



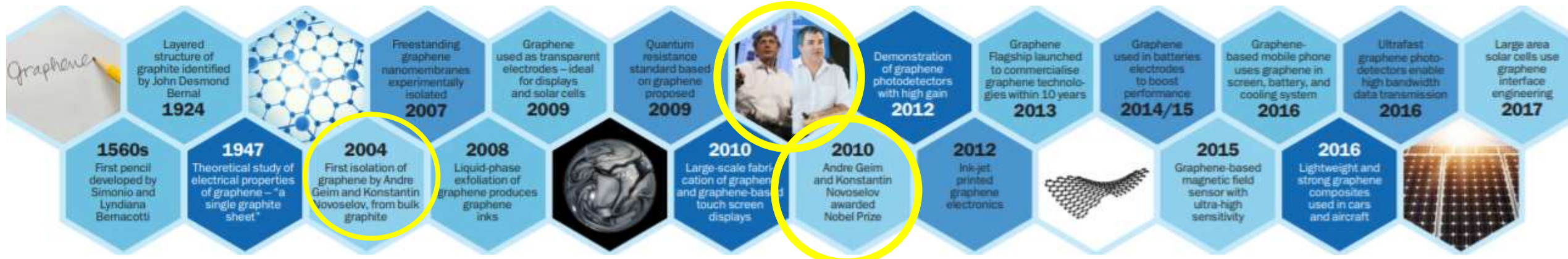
Exploring graphene-based 3D macrostructures for environmental and biomedical applications

Paula Marques

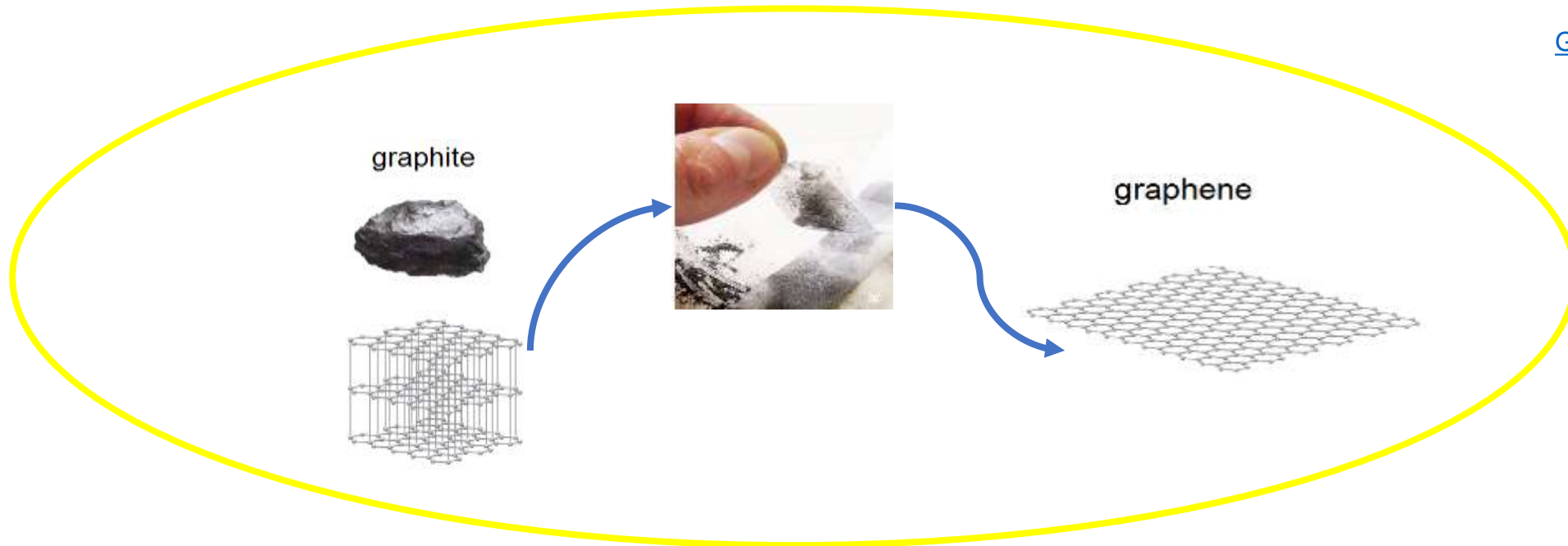
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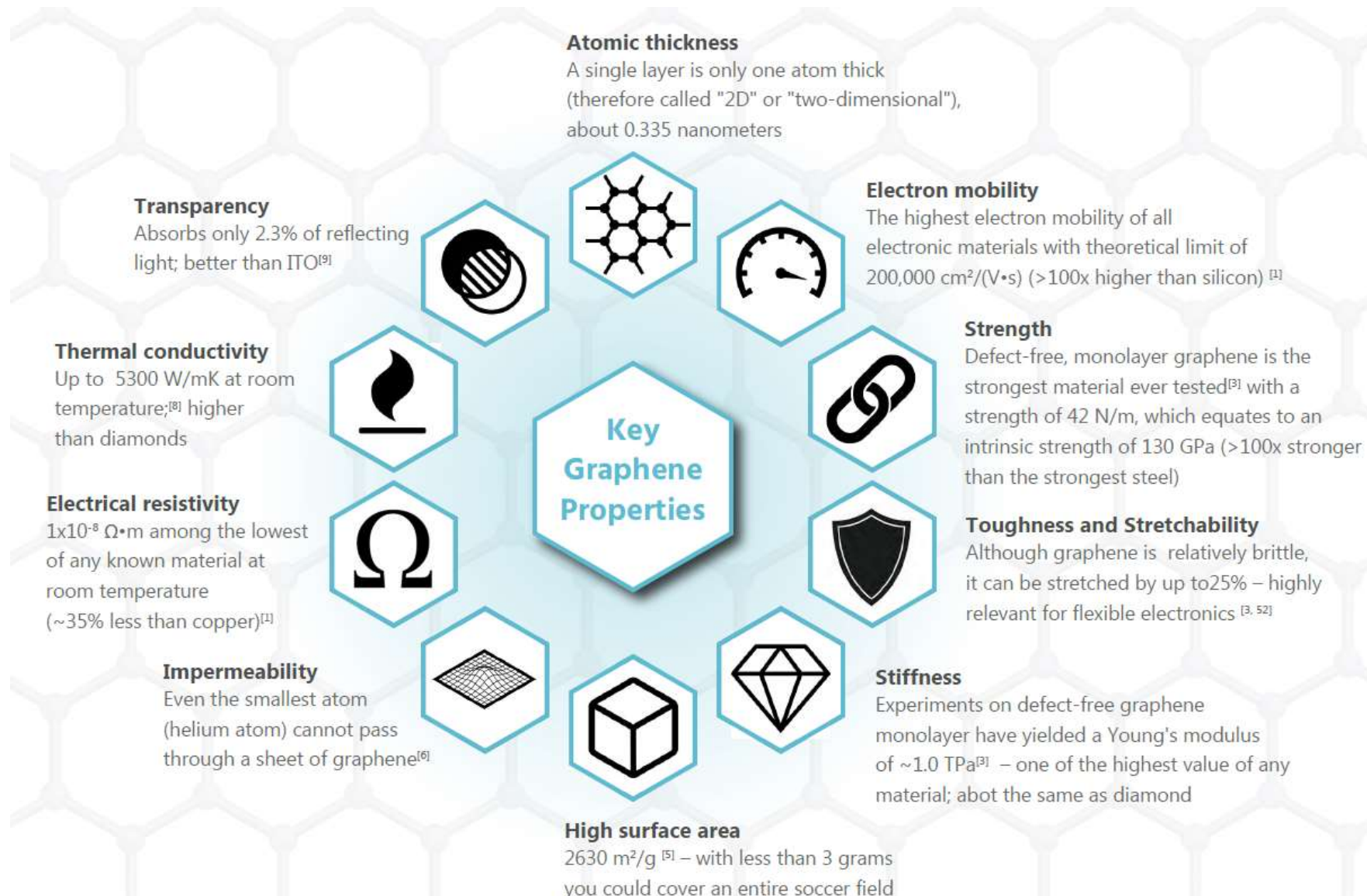
Graphene Timeline

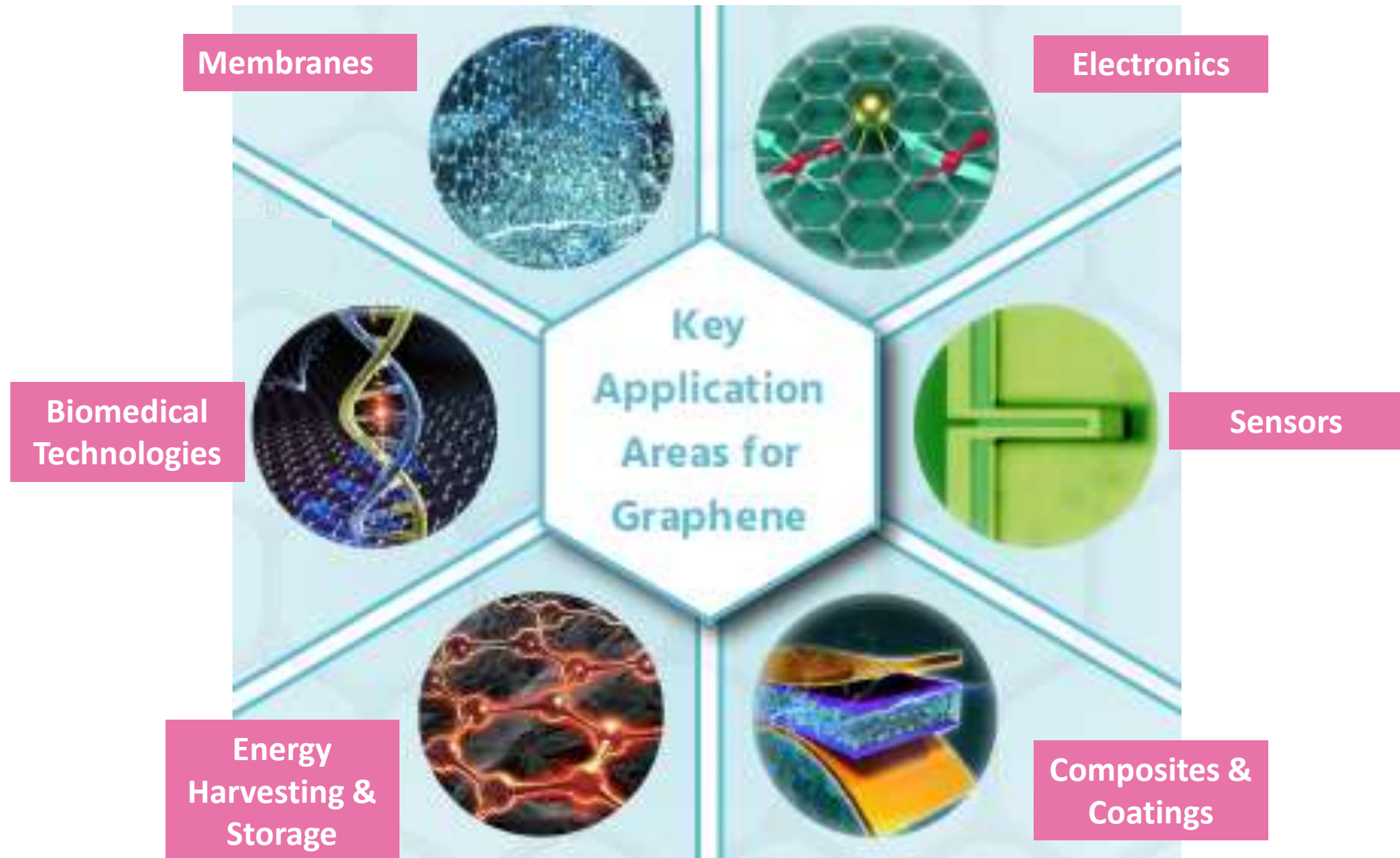


[Graphene Flagship](#)

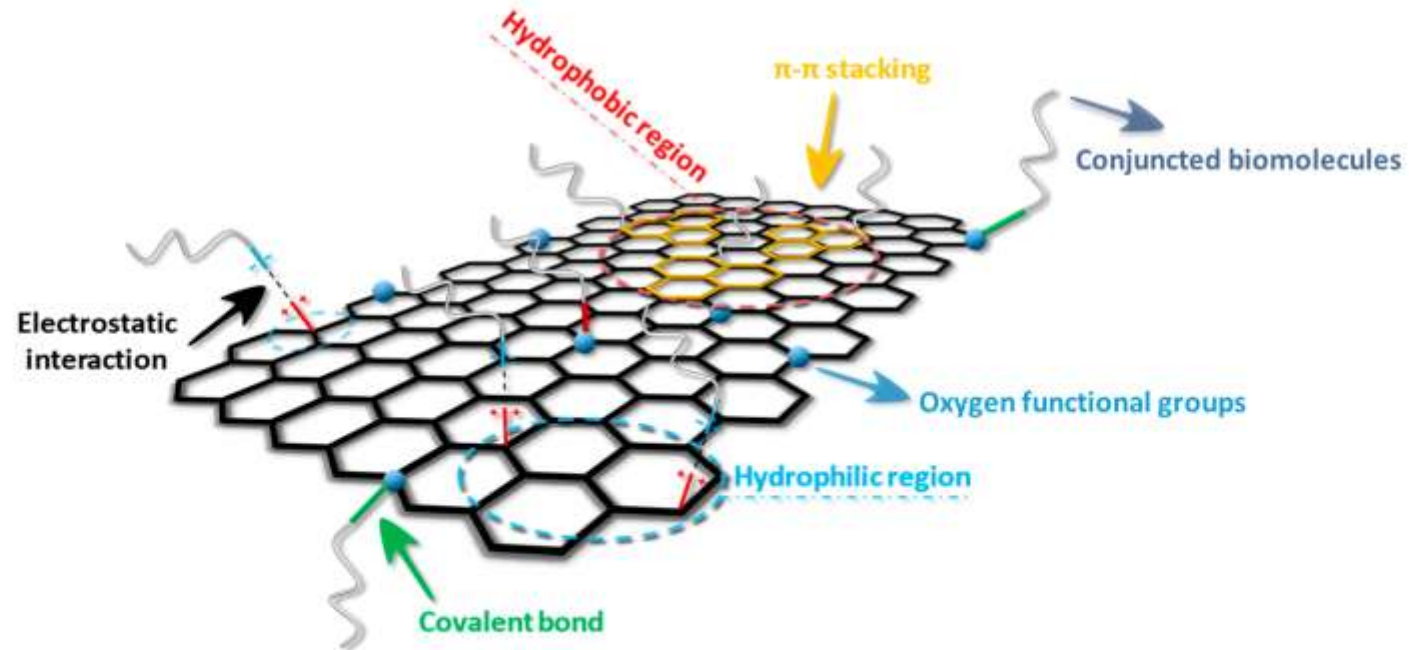
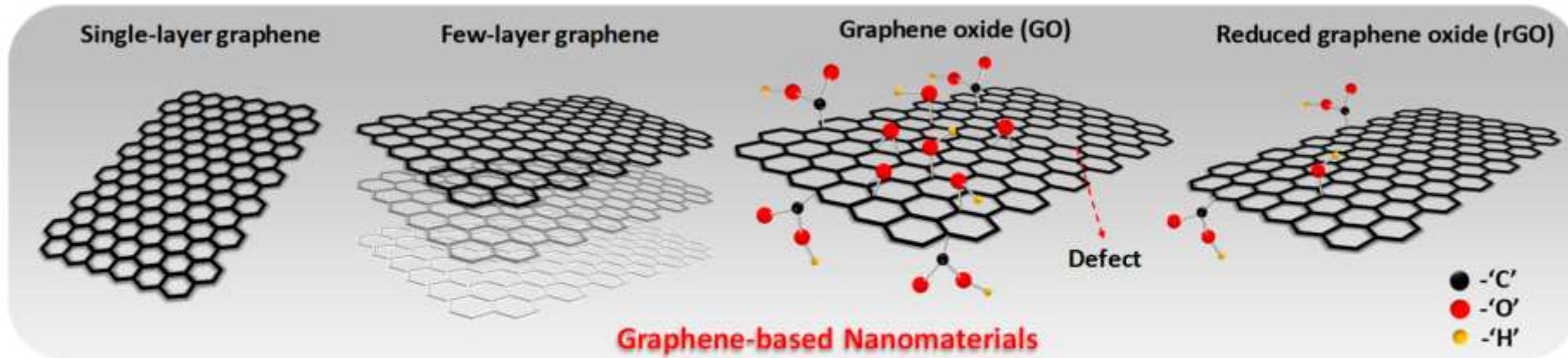


Graphene extraordinary properties





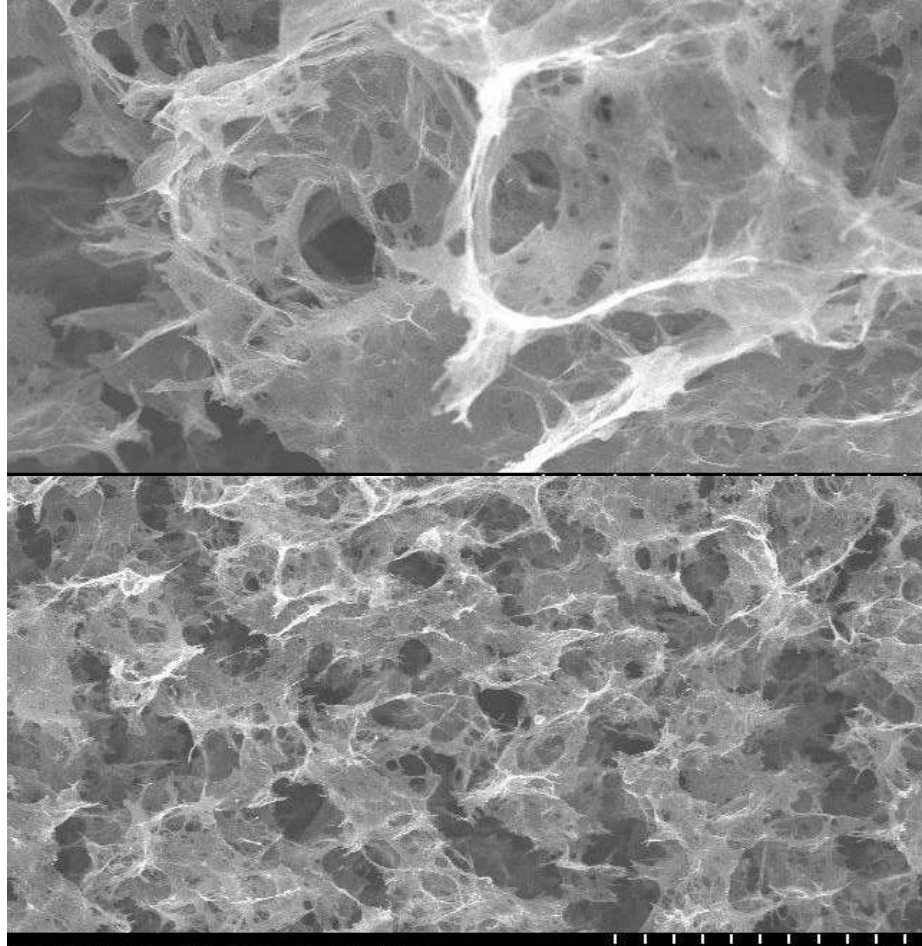
Graphene Based Materials



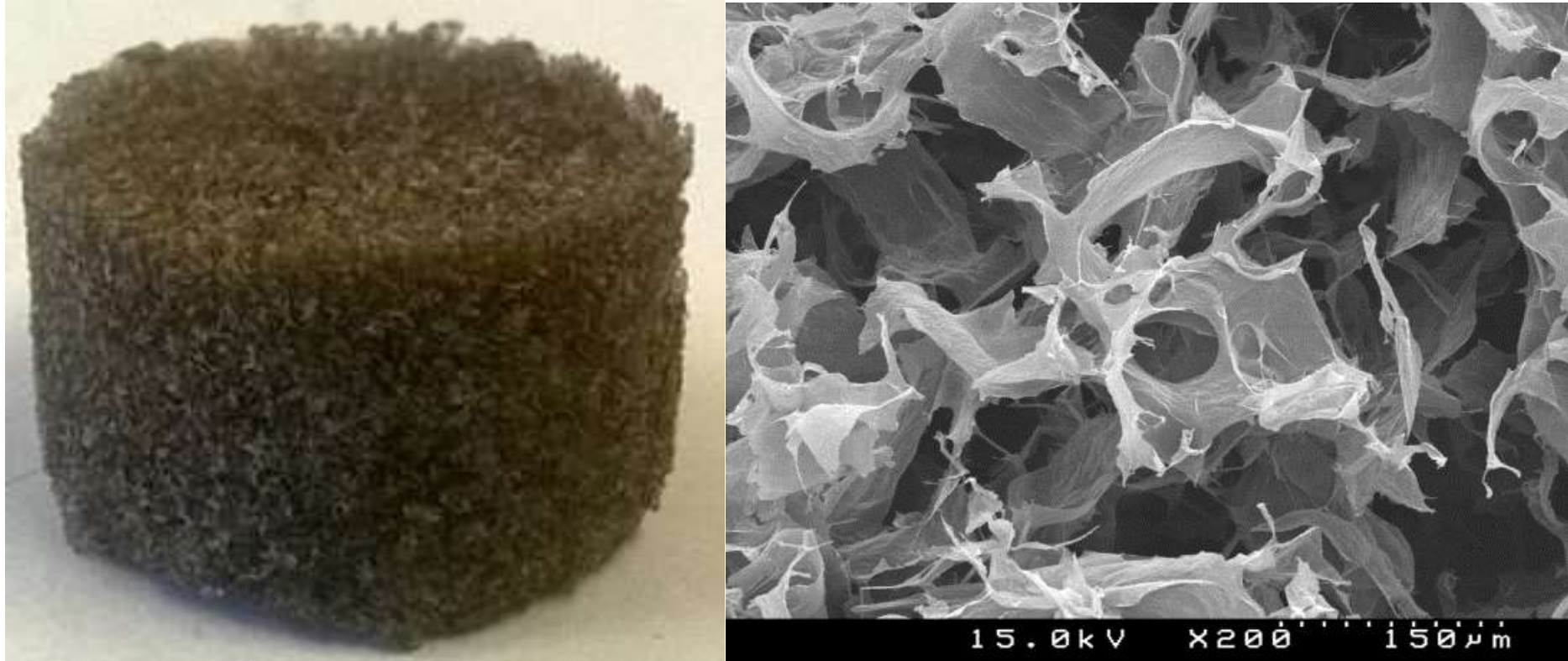
Functionalization of graphene-based Nanomaterials

Molecules **2019**, *24*(4), 658

3D Graphene-based macrostructures



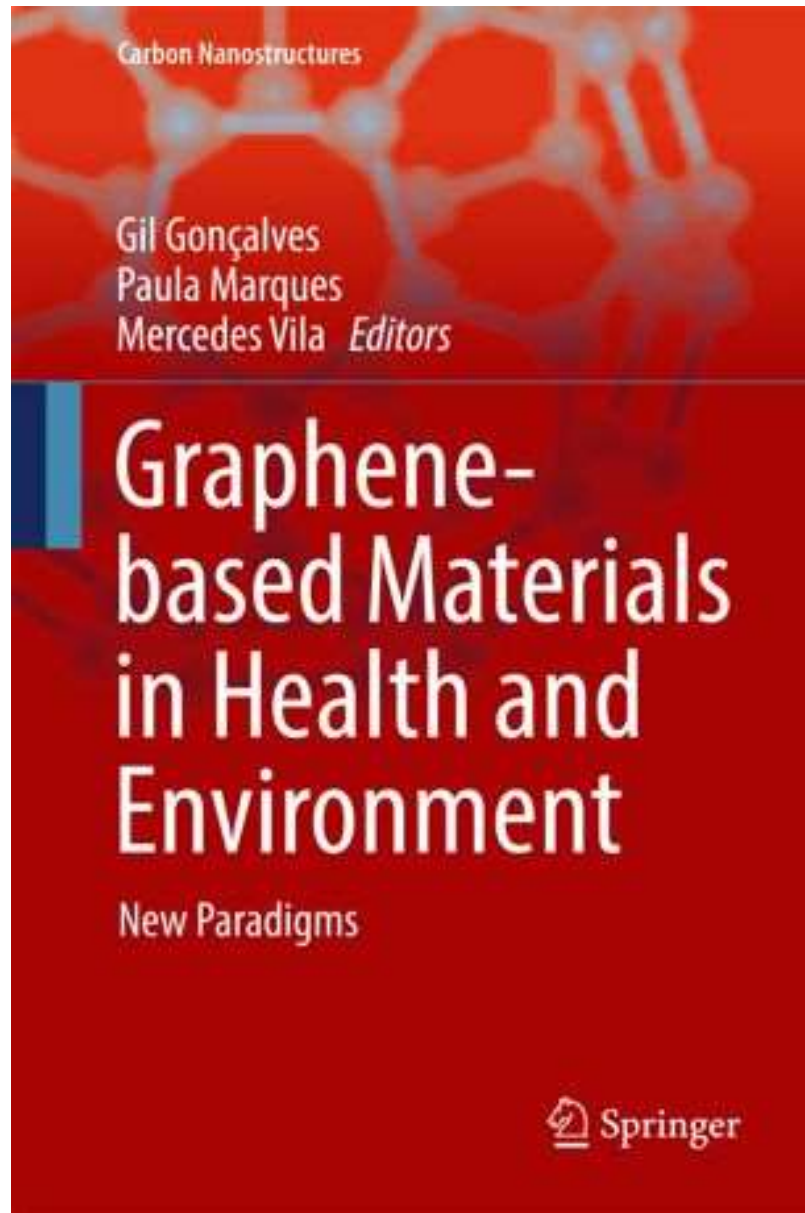
3D Graphene/Polymer based macrostructures



WHO - European Centre for Environment and Health: 17 goals to transform our world



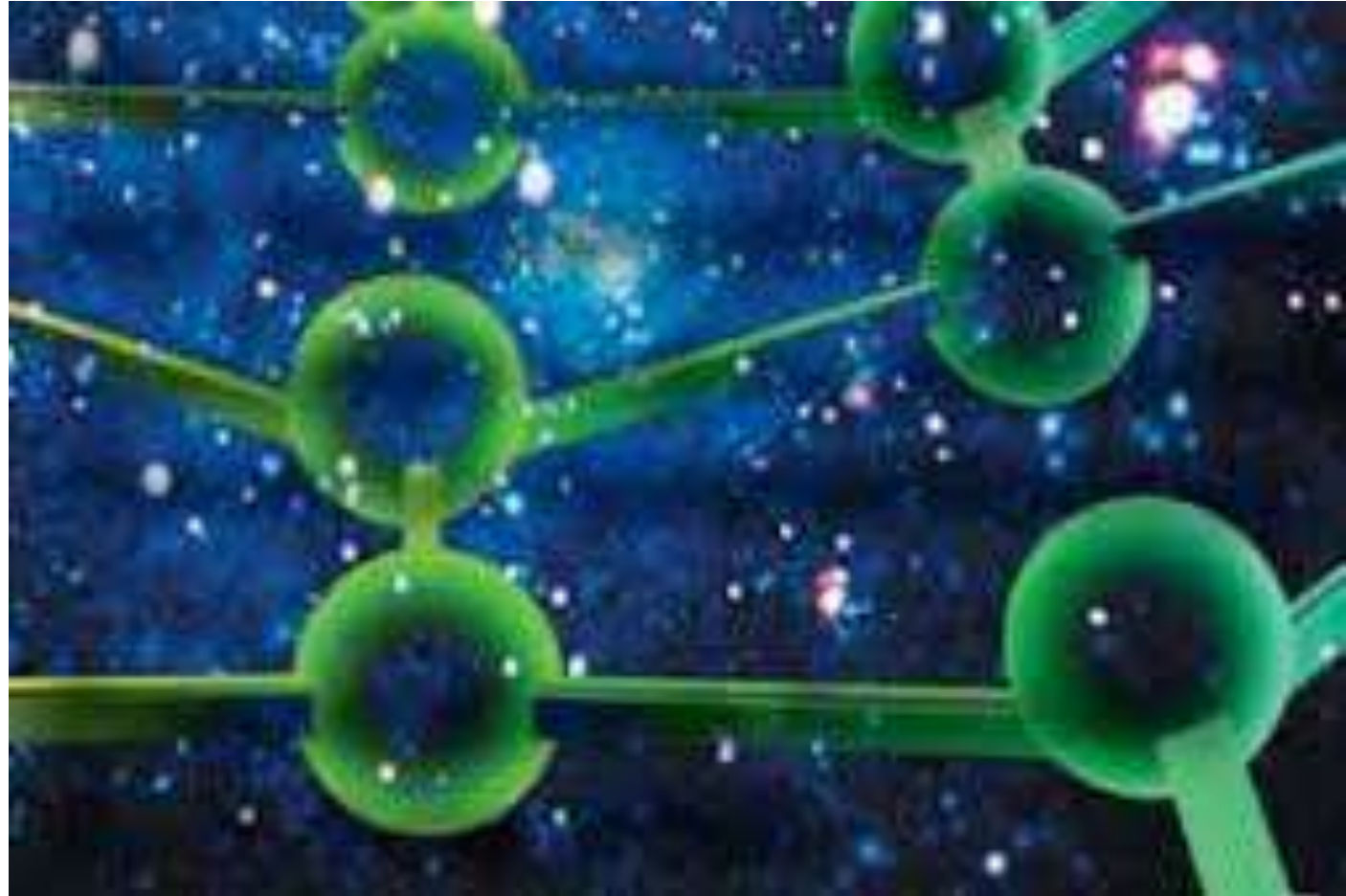
Protect our environment, protect our health



Much research is focused on graphene for different water treatment uses, and nanotechnology also has great potential for elimination of bacteria and other contaminants.

The biomedical applications of graphene represent a field **in continuous expansion**. Basic investigations demonstrate the high potential of graphene and its derivatives in many important applications, including **drug delivery, tissue engineering and sensing**.

Nanotechnology for water remediation





H₂OValue – Graphene based materials and water remediation: a sustainable solution for a real problem?

CENTRO-01-0145-FEDER-030513 (COMPETE 2020); PTDC/NAN-MAT/30513/2017.

Started in June 2018. Budget: 234 935€. Coordinator

PhD project 1: Three dimensional graphene-based macrostructures for cleaning contaminated waters: optimization towards a more efficient re-use of water

PhD grant: SFRH/BD/110478/2015

PhD project 2: The impacts of graphene multifunctional nanocomposites in the environment: interaction between climate change and invertebrates

PhD grant: SFRH/BD/118582/2016



H₂OValue project (PTDC/NAN-MAT/30513/2017) supported by FCT/MEC through national funds, and the co-funding by the FEDER, within the PT2020 Partnership agreement and Compete 2020 (CENTRO-01-0145-FEDER-030513)



Graphene oxide 'teabags' make a mercury-free brew

25 June 2015 Emma Stoye

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Water-cleaning tea bags containing a porous graphene oxide foam have been developed by researchers in Portugal, who say they can help purify water by removing dissolved mercury.

Paula Marques and colleagues at the University of Aveiro synthesised the foams by heating graphene oxide with ammonia to create a porous 3D material with a high surface area. After screening their materials for their ability to adsorb various toxic pollutants, the team chose to focus on mercury, one of the top three on the EU's priority list of hazardous substances in water.

'We put it in a tea bag because sometimes the foam breaks apart. The shape also optimises contact with water – I guess that's why they make teabags like that!' says Marques, who was presenting the work with colleague Gil Gonçalves at [Graphene Week 2015](#), a conference run by the European commission's Graphene Flagship initiative in Manchester, UK.



The 'teabags' remove mercury well from clean water but struggled with seawater © Gil Gonçalves



NATIONAL PATENT pending:
Graphene oxide macrostructures
for heavy metal removal from
polluted waters. Patent number:
PPP 108.061 Publication date: 25
Nov 2014

Nanotechnology in tissue engineering



NeuroStimSpinal

A step forward to spinal cord injury repair using innovative stimulated nanoengineered scaffolds



H2020-FETOPEN-2018-2019-2020-01
Grant Agreement: 829060

Budget: €3,518,962.50

Started: 1st April 2019
Duration: 48 month

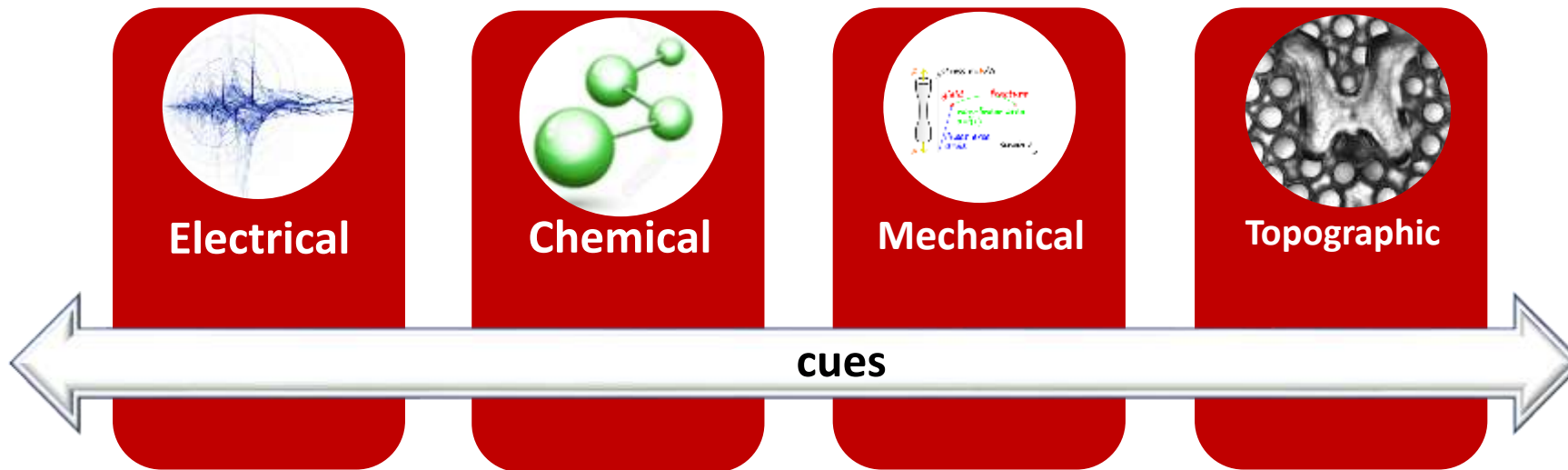
CONSORTIUM

- University of Aveiro (UAVR) (HEI; Portugal)
- Tecnalia (Research Centre, Spain)
- Complutense University of Madrid (UCM) (HEI, Spain)
- Foundation for Research and Technology-Hellas (FORTH) (HEI, Greece)
- Radboud University Medical Center (Radboudumc) (HEI, Netherlands)
- Graphenest (SME, Portugal)
- Stematters (SME, Portugal).

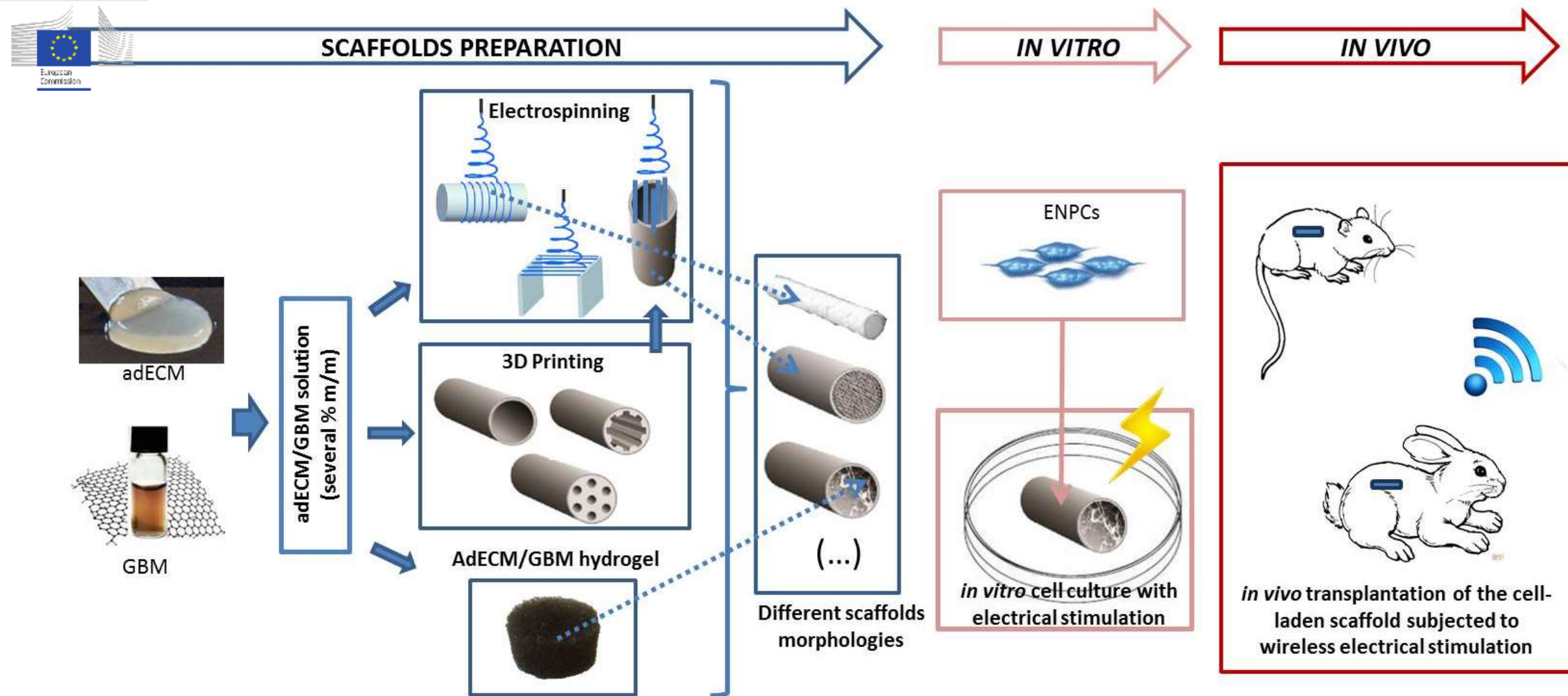


Concept:

Graphene/adECM- based **nanoengineered scaffold** creating a **3D** microenviroment with:



Schematic representation of the methodologies steps projected to achieve SCI repair



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 829060.

For the moment: <https://sites.google.com/view/neurostimspinal/home>

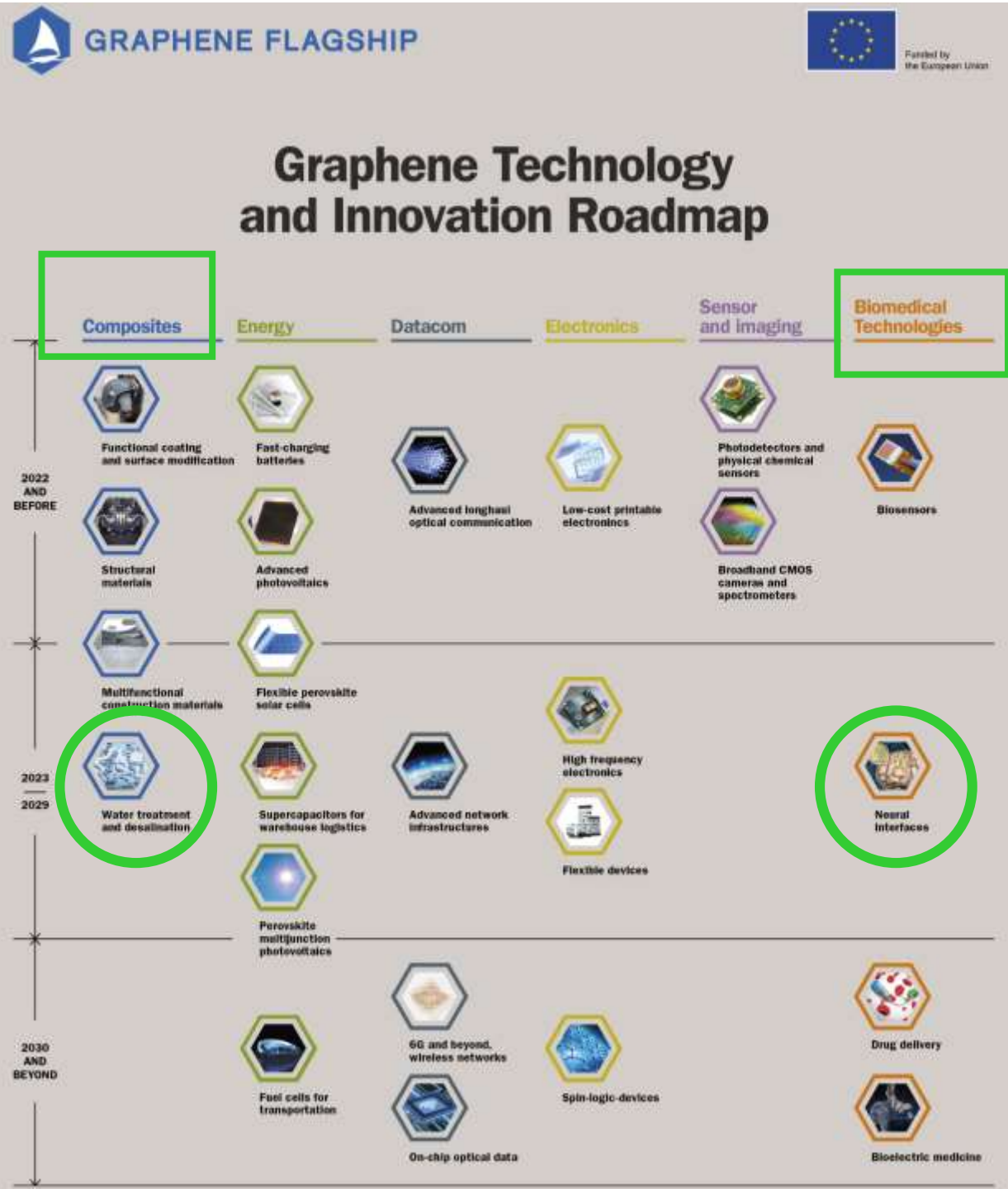
Soon at: www.neurostimspinal.eu .



Follow us online!

The Graphene Flagship is a Future and Emerging Technology Flagship by the European Commission.

With a budget of €1 billion, the Graphene Flagship represents a new form of joint, coordinated research on an unprecedented scale, forming Europe's biggest ever research initiative.



<https://graphene-flagship.eu/>

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