



## **Breakthrough M-ERA.Net Project to Develop High Volume Manufacturing for Graphene-Based Biosensors**

Haydale, the company focused on the commercialisation of graphenes and other nanomaterials, has announced its partnership in BIOGRAPHY, a breakthrough project backed by EU funding network, M-ERA.Net. Utilising Haydale's HDPlas® graphene-based conductive inks, the project is set to establish a highly cost-effective mass fabrication process for graphene-based biosensors with significant impact expected for applications in healthcare and environmental protection.

M-ERA.Net is an EU funded network which has been established to support and increase the coordination of European research programmes and related funding in materials science and engineering.

The three year project, which commenced in October, is a collaborative venture between Haydale, Fraunhofer IBMT, Sauressig, AiCuris and cellasys aiming to print graphene electrodes with biofunctional coatings on large-area polymer foils via a roll-to-roll process, similar to the printing of newspapers. Through the development of this high-speed manufacturing process, the project is set to enable a mass fabrication process for graphene-based biosensors for the first time. This will enable significant reductions to be made in manufacturing costs for medical applications such as detectors of pesticides, airborne pathogens, drug residues and antibiotics, glucose monitors and other health screening devices.

BIOGRAPHY will undertake several steps to achieve this development over the three year period, including the production of a biocompatible, electrically conductive graphene ink (to be provided by Haydale) for rotogravure printing and a fabrication method for micro (< 10 µm) patterning of gravure printing cylinders. The project will then develop the roll-to-roll process and production line for the surface functionalisation of large polymer foils by gravure printing of a micro-patterned graphene/protein multilayer, and will provide a proof of suitability for the printed multilayer for two different biosensor applications.

Dr. Chris Spacie, Chief Technology Officer at Haydale, commented: "Biosensors are becoming increasingly sophisticated and biosensor devices are now extremely effective at detecting a large variety of analytes including organic compounds, gases, ions and bacteria. However, the materials and processes used to manufacture these sensors are expensive, leading to costs to the end user which often exceed that of the sensor device itself."

He continued: "Graphene's electrocatalytic properties make it a perfect material for biosensor technology and its multiple forms make it a suitable transducer for a wide range of biosensors. Haydale's customised surface functionalisation capability is ideal for the production of a biocompatible, electrically conductive graphene-based ink customised for this application and for implementation into a mass roll-to-roll fabrication process. Through this method, the project is set to produce cost effective, high-performance graphene-based biosensors for the first time."

Ray Gibbs, CEO of Haydale, commented: "The new M-ERA.Net funded project presents an excellent opportunity for graphene's extraordinary electrical conductivity and electrocatalytic properties to be realised. Our low temperature, proprietary plasma functionalisation process provides the capability to develop biocompatible, graphene-based inks customised for this specific application. By successfully developing a process which will significantly reduce biosensor manufacturing costs, graphene will prove a commercially viable solution over existing materials. Thanks to our partners at Fraunhofer IBMT, Sauressig, AiCuris and cellasys, BIOGRAPHY has the potential to provide a platform for graphene to achieve commercialisation."



In order to effectively utilise graphene and achieve its full potential in industrial applications such as biosensors, it must be functionalised, dispersed and easily incorporated into other materials and structures. Haydale's plasma functionalisation technology overcomes the key barrier to the material's commercialisation which industry is currently trying to overcome, offering the tailored surface modification of graphene nanomaterials whilst maintaining structural integrity. Via this functionalisation process, Haydale can provide customised solutions for specific applications on three levels – raw material, functional group and functionalisation level.

To find out more about Haydale's proprietary plasma process and graphene-based conductive inks, visit <http://www.haydale.com>, email [info@haydale.com](mailto:info@haydale.com) or call +44 (0)1269 842946

**\*ENDS\***

### **About Haydale**

Haydale has developed a patent pending proprietary 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 low pressure plasma process that treats both organic mined fine powder and other synthetically produced nanomaterial powders producing high quality few layered graphenes and graphene nano platelets. The process can functionalise with a range of chemical groups, where the amount of chemicals can be tailored to the customer needs. Good dispersion improves the properties and performance of the host material and ensures it delivers as specified.

The Haydale plasma process does not use wet chemistry, neither does it damage the material being processed, rather it can clean up impurities inherent in the raw material. The technology is a low energy user and most importantly environmentally friendly. The Haydale method is an enabling technology where working with a raw material producer can add value to the base product and tailor the outputs to meet the target applications of the end user.

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

[www.haydale.com](http://www.haydale.com)