

WP2. Health and Environment Impact

Min aim of this WP:

Determination of the conditions and material properties aimed to a safe use of graphene, 2D crystals and hybrids

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Presenter: Cécilia Ménard-Moyon – CNRS Strasbourg

WP2. Partners and Expertise

Maurizio Prato and Laura Ballerini, University of Trieste (Italy) – **Material and cell interfacing**

Alberto Bianco, CNRS ICT (France) – **Immune system impact and biodegradation**

Kostas Kostarelos, University College London SoP (UK) – **Toxicity and pharmacokinetics**

Ester Vazquez, University Castilla-La Mancha MSOC (Spain) – **Material and dispersion**

Bengt Fadeel, Karolinska Institutet (Sweden) – **Nano/immunotoxicology**

Peter Wick and Harald Krug, EMPA (Switzerland) – **Nanosafety**

Emmanuel Flahaut, Laury Gauthier, CNRS CIRIMAT/ECOLAB (France) – **Ecotoxicology**

Kenneth Dawson, University College Dublin CBNI (Ireland) – **Bionanointeractions**

Fabio Benfenati, Italian Institute of Technology NBT (Italy) – **Cellular neurophysiology**

WP2. Disciplines

The partnership covers multidisciplinary expertise that combines:

Synthetic chemistry

Physical chemistry

Cell biology

Pharmacology

Nanomedicine

Toxicology

Ecotoxicology

Nanosafety

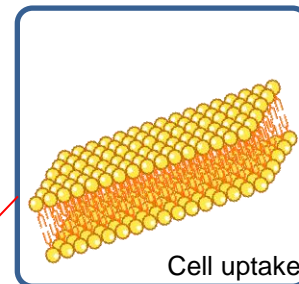
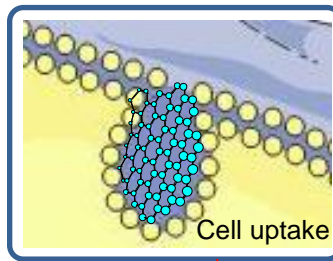
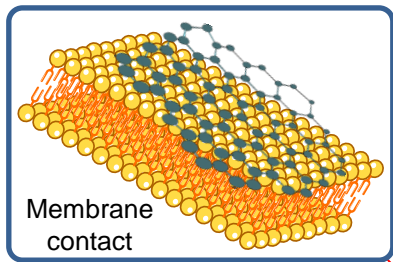
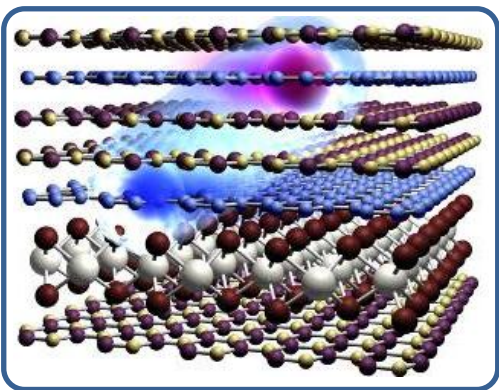
WP2. Objectives (1)

- Elucidate the mechanisms of how graphene forms and 2D crystals interact with cells at cellular and molecular level
- Address the effects of graphene forms and 2D crystals on specific tissues such as the immune system, nervous system or placenta
- Identify any possible hazard of graphene forms and 2D crystals in relation to their physico-chemical properties with a special focus on the most important exposure routes (i.e. lung, skin)

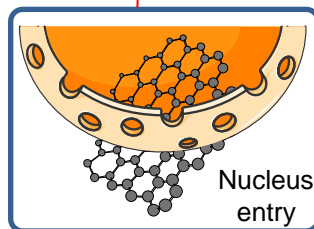
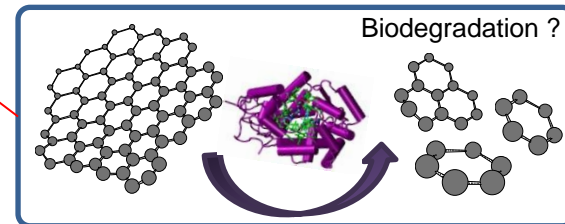
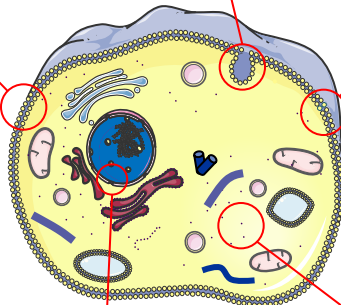
WP2. Objectives (2)

- Understand the processes that control biostability and biodegradation of graphene family nanomaterials
- Investigate the potential impact of the various 2D nanoforms on aquatic species (i.e. amphibians), terrestrial organisms and microorganisms
- Develop a standardized and validated testing strategy for graphene forms and 2D crystals, to enable the regulation of these materials

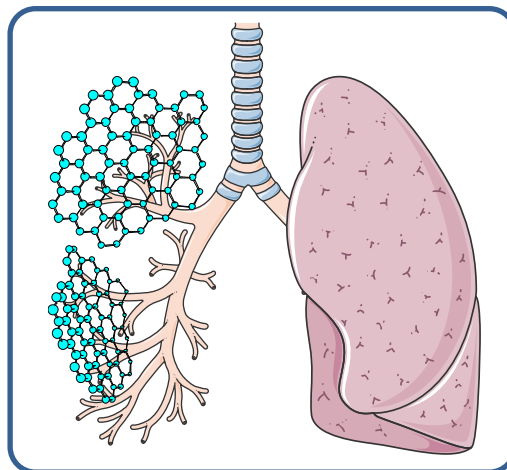
Graphene and 2D hybrid structures



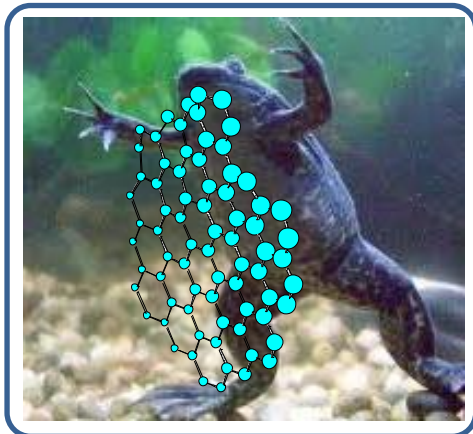
Cell interaction



Health impact



Environmental impact



WP2. WP Exchanges

Exchange and collaboration with the partners of:

WP1 – Materials

WP10 – Nanocomposites

The development of graphene and 2D crystals, their complete characterization in terms of physico-chemical properties and their integration into new devices, envisaged in these two WPs, will be beneficial and fundamental to assess the impact on health and environment

In WP2 we will indeed test and explore the effects of these engineered nanomaterials in a systematic and comprehensive manner

French expertise in WP2

➤ Alberto Bianco, CNRS ICT (France) – **Immune system impact and biodegradation**

Expertise

- Development of novel platforms based on carbon nanomaterials for therapeutic and preventive biomedical applications.
- Study of the impact of carbon nanotubes and graphene on health and environment.

Role in WP2

Functionalisation of graphene, degradation of graphene and 2D crystals by oxidative enzymes, assessment of the toxicological impact of metabolites generated by degradation, interactions with immune cells.

➤ Emmanuel Flahaut, Laury Gauthier, CNRS CIRIMAT/ECOLAB (France) – **Ecotoxicology**

Expertise

- Synthesis, nanocomposites, toxicity and environmental impact of carbon nanostructures (CIRIMAT)
- Evaluation of the potential ecotoxicological impact of contaminants in the environment (ECOLAB)

Role in WP2

Ecotoxicity tests of graphene materials, acute toxicity assay as well as a genotoxicity assay.