derived using natural flake graphite ore from Focus's Lac Knife deposit in Quebec in a patented one-step process. Even this process is 'scalable' because, it can use any graphite ore with 10% or higher purity.

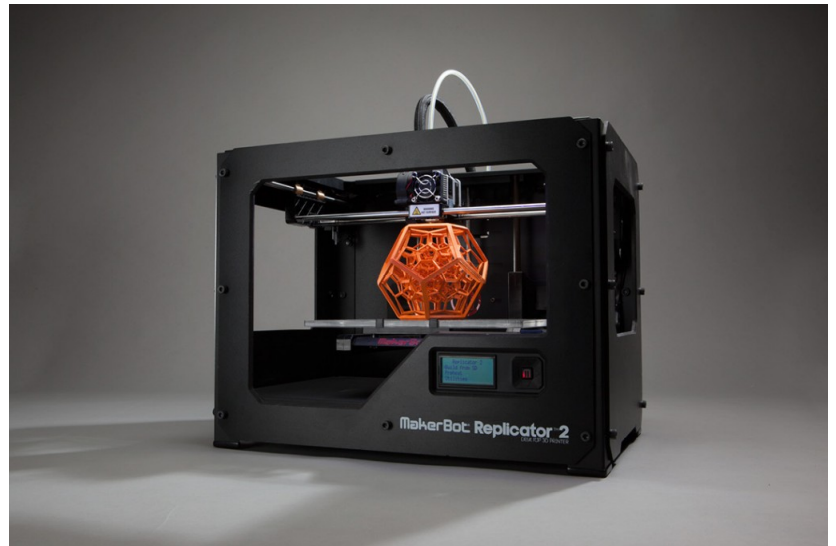
Improved metallurgical results from the Lac Knife Pilot Plant suggest that Focus Graphite has the potential to become one of the lowest-cost producers of graphite in the world, competitive – and appealing enough – even to Chinese end users. Indeed, Focus recently announced recently an upgrade to their PEA, such that a more efficient metallurgical process as has allowed the Company to reduce operating cost to 458 dollars per ton, leaving ample margins for profit , considering that graphite is costing about USD\$ 1,600-1,800/ton to produce, which falls within the range of Chinese suppliers. On August 8, Focus Graphite presented the technical report for the feasibility study. This means that Focus has further de-risked the Lac Knife Project, allowing the Company to work and complete detailed engineering, project financing, working toward the approval process. Moreover, the feasibility study gives Focus access to further funding levels, being in an even better position to negotiate with potential partners and vendors to put together financing packages for the technical equipment. The company's goal is to reduce the initial investment and to expand the range of

available financing options. One alternative project financing solution may include stocks and low interest loans, strengthening economic fundamentals for the Project.

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## **Grafoid and Altamat to develop mass market graphene based 3D printable powders**

Focus Graphite Inc. ('Focus', FMS: TSX.V; FCSMF: OTCQX; FKC: FSE) is ever closer to bringing graphene to the mass market through its partner Grafoid Inc in which it has a 40% stake in.



In the past few weeks, Grafoid has announced a series of important deals aiming at bringing graphene to the mass market. Yesterday, Grafoid Inc. announced it has signed an agreement with Altamat Inc. for the construction of an atomization facility to produce MesoGraf™ (Mesograf) graphene-based powders and filaments for 3D printing. It was only last week, meanwhile, that Grafoid announced a deal with one of the largest trading houses in Japan, Mitsui Inc., to identify and evaluate market opportunities for graphene in Japan.

Grafoid has an expanding and pioneering array of graphene developments backed by ventures and intellectual property

rights, bringing graphene ever closer to commercial reality. Grafoid and its parent Focus Graphite have also been involved in advanced applications for lithium iron phosphate (LiFePo) graphene based battery materials in partnership with Hydro-Québec.

The agreement between Grafoid and Altamat gives Grafoid the exclusive global rights to adopt Altamat's proprietary technology to produce a wide range of powders specifically designed to be used in 3D printing applications. Altamat has acquired a great deal of expertise in advanced material processing, metals and composites alike. Altamat was founded by Dr. Hani Henein, an expert and professor of Materials Engineering at the University of Alberta. Grafoid has a facility at Kingston's 'Innovation Park' technology center in Kingston, Ontario and it will be used to develop graphene based printable powders and filaments material to achieve the best performance at the lowest possible cost and environmental impact. The Mesograf powders will also be designed to be used in conjunction with various additive manufacturing processes in order to address all industrial needs.

Grafoid launched its trademarked Mesograf in May 2013. It is one of the first platforms for the mass industrialization and commercialization of graphene. MesoGraf, therefore, represents the first tool through which to achieve graphene's potential, bridging the gap between the growing bodies of graphene research with actual commercialization of the material, essentially making the science available to the market. Until now, graphene has been limited to development and study in the laboratory; commercial scale applications have not yet been possible. Grafoid worked closely with the National University of Singapore to develop Mesograf. Mesograf is a vertically integrated business model based on a one-step method of exfoliating natural graphite ore. MesoGraf could become the standard 'go-to' graphene material as it offers the scalability that is needed to bring the material's potential



to the market. A scalable graphene material implies that it can be made to address a large increase in users and applications without undue effort. Scalability has been the 'weak link' in graphene until now. MesoGraf will be derived using natural flake graphite ore from Focus' Lac Knife deposit in Quebec in a patented one-step process. Even this process is 'scalable' because, it can use any graphite ore with 10% or higher purity.

3D Printing is another revolutionary technology involving "the creation of three-dimensional, solid objects from a digital file, of virtually any shape." 3D printing requires the use of polymers; however, when these polymers are combined with graphene, they acquire far superior properties in mechanical strength and conductivity. 3D printing is finding an ever longer list of applications; one of the most promising and wide scale is the printing of electronic circuits, sensors or batteries (themselves being enhanced by graphite and graphene). 3D printing made headlines in 2013 but the technology is still quite expensive, so efforts such as those made by 3D Labs to enhance the technology by expanding its range if use in very high-value added applications is very significant. A few years ago 3D printing was a tool with few enthusiasts. Now, the technology has started to make its way into everyday life. 3D printing will play an important role in the future; the question is really how long it will take to make a breakthrough in the mass market. In Italy, one of the largest pasta manufacturers, Barilla, wants to use 3D printing to make pasta noodles. Gartner, a major printer manufacturer, expects a rapid growth of 3D printing. In 2014, market researchers expect that some 98,000 3D printers will be sold with the number rising to 430,000 units by 2016. 3D printing cannot be said to have matured yet, but it is like the personal computer in its early days, which means that it should see a very sharp rise in demand as the technology become more available and cheaper through competition.

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# Game Changer: Grafoïd's new patent-pending MesoGraf™ technology sets the standard for high-energy-density graphene

## MESOGRAF

In my most-recent **InvestorIntel** Graphite & Graphene Week-in-Review, I wrote about the forthcoming “graphene revolution”... and here's further proof about the incredible innovation and transformation happening in this sector. In a collaborative agreement, a new, provisional patent application was recently filed on behalf **Grafoïd Inc.** and **Hydro-Québec** for **MesoGraf™** (MesoGraf); the first trademarked graphene in the world. MesoGraf is a high-density graphene composition obtained from natural graphite. The application describes a new composition using a type of graphene. The inventors, **Dr. Gordon Chiu** (Chief Scientist, Vice President and Co-founder of Grafoïd), **Dr. Karim Zaghïb** (Director of Hydro-Québec's Research Institute), Abdelbast Guerfi (Hydro-Québec's Research Institute) and **Amélie Forand** (Hydro-Québec's Research Institute), have successfully designed a uniform composite containing carbon-coated lithium metal phosphate with MesoGraf.

It should be noted that **Focus Graphite Inc.** (TSXV: FMS | OTCQX: FCSMF) is a partner of the technology firm Grafoïd; holding a 21% ownership stake in the privately held research-

and-development company. As most readers are aware, Focus is developing the **Lac Knife** high-grade graphite property in Quebec; however, what readers may not know is that Focus supplied all of the graphite Grafoïd used to develop and optimize MesoGraf from Lac Knife.

MesoGraf has a novel structural, conductive and hybrid properties that allow it to act as an energy-storage mechanism and as an energy conduit. The patent-pending technology is the culmination of the research-and-development agreement between Grafoïd and Hydro-Québec's Research Institute to produce next-generation lithium ferrophosphate (LFP)-graphene batteries with ultra-short charging times and dramatically longer recyclable lifetimes. MesoGraf is anticipated to be vital for the energy sector – specifically, portable energy – and impact everything from alternative energy (any energy source that is an alternative to fossil fuel) storage and transmission to radically improved consumer products.

Dr. Chiu explained that, *“MesoGraf is a stable intermediate product derived from raw graphite ore that can easily be transformed into graphene.”* In record time, Dr. Chiu and his partners at the National University of Singapore (NUS) were able to isolate a material from raw graphite ore that can be transformed instantly into graphene.

According to **Gary Economo**, President and CEO of both Focus and Grafoïd, *“MesoGraf offers a direct, fast and cheap way to commercialize graphene on a global scale, and catapults the enterprise ahead of any graphene development venture in Asia, the US or Europe.”* Grafoïd has already received orders for MesoGraf from a number of large companies, including battery businesses, a chemical firm and a large utility company.

Both Dr. Chiu and Economo emphasized that having a global standard for economically scalable graphene has long been recognized as central to establishing the nano-carbon as a marketable technology. *“We believed that by accomplishing two*

*things – by investing in a process of producing graphene cost-effectively and by setting a global standard – the door to industrial scale adaptation would open to us,” according to Dr. Chiu. “MesoGraf has achieved this... and it is the game changer.”*

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## **MesoGraf™ gives graphene the elusive scalability to reach the Market**

✘ Today, May 23, 2013, Grafoid Inc., part of Focus Graphite (TSXV: FMS | OTCQX: FCSMF), announced the launch of a trademarked graphene product called MesoGraf™ ('MesoGraf'). The product represents nothing short of the first platform for the industrialization and commercialization of graphene. Stories about graphene's novel applications and their potential are published daily around the world. MesoGraf, therefore, represents the first tool through which to achieve graphene's potential, bridging the gap between the growing bodies of graphene research with actual commercialization of the material, essentially making the science available to the market. Until now, graphene has been limited to development and study in the laboratory; commercial scale applications have not yet been possible.

At the 'New Diamond Nano Carbons' conference in Singapore, Gary Economo, President and CEO of Focus Graphite and Grafoid Inc. unveiled the trademarked MesoGraf, which represents the first example of an economically scalable and commercially viable graphene material. Grafoid worked closely with the National University of Singapore to develop MesoGraf. Graphite

Zero Pte. a Singapore-based graphene R&D and production company, chaired by Mr., Economo, is a spinoff of the National University of Singapore's (NUS) Graphene Research Center and it will play an important role in the research and development aspects of MesoGraf.

MesoGraf is based on a vertically integrated business model based on a one-step method of exfoliating natural graphite ore. Gary Economo suggests that MesoGraf could become the standard 'go-to' graphene material. MesoGraf was developed in a USD\$ 100 million research facility at NUS by Dr. Loh Kian Ping and Grafoid co-founder Dr. Gordon Chiu. The main difference between MesoGraf and all other attempts at developing a graphene material is that MesoGraf is finally able to offer the scalability that is needed to bring the material's potential to the market. A scalable graphene material implies that it can be made to address a large increase in users and applications without undue effort. Scalability has been the 'weak link' in graphene until now.

MesoGraf addresses this shortcoming because it means that end users will be able to order varying sizes or forms of the material while maintaining its integrity. This is why it opens up much sought after commercial channels, establishing the new standard. Mr. Economo has described MesoGraf as an economical and market-ready product able to reach end users worldwide. Mr. Economo did not offer hints about pricing but he said that MesoGraf has already attracted customers, including battery a chemical manufacturers and a large utility company – and, in fact, Focus Graphite has worked closely with Hydro Quebec in the development of fast charging technology. The other key aspect of MesoGraf is its vertical integration from raw supply to final product. MesoGraf will be derived using natural flake graphite ore from Focus's Lac Knife deposit in Quebec in a patented one-step process. Even this process is 'scalable' because, it can use any graphite ore with 10% or higher purity according to Mr. Economo.

Graphene, despite its one atom thickness and chicken wire structure, is extremely strong, perhaps the strongest material available today, and extremely conductive, which renders it ideal for use in countless applications from batteries to airframe composites and as cooling agents. The Iron and bronze ages marked the rise of the first urban civilizations; alchemy in the Middle Ages led to the development of chemistry and the discovery of new elements, but every era has its material. Steel, plastic, aluminum and silicon were the materials that propelled technological progress in the 20th century. Graphene, the first two-dimensional material ever, has now arrived on the scene and ready to change industrial and scientific paradigms.

Graphene has the potential to be used in applications representing all industrial sectors and its potential is seen as rivaling the role of silicon. However, unlike silicon, the new 'miracle' material is not mass produced yet. Graphene, as a material, is still at the experimental stage and it is very expensive – it can cost as much as USD\$ 600,000 a kilo at a specialized online graphene vendor called Graphene Supermarket. In order to make graphene commercially viable, an affordable and efficient production method must be developed. MesoGraf has now filled this gap, setting the stage for all the various graphene innovations to come to life ...and to market.