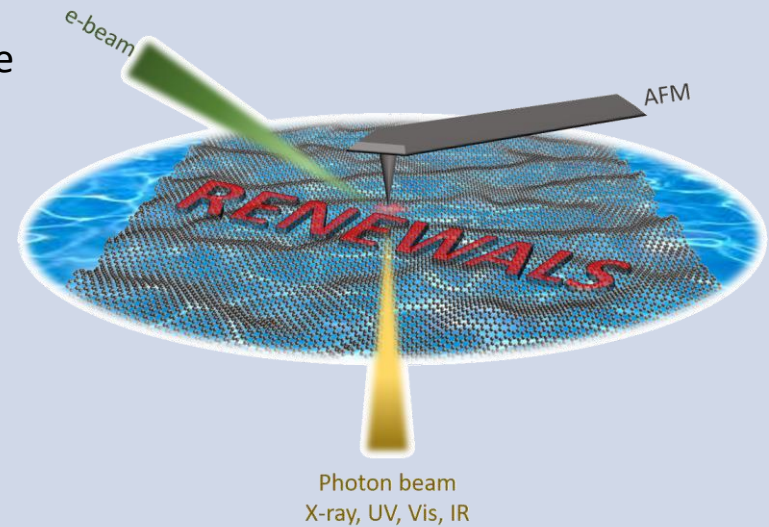


The proposed technology is based on the exploitation of optical and mechanical properties of graphene to develop and implement environmental liquid cells suitable for cross-talk characterization of bio-cellular samples with atomic force, photon and electron-based microscopies, using conformable few-layers graphene membranes (Graphene Liquid Cells, GLCs).

A new strategy for bio-sample encapsulation with graphene has been developed more reproducible, biocompatible, and faster than standard graphene encapsulation technologies, allowing large fields of view and easy-to-handle liquid cells.



- The technology was developed to strengthen correlative analysis of bio-samples under physiological conditions with a large variety of spectral-imaging techniques, both in-vacuum and at environmental pressure: SEM, TEM, Low-Energy (LE) X-ray microscopy and LE-XRF, FTIR and UV-Raman microscopy, optical microscopy, AFM.
  - The conformability of graphene allows keeping the water layer thin enough for barely interfering with the sample signal, allowing unprecedented morpho-chemical details to be disclosed.
- The technology could have the following fields of application:
    - Morpho-chemical characterization of hydrated bio-samples and hydrated samples in general.
    - The integration with fluidic systems may allow to follow hydrated sample dynamics.
    - For all those analyses where the sample confinement is mandatory for safety reasons (e.g. hazardous volatile materials, such as nano-fibers), but the penetration depth of the probing beam is limited (e.g. s-SNOM).
    - For all those chemical-sensitive analyses that limit the possible sample fixation/embedding materials (e.g. FTIR, Raman).

## Strengths

- Work in physiological conditions, while providing a spectral quality comparable to that of dried
- More reproducible, more biocompatible and faster than standard “graphene fishing” methods
- Improve the reliability of *in vitro* measurements
- Favor the cross-talk of diverse characterization technologies
- Strengthen the multidisciplinary of science

## Opportunities

- Adaptable also to other characterization technologies
- Applicable at diverse analytical RIs

## Weaknesses

- The technology is not commercial yet but it has the possibility to be standardized for market purposes: the fabrication process is simple and uses broadly available techniques and extensively employed materials

## Threats

- Considered the scientific trend of multidisciplinary of scientific research, no specific threats can be identified for a technology that maximizes the cross-talk among diverse investigation tools

# IPR Status & Contact Information

- The IPR status of the technology is protected by secret know-how
- For further information, the contact point is Dr. Lisa Vaccari, email: [lisa.vaccari@elettra.eu](mailto:lisa.vaccari@elettra.eu)
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