Graphene Flagship

M. García-Hernández (CSIC)
Leader WP3-Enabling MATERIALS & Member of the EB

FLAG-ERA Networking event
Madrid, 12th January, 2017
Our Mission:

Bring graphene disruptive technologies from European laboratories to Europeans in ten years space of time.
• A total budget of €1 billion, of which the EC funds 50%; the remaining 50% is funded by national sources and by flagship partners

• Coordinated by Chalmers University of Technology, Gothenburg, Sweden

• The project does not interfere with national programmes or other EU initiatives but it is aligned.
Flagship in H2020

Framework Partnership

Core Project 1
152 partners, 2016-18

Core Project 2
> 120 partners, 2018-20

Core Projects 3-
> 120 partners, 2020-

National projects

FLAG-ERA

Regional projects

Other EU projects
Initial consortium & open call

- Open Call (66)
- Flagera (30)
- Today
- Flagera

Graphene Flagship
EU countries
Academic Partners
Industrial Partners

European Commission Funding
A 30 month run-up phase / 7th Framework Programme
A 50 Mio. p.a.

1. October 2013
2023

17
61
14°

54 Mio.
EC-funded part in CORE1

- H2020: Core 1 started on April 1, 2016
  - 152 partners in 23 countries; about 1/3 industry, 1/2 academia and 1/6 other
  - 15 S&T work packages, 5 supporting work packages
  - 450 full-time equivalent persons, over 1,300 individuals

- 53 Associated Members, many of whom are involved in 16 Partnering Projects

- Progress along the value chain materials-components-systems towards higher technology readiness levels
Evolution of the flagship

- The flagship has more than doubled in size since its launch:

<table>
<thead>
<tr>
<th>Year</th>
<th>Partners</th>
<th>Academic</th>
<th>Industrial</th>
<th>Other</th>
<th>Budget/yr</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>75</td>
<td>48</td>
<td>16</td>
<td>8</td>
<td>18 M€</td>
</tr>
<tr>
<td>2014</td>
<td>142</td>
<td>76</td>
<td>41</td>
<td>25</td>
<td>24 M€</td>
</tr>
<tr>
<td>2016 (H2020)</td>
<td>152</td>
<td>75</td>
<td>52</td>
<td>25</td>
<td>45 M€</td>
</tr>
</tbody>
</table>

**GLOBAL EFFORT**

<table>
<thead>
<tr>
<th>Ramp up</th>
<th>Actual PM M1-12</th>
<th>Actual PM M13-30</th>
<th>Total Actual PM</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL</td>
<td>1399</td>
<td>5582</td>
<td>6980</td>
</tr>
</tbody>
</table>
## Key Performance Indicators (M1-M30)

<table>
<thead>
<tr>
<th>KPI</th>
<th>Target</th>
<th>Achieved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of scientific publications</td>
<td>305</td>
<td>782</td>
</tr>
<tr>
<td>Number of citations (without self-citations)</td>
<td>1500</td>
<td>4595</td>
</tr>
<tr>
<td>Number of invited talks at conferences</td>
<td>130</td>
<td>465</td>
</tr>
<tr>
<td>Number of invention disclosures</td>
<td>38</td>
<td>45</td>
</tr>
<tr>
<td>Number of patent applications</td>
<td>26</td>
<td>49</td>
</tr>
<tr>
<td>Number of patents</td>
<td>11</td>
<td>0</td>
</tr>
<tr>
<td>Number of prototypes</td>
<td>4</td>
<td>36</td>
</tr>
<tr>
<td>Number of PhDs and Postdocs recruited into the Flagship</td>
<td>139</td>
<td>225</td>
</tr>
<tr>
<td>Number of spin-offs established</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Number of products on market</td>
<td>8</td>
<td>13</td>
</tr>
<tr>
<td>Number of industry/academy collaborations, in particular SME collaborations</td>
<td>6</td>
<td>165</td>
</tr>
<tr>
<td>Number of enterprises that actively use university facilities</td>
<td>29</td>
<td>36</td>
</tr>
<tr>
<td>Number of appearances in public media including popular science publication</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>Number of press releases</td>
<td>20</td>
<td>102</td>
</tr>
<tr>
<td>Number of companies attending industrial workshops organised by the flagship</td>
<td>30</td>
<td>84</td>
</tr>
<tr>
<td>Number of member states and associated countries engaged in a dialogue with the flagship either directly or through an ERA-NET</td>
<td>18</td>
<td>26</td>
</tr>
</tbody>
</table>
Divisions and Work Packages in Core1

• The Graphene Flagship has
  • Four scientific divisions
  • One administrative division
  • 20 Work Packages
    • 15 on research and innovation
    • Five on operative management aspects
• One external division
  • Associated members and partnering projects
Core 1 Divisions

- Administration and service division (K. Boustedt)
  - Management (J. Kinaret)
  - Research management (K. Boustedt)
  - Innovation (K. Hjelt)
  - Dissemination (M. Fogelström)
  - Alignment (A. Helman)

- Enabling science and materials division (V. Fal’ko)
  - Enabling technologies (V. Fal’ko)
  - Enabling materials (M. Garcia Hernandez)
  - Spintronics (B. van Wees)

- Health, medicine and sensors division (M. Prato)
  - Health & environment (M. Prato)
  - Biomedical technologies (K. Kostarelos)
  - Sensors (H. van der Zant)

- Electronics and photonics integration division (D. Neumaier)
  - Electric devices (D. Neumaier)
  - Optoelectronics (F. Koppens)
  - Flexible electronics (H. Sandberg)
  - Wafer-scale system integration (M. Romagnoli)

- Large-scale technologies division (G. Gebel)
  - Energy storage (V. Pellegrini)
  - Energy generation (G. Gebel)
  - Polymer composites (V. Palermo)
  - Coatings & foams (X.-L. Feng)
  - Production (K. Teo)

- Partnering division (M. Lemme)
  - External

http://graphene-flagship.eu/project/divisions/Pages/divisions.aspx
Future evolution

• Continue moving towards higher technology readiness levels but keeping the fundamental science component as well

• Focus the activities: try to combine technology push (what is doable?) and market pull (what is worth doing?)

• Focusing decisions based on four input streams:
  • EC reviews (backward-looking)
  • Our internal reviews (forward-looking)
  • Our technology and innovation roadmap
  • Our Science and Technology Fora
Divisions and Work Packages

The Graphene Flagship is implemented in six divisions: four of them scientific and one each for Partnering Projects and Administration. Within the divisions are a total of 20 Work Packages, 15 on research and innovation and five on operative management aspects.

1. Enabling Science and Materials

Leader: Vladimir Falko, The University of Manchester, UK
Deputy: Bart van Wees, University of Groningen, The Netherlands

Work Package 1: Enabling Research
Work Package 2: Spintronics
Work Package 3: Enabling Materials

2. Health, Medicine and Sensors

Leader: Maurizio Prato, University of Trieste, Italy
Deputy: Kostas Kostarelos, The University of Manchester, United Kingdom
Thank you for your attention!

Graphene disruptive technologies - from academic laboratories to society