Flagship structure

Ramp-up phase, 74-142 partners, 2013-2016

- Core Project 1
  156 partners, ’16-18

- Core Project 2
  155 partners, ’18-20

- Core Projects 3-
  ≈ 165 partners, ’20-23

- 2D-EPL
  11 partners, ’20-24

- National projects

- Regional projects

- Other EU projects

- FLAG-ERA

Horizon Europe? 2023-?
The Framework Partnership is evently split between commercial partners and academic/research organizations.

In addition, we have 36 Partnering Projects and 101 Associated Members coming from 26 countries.

The consortium has demonstrated great ability for renewal: 28% of our partners have joined this year, and only 31% have been involved since the start.
OVERVIEW OF THE PARTNERING DIVISION

- **36 PPs**
- **101 AMs**
- **26 EU and Associated countries**
- **37 individual AMs**
- **64 AMs belonging to the PPs**
Recent results
(Core 2, in May 2020 unless otherwise stated)

<table>
<thead>
<tr>
<th>KPI</th>
<th>C2 realized</th>
<th>C2 target</th>
<th>Cumulative realized</th>
</tr>
</thead>
<tbody>
<tr>
<td>Publications (26.11.)</td>
<td>891</td>
<td>703</td>
<td>3,864</td>
</tr>
<tr>
<td>Citations (26.11.)</td>
<td>5,842</td>
<td>660</td>
<td>135,428</td>
</tr>
<tr>
<td>Number of patent applications</td>
<td>117</td>
<td>62</td>
<td>272</td>
</tr>
<tr>
<td>Number of patents</td>
<td>28</td>
<td>13</td>
<td>34</td>
</tr>
<tr>
<td>Number of prototypes</td>
<td>149</td>
<td>67</td>
<td>250</td>
</tr>
<tr>
<td>Number of products on market</td>
<td>31</td>
<td>19</td>
<td>76</td>
</tr>
<tr>
<td>Number of spin-offs established</td>
<td>4 (5)</td>
<td>7</td>
<td>15</td>
</tr>
</tbody>
</table>
Some highlights

Authoritative white book on 2D materials
Some highlights

First products in biomedical technologies

Commercialisation of first two products in two different markets by two different industrial WP5 partners

Commercialisation of **wired** 16 and 64 channel electronic systems for gFETs

Commercialisation of **wireless** gFET epicortical probe

Funded by the European Union
Some highlights

High-Energy CoinPower® Cell

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Capacity*</td>
<td>88 mAh (+35%**)</td>
</tr>
<tr>
<td>Total Energy*</td>
<td>300 mWh (+25%**)</td>
</tr>
<tr>
<td>1st CE</td>
<td>86,0%</td>
</tr>
<tr>
<td>3rd CE</td>
<td>99,7%</td>
</tr>
</tbody>
</table>

*0.1C Discharge
** compared to benchmark

In SH5, the partners developed a high-energy silicon/graphene prototype that outperforms SotA graphite-based cells by up to 35% in capacity and 25% in energy density.

Some highlights

De-/ Anti-icing Demonstrator for airplanes

- Co-curing of graphene serpentine in complex SA LE shape
- No issues identified with leading edge shape, good adaptation of graphene serpentine to complex shape
- Confirmation of graphene serpentine heating capability in curve shape

Evaluation / testing of SA LE demonstrator @ Room Temperature

- Different voltages (10, 20, 30, 50 & 85V)
- Sheet resistance: 20 Ohm
- Homogeneity ok, but room for improvement (hotter areas)
- Good / quick heating
  - 70°C in 60 seconds, at 30V & 1.5A
  - 50°C in 30 seconds, at 85V & 4A
- Maximum specific power: 13 KW/m² at 85V & 4A
Some highlights

Launch of experimental pilot line 2D-EPL

The 2D-EPL started on October 1, 2020, and had a digital kick-off on October 8. The 2D-EPL project involves 11 partners from Belgium, Finland, Germany, Spain and the UK.

There is already large industrial interest in the 2D-EPL as shown by its Industrial Advisory Board that today includes 10 European companies.
Dissemination activities

Visit by EC Executive Vice President
Margarethe Vestager

"It is incredible to see how well the project is administered, coordinating even a large group of academic institutions can be a challenge, but adding industrial partners successfully into the mix is remarkable."

"the Graphene Flagship is money well spent"

Due to Covid19, most dissemination activities have moved online for the time being:

- Women in Graphene (virtual reality implementation)
- New "Graphene for" series
  - Energy storage (June)
  - Research, Innovation, Collaboration (September)
  - Health (November)
  - Standardization (January)
Impact of Covid19

• The impact has been and continues to be quite substantial but uneven in the consortium

• In the first 6 months, the Core 3 partnership has used about 10% of its resources, which is 2/3 of the expected usage: *we will be applying for a cost neutral 6 month extension of the Core 3 project*

• At this time we do not expect that the 2D-EPL project will ask for an extension, but the situation may change if the pandemic persists

• The impact is particularly strong on our international workshops and conferences, which are all either on hold or have been converted to digital formats. This puts substantial strain on our staff working on event management, and I am impressed by how they cope with the challenging situation
Horizon Europe

• We are convinced that the most appropriate way to implement the activities of the Graphene Flagship in Horizon Europe is to keep the coherence that has allowed us to reach remarkable results in the last 7 years, demonstrated how to cross the valley of death from academia to industry.

• Compared to the RIAs+CSA model included in the latest circulate HE work programme draft, the FPA+SGA model has several advantages. It is the most efficient way to implement large scale research actions, enables the creation of a large industrial ecosystem needed to bring new technologies to society, and it has demonstrated an ability to renewal by continuously adding new competence to the consortium.

• If legally necessary, the FPA+SGA structure may be supplemented by additional RIAs, which would naturally become Partnering Projects and benefit from many of the support functions from the FPA+SGA, if they so desire.

• We are concerned by the prolonged negotiations on the Horizon Europe budget, which delays our planning process, causes uncertainty in the consortium and leads to internal competition rather than collaboration.
Where we are as a technology?

gartner.com/SmarterWithGartner

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Funded by the European Union
Graphene disruptive technologies - from academic laboratories to society