

**Haydale Graphene Industries plc**  
**("Haydale" or the "Company")**

**Haydale Subsidiary Haydale Composite Solutions Limited enters into a Joint Development and Commercialisation Agreement with Scott Bader Company Ltd**

Haydale (AIM: HAYD), the group focused on the commercialisation of graphene and other nano particle products using their proprietary plasma process is pleased to announce its composites division Haydale Composite Solutions Ltd ("HCS") has entered into a joint development and commercialisation agreement ("JDCA") with Scott Bader Company Ltd ("Scott Bader") a leading global supplier of liquid resins, gel coats and adhesives.

Under the agreement, HCS will functionalise Graphene Nano Platelets ("GNPs") utilising its proprietary HDPlas<sup>®</sup> process and add them to Scott Bader's Crestapol resin to create a highly loaded masterbatch. This masterbatch will then be diluted down by Scott Bader and HCS into a range of concentrations from 1% to 8% and cast into resin plaques which will then be tested to quantify any improvements in mechanical, physical, electrical and thermal performance.

Preliminary work has already demonstrated that the functionalised GNP's readily disperse in the Crestapol resin to produce a masterbatch with loadings of GNPs up to 25% by weight. It has also been demonstrated that the masterbatch can be readily diluted down and cast into plaques for testing. Initial mechanical test results conducted by HCS have indicated increases of up to 200% in both tensile stiffness and strength which represent a major leap forward in resins technology. It is anticipated that there will be similar significant uplifts in electrical conductivity, thermal conductivity and physical properties which would open major opportunities for Crestapol resins in a wide range of composite applications such as thermally conductive tooling, EMI shield enclosures, lighter weight wind turbines etc.

Under the JDCA it is anticipated that Scott Bader and HCS will develop and validate the use of Graphene enhanced Crestapol resins in targeted composite applications and that Scott Bader will then supply graphene enhanced Crestapol resins to markets across the world utilising graphene masterbatch supplied by HCS.

Jonathan Campbell, Assistant Product Manager for Crestapols and Gelcoats Scott Bader Co Ltd.

"We at Scott Bader are excited to be part of this new joint venture to develop and offer graphene-enhanced resins. From the initial findings we have some promising results which we will look to duplicate in our further studies. This development will hopefully lead to an enhancement in physical properties of our already high end resins for specialist applications."

Ray Gibbs, Haydale Chief Executive, said:

"We have identified the composites market as a strategic sector for our functionalised graphene materials and this agreement represents a major opportunity to work with another global partner to develop a whole new range of formulated resins with enhanced properties which can be sold into the composites' market across the world. Following our agreement with Huntsman, Haydale now have partners for both epoxy and polyester resins which provides Haydale with access to a significant portion of the composites market."

Gerry Boyce Managing Director of HCS added:

“We are very excited about working with another leading resins company and to developing markets and applications for these new graphene enhanced Crestapol resins. We see Graphene enhanced polymer resins and their use in composite materials as being a revolution. The ability to fundamentally change the mechanical, electrical, thermal and physical properties of the base resin, which typically represents up to 50% of the composite material, will be a major step forward and will give us the ability to develop a whole new range of advanced composite materials and products with enhanced performance and lower cost.”

- Ends -

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**About Haydale ([www.haydale.com](http://www.haydale.com))**

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.

#### **About Haydale Composite Solutions (HCS)**

Haydale Composite Solutions is a recognised composite R&D and testing house, based in Loughborough. HCS customers include significant corporations such as National Grid, SSE, Eirgrid, Chevron, Anglian Water, Severn Trent Water, Yorkshire Water, and 3M. HCS has developed a reputation for delivering innovative solutions in the commercial applications of advanced polymer composite materials working with global companies over more than 20 years. HCS is focused on a range of market sectors including pipe lining for the oil, gas and water industries, infrastructure for electricity and energy sectors plus the marine and transportation markets. HCS competence spans the entire development cycle from applied research, product design, process development, product testing, and certification, to setting up manufacturing plants. HCS also works with OEMs and end-users to develop and provide composite solutions with demonstrable clear technical, economic and environmental benefits over existing structures currently manufactured in traditional materials such as steel, aluminium, wood or concrete.

#### **About Scott Bader**

Scott Bader was established in 1921. Today it is a €237 million global chemical company, employing over 640 people worldwide. It is a common trusteeship company, having no external shareholders, with a strong commitment to supporting its customers, workforce and the environment.

Scott Bader's headquarters is based in the UK where it has purpose-built, state-of-the-art technical facilities that provide R & D as well as complete evaluation, testing and application support. It has manufacturing facilities in Europe, The Middle East, India, South Africa, Canada and South America.

For further information regarding Scott Bader, please call +44 (0)1933 666638, visit [www.scottbader.com](http://www.scottbader.com), or e-mail: [enquiries@scottbader.com](mailto:enquiries@scottbader.com).

#### **Joint Development and Commercialisation Agreement ("JDCA")**

As explained in the text above, the agreement with Scott Bader is a joint collaboration aimed at developing commercial products. By its very nature this is a non-binding document setting out the first steps in the joint development work as it is only after the exploratory programme has identified target markets and products that commercial binding contracts can be put in place.