

Haydale Graphene Industries plc

("Haydale" or the "Group")

Launch of Graphene Enhanced PLA Filaments for 3D Printing

Haydale Graphene Industries plc (AIM: HAYD), the Group focused on enabling technology for the commercialisation of graphene and other nanomaterials, is pleased to announce that Haydale Composite Solutions ("HCS"), a wholly owned subsidiary of Haydale, will be launching Graphene enhanced poly lactic acid ("PLA") filaments for 3D printing at the TCT show in Birmingham on 28 and 29 September 2016.

3D printing (also known as additive manufacturing) enables designers to produce components or models directly from computer aided design software ("CAD") on a computer without the need to manufacture moulds or tooling. This is a fast growing and sizeable market today estimated to be worth over \$30bn by 2022. *Source: marketsandmarkets.com (April 2016).*

The Haydale graphene enhanced PLA filaments, available in 1.75mm and 2.85 mm diameters, have been trialled by a number of 3D printing companies who have reported a number of major benefits, including:

- Excellent first layer adhesion and z axis strength retention;
- Major increase in speed of processing;
- Improved strength and stiffness;
- Better impact performance;
- Excellent print quality and surface finish;
- Improved dimensional accuracy; and
- Compatibility with a broad range of printers and ease of use.

HCS are collaborating with Filamentprint (UK) Ltd, a company specialising in the compounding and manufacture of thermoplastic filaments for 3D printing and Fullerex Ltd, HGI's sales agent for its functionalised nanomaterials.

HCS and Filamentprint (UK) Ltd are exhibiting these new materials at the TCT show on adjacent booths H39 and H41 and staff from all three companies will be available to discuss the properties and benefits of graphene enhanced PLA filaments. These specifically include how the mechanical, electrical, thermal and physical properties of the graphene enhanced PLA filaments can be tailored to meet the needs of different applications and markets. The companies will also be demonstrating products being 3D printed in graphene enhanced PLA. Data sheets and price lists will be available for interested parties.

Whilst HCS and Filamentprint (UK) Ltd will be launching their first commercially available Graphene enhanced PLA filaments, the companies are also developing an extended range of Graphene enhanced thermoplastics including ABS (Acrylonitrile-Butadiene-Styrene), Nylon and Polypropylene materials.

Ray Gibbs, CEO at Haydale Limited, said:

"I am delighted with this sales initiative which represents another step forward for Haydale as we seek to commercially exploit the potential for graphene and other nanomaterials. The trials

undertaken provided excellent results and that gives us confidence we have a ready-made product for this rapidly growing world-wide market. While we have chosen thermoplastic materials as the first product suite, we know from our relationship with WCPC (the Welsh Centre for Printing and Coating) that they have 3D printed with a range of novel materials from chocolate and collagen to concrete! Building on this expertise we see additive manufacturing using our nano materials included as another potential area for future sales.”

Commenting on the feedback from 3D printing companies, Gerry Boyce, Managing Director of HCS said:

“We are very excited about the development of graphene enhanced thermoplastic materials for 3D printing. These new materials offer so many benefits including the ability to make parts stiffer, stronger and faster! Speed of print has historically been a barrier to wide scale take up of 3D printing. In the future, the thought of making structural components direct from CAD excites us enormously.”

Clive Wilcox Managing Director of Filamentprint (UK) Ltd added:

“We are unashamed nano-technology enthusiasts. Our thinking incorporates that of both the major industrialists through to the hobbyists. Our collaboration with Haydale and Fullerex is the next logical step in the developmental process to enable us to provide bespoke solutions for our clients’ requirements.”

Joe Eldridge, Director of Fullerex Ltd also commented:

“Significant improvements in conventional materials are needed to move FDM (Fused Deposition Modelling) 3D printers beyond making prototypes or display models and into a capable technology for rapidly manufacturing mechanically robust, functional parts. Haydale's ability to engineer graphene to properly exploit its desirable properties has been a vital prerequisite to bridge this gap. This filament is easy to use and has broad compatibility, so is an exciting option regardless of whether you are a hobbyist or an industrial manufacturer.”

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About Haydale

Haydale has developed a patented scalable plasma process to functionalise graphene and other nanomaterials. This enabling technology can provide Haydale with a rapid and highly cost-efficient method of supplying tailored solutions to enhance applications for both raw material suppliers and product manufacturers.

Functionalisation is carried out through a patented low-pressure plasma process that treats both mined, organic fine powder and other synthetically produced nanomaterial powders, producing high-quality few layered graphenes and graphene nanoplatelets. The process can functionalise with a range of chemical groups, with the level of functionalisation tailored to the customer's needs. Good dispersion improves the properties and performance of the host material and ensures the final product performs as specified.

The Haydale plasma process does not use wet chemistry, nor does it damage the material being processed; rather, it can clean up any impurities inherent in the raw material. The technology is a low energy user and most importantly environmentally friendly. The Haydale process is a patented enabling technology, allowing the Group to work with a raw material producer who seeks to add value to the base product and tailor the outputs to meet the target applications of the end user.

Haydale, based in South Wales and housed in a purpose-built facility for processing and handling nanomaterials, is facilitating the application of graphenes and other nanomaterials in fields such as inks, sensors, energy storage, composites, paints and coatings.

www.haydale.com Twitter: @haydalegraphene

About Filamentprint (UK) Ltd

Filamentprint (UK) Ltd, established in 2009, are a research and development company specialising in the manufacture of thermoplastic filaments for the 3D printing industry. The company has a detailed understanding on the compounding and extrusion of thermoplastic filaments for 3D printing applications. The company also have a detailed knowledge of the 3D printing process.

About Fullerex

Fullerex Ltd are an advanced materials and technology brokerage company specialising in the enhancement and commercialisation of nanomaterials. The company look to broker relationships between companies wishing to exploit and commercialise nanomaterials. Fullerex have a sales agency arrangement with HGI and are responsible for identifying new market opportunities and potential customers/distributors for their functionalised nanomaterials and compounded polymer materials.