MANCHESTER

Manchester:
The home of advance materials, of Graphene, and the home of Graphene Commercialization - Lightweighting and Beyond

Graphene@Manchester: globally leading and at the forefront of this key disruptive technology: a great example of GREAT UK Innovation!

Greater Manchester is the UK's largest city region outside London and both its history and its future are steeped in innovation. The home of the industrial revolution, where the atom was split, the birthplace of the computer and more recently the home of Graphene - it's no wonder the saying 'what Manchester does today, the rest of the World does tomorrow' has been repeated countless times through the centuries.

Benefiting from diverse specialisms across manufacturing, digital and creative industries, life sciences and financial and professional services Manchester is a magnet for global companies looking to innovate, particularly in Advanced Materials where Greater Manchester is truly World leading.

With a rich history of industry and academia developing and commercialising light alloys, composites, technical textiles, materials for demanding environments, surfaces & coatings and most recently 2D materials like Graphene, it's unsurprising that Manchester is the UK's Hub for Advanced Materials research, with facilities like the Henry Royce Institute, The Aerospace Research Institute, the National Graphene Institute, the National Composites Certification and Evaluation Facility, BP's International Centre for Advanced Materials and the recently opened Graphene Engineering Innovation Centre – a globally unique facility for industry to pilot produce and commercialise Graphene enabled products.

In simple terms, Graphene is a single atomic layer of Carbon. It was first isolated in Manchester by scientists Andre Geim and Kostya Novoselov who were rewarded with the Nobel Prize for Physics, and who continue to work at the University of Manchester. Graphene's properties led it to be dubbed a 'wonder material' as it is the strongest, stiffest, thinnest material, it's 100% surface area, electrically & thermally conductive, impermeable and transparent, offering new possibilities across multiple applications.

In Manchester over 340 academics are working with industry to rapidly move from laboratory to pilot production to commercialization – and this is what the Graphene Engineering Innovation Centre was designed for Industrial partners make use of the unique suite of pilot production equipment to prototype new applications and products, test them, prove them and launch them to market ahead of their competition.

Applications being explored include Composite materials, new battery technologies, sensors, surfaces and coatings, printed electronics, biomedical applications, membranes and electronics.

Aligned to the 'coming of age' of Graphene, the UK Government has highlighted Greater Manchester as the ideal location for companies to capitalize on the global opportunities around the lightweighting of transport (cited at £138 billion over 3 years) – lighter automobiles, aircraft and trains for our Low Carbon future.

Manchester is located at the heart of the largest aerospace cluster in Europe and the second largest automotive cluster in the UK, offering easy access to end manufacturers including BAE Systems, Rolls Royce, Bentley and Airbus. Automotive, aerospace and rail manufactures are driving the demand for lightweight, but strong, materials in a bid to reduce carbon emissions. These high strength low weight materials also have applications in sectors such as construction and energy.

Combining Manchester's Advanced Materials expertise with the benefits Graphene offers is a game-changer.

In composites for example, the addition of Graphene can add strength leading to less material being required so a lighter product – a good enough result in itself, but when carefully designed and engineered the Graphene can deliver additional functionality – perhaps electrical or thermal conductivity. This could mean an aircraft wing could be enhanced with Graphene to make it lighter but also to provide lightning protection – eliminating the need for separate copper based lightning protection – saving further weight an complexity.

Some may suggest 2D materials are too 'young', and not yet for commercial applications – citing use cases in highly expensive lightweight drones, or the BAC Mono R sportscar (which uses Graphene enhanced Carbon fiber to dramatically reduce weight and add strength) as cutting edge, yes, but everyday applications?

The answer perhaps lies with Ford. Ford in the U.S. are using Graphene – and not in some never to be produced concept car, they're using it under the hood of the F150 pick-up truck! Graphene enhanced form protection for the fuel lines delivers a weight and cost saving and gives the additional benefit of thermal conductivity for heat dissipation.

That's the beauty of Graphene – it's not the preserve of the high-spending defense projects, supercars or elite sports equipment – it can be applied to mundane, everyday, components and it can be engineered to deliver multiple benefits including, in Ford's case, a cost saving.

So is Graphene something your organization needs to investigate? To paraphrase the old saying, perhaps it's 'What Ford does today, the rest of the World must follow', so to gain commercial advantages consider engaging with MIDAS and the Graphene@Manchester team today.

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