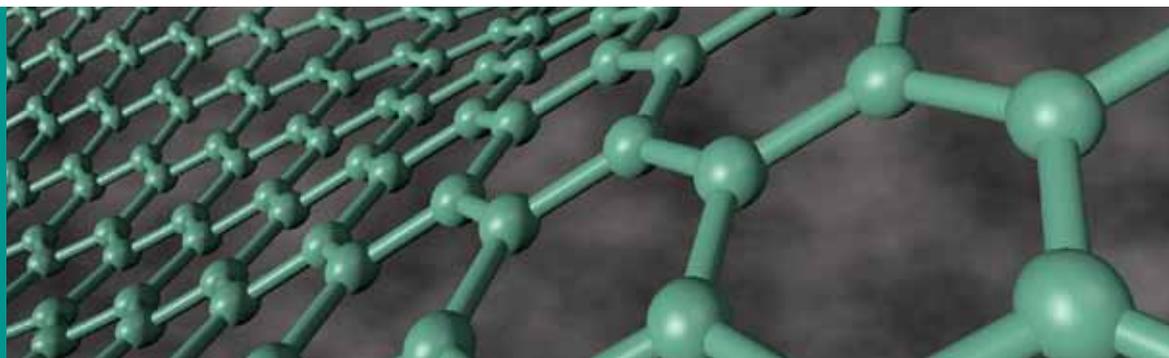


Technology Strategy Board

Driving Innovation



# Realising the graphene revolution

**COMPETITION FOR FEASIBILITY STUDY FUNDING**

**APRIL 2014**

**EPSRC**

Pioneering research  
and skills

# Realising the graphene revolution

## COMPETITION FOR FEASIBILITY STUDY FUNDING

### Summary

The Technology Strategy Board and the Engineering and Physical Sciences Research Council (EPSRC) are investing up to £2.5m in feasibility studies to accelerate commercial applications in the novel material, graphene. It will include related carbon-based, two-dimensional nanotechnologies that have recently emerged from the science base.

This competition will invest in projects that explore the realistic potential of graphene to yield new products that could disrupt markets. We expect them to stimulate development of a robust and competitive supply base to support the nascent graphene-using industry.

Proposals must be collaborative and business-led. We are looking to attract consortia drawn from small and medium-sized enterprises (SMEs) and/or large companies. Universities and other research organisations can be partners in consortia where their high-end academic knowledge and innovation expertise is needed to deliver the project.

We expect to fund feasibility studies (mainly pre-industrial research projects) in which a business partner will generally attract up to 65% public funding for their project costs (75% for SMEs). Research organisations can attract funding of up to 100% of their costs.

We expect projects to last up to 12 months and to range in size up to total costs of £200k.

This competition opens on **7 April 2014** and the deadline for receipt of applications is noon on **4 June 2014**. A briefing for potential applicants will be held on **24 April 2014**. Consortium building events will be run by the Graphene Special Interest Group between **27 February 2014** and **18 March 2014** (see panel on this page).

We strongly advise potential applicants to attend at least one of these events.

### Background

The UK is a global leader in research into graphene, one of the strongest materials known to science and one with extraordinary properties of electrical and heat conductivity. Graphene has a range of applications in areas such as electronics, high-performance materials, filters and medical devices. The global market for these could grow to tens of billions of pounds over the long term.

The Government is investing more than £90m in graphene research and infrastructure, building on existing UK research strengths in universities and in business.

More than 35 UK university groups are active in fundamental and applied graphene research, having attracted significant funding from Europe, global corporations and learned societies such as The Royal Society and The Royal Academy of Engineering.

In its purest form, graphene has attractive intrinsic properties derived from its two-dimensional, single-layer structure and its constituent carbon atoms. In practice, its performance at scale is affected by the method used to prepare the material and the way it is subsequently incorporated within applications. Adding more layers, different atoms or changing the supporting substrates will substantially affect those properties.

There is therefore a key question over whether graphene will retain its novel properties when used in practical applications. Lack of evidence on performance when incorporated into applications was highlighted as a key barrier to commercialisation during consultation workshops held by the Technology Strategy Board, EPSRC and the Knowledge Transfer Network in March 2013.

An added complication for companies exploring the potential of graphene is the wide choice and variable quality of graphene available on the market. Companies may need to work more closely with researchers to select the most appropriate form of graphene for their application, to characterise the graphene they are working with, and to investigate to what extent the graphene retains its novel properties when incorporated into bulk, electronic or other applications.

### Graphene Special Interest Group (SIG)

The Graphene SIG will provide resource and specialist skills to engage the nascent graphene-using industry and connect it with researchers, helping to develop the value chain and driving the exploitation of graphene.

The Graphene SIG will run four consortium-building workshops as part of this competition:

#### NORTH EAST

Centre for Process Innovation, Sedgefield

**Thursday 27 February 2014**

#### SOUTH WEST

National Composite Centre, Bristol

**Thursday 6 March 2014**

#### NORTH WEST

National Graphene Institute, Manchester

**Wednesday 12 March 2014**

#### SOUTH EAST

Cambridge Graphene Centre

**Tuesday 18 March 2014**

Full details of the workshop events, registration and venue information can be found on the Graphene SIG pages of [\\_connect](http://www.GrapheneSIG.net) at [www.GrapheneSIG.net](http://www.GrapheneSIG.net)



This competition will build upon other investments to help industry work with world-leading academic partners in addressing key questions about practical graphene performance; it will accelerate the commercial application of emerging graphene and related carbon-based nanotechnologies.

## Scope

This competition aims to stimulate the development of a robust and competitive supply base in support of the emerging graphene-using industry. It will help companies to explore the realistic potential of graphene for new products that could disrupt the marketplace.

We are seeking to fund projects based on graphene and related, substantially planar, 2D carbon-based nanotechnologies that have the potential to lead to the products and services of tomorrow – or even to completely new industries.

We invite applicants to test or demonstrate the potential of newly emerging graphene technologies that exploit the novel properties of the material.

This includes, but is not limited to, mechanical strength and stiffness, electrical and thermal conductivity, thinness, transparency and other optical properties, high surface area to volume, high-charge carrier mobility, impermeability and biocompatibility.

We are not seeking iterative changes in performance but significant or breakthrough advances in translating the benefits of graphene into real world applications. To achieve this applicants need to focus their projects on:

- characterising graphene material and its functionality
- obtaining accurate data on performance of graphene within applications

- design and manufacture of technologies for producing graphene materials with properties that will meet a specific application requirement, for example, using chemical vapour deposition (CVD), exfoliation, reduction, epitaxy and other techniques.

Applicants to this competition must incorporate R&D for a specific application, with a strong focus on a route to market. Possible applications may include, but are not limited to:

- structural composites
- conductive fillers, such as for aerospace applications
- sensors
- conductive inks
- conductive layers as, for example, in solar cells, smart windows, antistatic layers, electromagnetic shielding
- barrier coatings for food packaging
- non-copper connects in electronic circuits
- corrosion protection
- transparent electrodes
- rollable e-paper, foldable organic light-emitting diode (OLED) displays, flexible electronics
- electronic devices and touch screens
- electronic high frequency transistors
- thermal heat dissipation in polymers
- electrodes for batteries and super capacitors
- optical photon detectors and ultra-fast lasers
- drug delivery, wound dressings, scaffold for tissue replacement.

Functionalised graphene is within the scope of this competition but carbon nanotubes, novel diamond and Bucky-balls (buckminsterfullerene) are out of scope.

## Funding allocation and project details

Proposals must be collaborative and business-led. The competition is looking to attract consortia drawn from SMEs and/or large companies. Universities and other research organisations may be partners in consortia where their high-end academic knowledge and innovation expertise is needed to deliver the project.

We are primarily seeking to fund pre-industrial research, in which a business partner will generally attract up to 65% public funding for their eligible project costs (75% for SMEs). The maximum level of project costs that can be shared by research organisation participants is 50%. We expect total project costs to be up to £200k. Projects should last up to 12 months.

EPSRC will contribute up to £1m to the competition funding. This is available for parts of projects (work packages) where there is a significant high-quality academic research component, and in particular for those projects that build on, or are complementary to, existing EPSRC research programmes.

Each partner in a collaborative feasibility project can receive funding towards their project costs. The funding is a percentage of the total eligible project costs and varies, depending on the type of organisation and the type of research. For general guidance on how projects are funded see: [www.innovateuk.org/-/funding-rules](http://www.innovateuk.org/-/funding-rules)

## Application process

This competition will open on **7 April 2014**.

All applicants must first register via our website. The deadline for registration is at noon on **28 May 2014** and the deadline for completed applications is at noon on **4 June 2014**.

There will be a competition briefing event on **24 April 2014** to highlight the main features of the competition and explain the application process. Consortia building workshops will be run by the Graphene Special Interest Group between **27 February 2014** and **18 March 2014** (see panel on page 2). We strongly advise potential applicants to attend at least one of these events.

Applications are assessed on individual merit by an independent panel of experts. We may apply a portfolio approach across the themes/areas identified in the scope.

**NB: All deadlines are at noon**

## Key dates

Workshop (NE) Sedgefield	<b>27 February 2014</b>
Workshop (SW) Bristol	<b>6 March 2014</b>
Workshop (NW) Manchester	<b>12 March 2014</b>
Workshop (SE) Cambridge	<b>18 March 2014</b>
<b>Competition opens</b>	<b>7 April 2014</b>
Competition briefing	<b>24 April 2014</b>
Registration deadline	<b>28 May 2014 noon</b>
Deadline for applications	<b>4 June 2014 noon</b>

## More information

For more information and all the documents you need to read before you apply, including the *Guidance for Applicants*, go to the web page for this competition at **www.innovateuk.org** under Funding & Support > Funding competitions.

To apply you must first register with us through the competition page on the website. Registration opens when the competition opens and closes a week before the deadline for applications.

Competition helpline:  
**0300 321 4357**

Email:  
[competitions@innovateuk.org](mailto:competitions@innovateuk.org)

## Publicity

As part of the application process all applicants are asked to submit a public description of the project. This should adequately describe the project but not disclose any information that may impact on intellectual property, is confidential or commercially sensitive. The titles of successful projects, names of organisations, amounts awarded and the public description will be published once the decision to offer an award has been communicated to applicants by email. Information about unsuccessful project applications will remain confidential and will not be made public. E-mail **pressoffice@tsb.gov.uk** with any queries.

*Technology Strategy Board is the UK's innovation agency.*

*We accelerate UK economic growth by stimulating and supporting business-led innovation.*

*We are a business-led executive non-departmental public body, sponsored and funded by the Department for Business, Innovation and Skills.*

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