GRAPHENE FLAGSHIP REVIEW (2016-2017)

September 2017

The European Commission held a review of the project to check on the progress of the past year. The overall conclusion of the experts is that the Graphene Flagship continues to deliver exceptional results, and keeps showing good promise for major impact.

Fourteen high-level experts, selected for their recognised knowledge and scientific expertise in the field, worked for two months to assess the progress of the Flagship. It was also an opportunity to look at the preparations for a next phase that will start in April 2018. Next challenges will be the integration of the new partners that were successful at the call for expression of interest earlier this year and the preparations for the next phase of the project starting next year.

Progressing towards industrial applications

The experts concluded that during the evaluated period (April 2016 – March 2017), the Graphene Flagship has made excellent progress towards its overall goal of taking graphene and related materials (GRM) from the research in laboratories stage to industrial exploitation. The activities encompass nearly all Key Enabling Technologies, in particular micro- and nanoelectronics, nanotechnology, advanced materials, photonics, and advanced manufacturing technologies, and to some extent biotechnology. Several scientific and/or technological achievements beyond state of the art have been highlighted.

These include the integration of GRM with current technologies or devices, with prominent examples such as a CMOS[1] integrated photodetector for/with application for consumer electronics, spintronic device for data processing and storage or enhanced stability of perovskite photovoltaic cells.

Focusing on innovation

High innovation potential results have been also achieved through the development of new devices, material and composites such as:

- graphene based magnetic, gas and bio-sensors for automobiles to medical applications
- a tuneable sieve using a graphene oxide membrane for water desalination
- a graphene-polymer sensor material that could be used for blood pressure monitoring
- a graphene-based composite to be used as permeation barrier in an Airbus winglet
- a graphene-based electrode material for energy devices such as batteries and supercapacitors.

[1] CMOS: complementary metal-oxide semiconductors

Significant progress has been made to enhance knowledge of other two-dimensional materials, often combined with graphene creating sandwich-like structures with tailor made characteristics and properties.

Performance figures

In the evaluated period the EU funded part of the Flagship produced 611 scientific publications, 5 patents and 37 patent applications, 39 prototypes and 17 products on the market such as inks for electronics or graphene-composite helmet. This shows that, while continuing the efforts on science, overall the Flagship is successfully moving toward a more industrially oriented initiative. In the different technical areas the work has progressed to higher Technology Readiness Levels, bringing the technology closer to exploitation. This is reflected in an increasing emphasis on intellectual property protection and commercialisation, strengthening the European leadership in this emerging technology.

Putting graphene on the map

The Flagship activities and scientific achievements have gained much visibility, both in the media and at major events such as the Mobile World Congress. This has made graphene more known to citizens, and also exposed industrial players in areas such as 5G and sensors to the most recent advances. The Graphene Flagship continues to be an anchor for international collaboration, as reflected in workshops with research in the US, China, Korea and Japan.
Finally, the crucial work done to determine the health and environmental impacts of graphene and perform safety assessments of the materials and life cycle assessments for products, which so far produced reassuring results, is praised for the thorough way it is carried out.

About the Graphene Flagship

The Graphene Flagship, launched in 2013, today involves hundreds of researchers in 23 countries in Europe, feverously working to put their knowledge and technologies together. It is now well into its operational phase, close to the mid-way point of its 10 year journey. Having started from a breakthrough in fundamental science, it is increasingly adjusting its sails to focus on those areas where the industrial promise of graphene and related materials is visible most clearly through the spyglass.