Cambridge's new £24 million graphene centre to bring flexible devices to market

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Cambridge is to step into the heart of the increasingly heated battle for graphene dominance by launching a multi-million pound development centre that will use an open innovation model to take the material beyond early research to a position where products, jobs and an industry can be created.

Nokia Research in Cambridge is interested in graphene's potential as an enabler for bendy mobile devices

By pooling the knowledge and resources of the private sector with other research centres, particularly at UK universities, the Cambridge Graphene Centre (CGC) hopes to compete close to the same level as many of its big-spending rivals.

Around £24 million will be used to get the Cambridge University run centre off the ground, which will include a prototype and pilot plant and up to 60 staff within the first year.

The centre will initially focus on a range of flexible products and production methods including the inks that can be used for printed and flexible electronics as well as flexible batteries and antennas with the aim of getting the first products out within five to 10 years.

By looking at carefully selected areas and using an open innovation model, CGC director, Professor Andrea Ferrari, believes Cambridge and the UK can claim its stake in the graphene race.

"All the effort will be targeted towards flexible and bendable devices because we believe the bendability, flexibility, stretchability of graphene is what makes it unique compared to other solutions," said Professor Ferrari.

The CGC will initially partner with some 20 private sector firms including some of the world's best known technology companies such as DuPont, BAE Systems, Johnson Matthey, Dyson and Nokia Research.

Though Nokia's Cambridge research centre is focused on bringing futuristic innovations to mobile phone design, Professor Ferrari, says mobile devices specifically is not a focus for the centre. However, some of the key components of mobile devices are and what the partners take away from the CGC work for further development can be.

Despite being major international companies, many have Cambridge operations focused on graphene or potentially symbiotic technologies. There is also a strong representation from locally grown groups such as Novalia, Tonejet, Plastic Logic and Aixtron.

CGC will initially be funded by government, which is providing around £12.5 million through the Engineering and Physical Sciences Research Council (EPSRC) with another £12m or so coming from its industry partners, either as cash or in kind through services or equipment. The centre will be based at the University's West Cambridge site in the CAPE building before moving into around 13,000 sq ft of dedicated space at Greenwich House, which is expected to happen by the end of 2013, by which time CGC hopes to be employing 50 to 60 staff.

Professor Ferrari says the centre will attempt to move graphene work beyond the research intensive stage which led to the groundbreaking experiments at Manchester University that eventually yielded a Nobel prize, and make something that can benefit the UK and industry.

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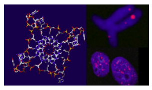

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"The idea now is to make sure that this work brings rewards in terms of exploitation in the UK and engineering and manufacturing and job creation and startups and so on so this funding is specifically targeted for the transition of graphene from research obligations."

Graphene's properties – transparency, conductivity, rubber-like flexibility yet stronger than diamond – have many believing it's the one of the most important materials of future and its exploitation is a world wide race that's being backed by many hundreds of millions of dollars.

Samsung for instance has already thrown some $200m into graphene research and has a patent lead, but while Cambridge can not compete directly, Professor Ferrari believes that by collaborating with other companies and universities with many years of research and funding already under their belts, they are operating on a much more level playing field.

For instance the Cambridge R&D centre for Aixtron – acquired through the 2007 purchase of Cambridge University spinout Nanoinstruments – has technology developed for carbon nanotube production that now has it producing 300mm single layers of graphene.

"Where did Samsung put a lot of money?" asks Professor Ferrari. "To develop chemical vapour deposition (CVD), processes, but we have Aixtron sitting a couple of miles from here and they've already put in a lot of money to develop this process. Aixtron is the first company that makes available large scale chemical depositions it has done for graphene."

Tonejet, says Professor Ferrari, is another example of there already been a wealth of work already done that can benefit CGC, here in an area where Samsung has done very little work, inkjet technology.

There will also be other money coming in, for instance another €5.6m has been made available to Cambridge University through the European Union as part of a €13.5m funding package for a synergies group between Manchester University, Cambridge University and the University of Lancaster.

Then there is the €1 billion EU graphene programme which is also being headed by Dr Ferrari and will be announced, either in favour of or not, this Monday 28 January. A lot of money, but spread over 10 years and divided across Europe, so though not individually particularly lucrative, as a whole it's a serious statement of intent.

Over the first five years CGC will focus on production of graphene – and that of other 'two dimensional' materials such as boron nitride – by liquid phase exfoliation and other related processes to make inks which can then be used for printed and flexible electronics, an area where Cambridge is traditionally very strong.

Professor Clare Grey will lead the centre's focus on energy, looking at batteries and super capacitors where graphene and related materials can be used for anything from grid and electric vehicle storage to mobile phones.

Professor Yang Hao, of Queen Mary, University of London, will handle connectivity such as antennas in radio communications and RF, which could help further advances in networked devices for the Internet of Things.

Work will also be undertaken in photonics and optoelectronics, which covers anything ranging from solar cells to photo detectors and lasers.

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