H2020 Partner profile in NMBP - Autonomous University of Madrid

Outline
The Organic Chemistry Department of the Autonomous University in Madrid would like to partner with other universities and companies in H2020 projects. Specific lines of research are supramolecular and systems chemistry, as well as nanotechnology and biomaterials. The skills of the group focus on Protein cage biohybid materials and on systems chemistry:

1. Protein Cage Biohybrid Materials: The self-assembly of biomolecules such as the coat proteins (CP) of virus cap-sids and other protein cages offer great opportunities in nanotechnology and nanomedicine, leading to monodisperse platforms where different chemical species can be organized through covalent or non-covalent bonding. Yet, because the covalent approach for the modification of virus capsids is still a de-manding task, efficient and straightforward supramolecular strategies are highly desirable. In this direction, we search for hierarchical and cooperative processes in which self-assembled functional materials serve as templates for the assem-bly of different viral CP around them. In such processes, the structure of the self-assembled templates determines the size and geometry of the resulting virus-like particles (VLP), while confinement within the VLP also determines the structure of the functional self-assemblies.
2. Systems Chemistry: The study of complex molecular networks is a clear objective of the field so-called systems chemistry, which is expected to have a great impact on the area of origins-of-life research as well as on materials science and biomedicine. Together with Dr. Carlos Briones (Centro de Astrobiología, CSIC-INTA) and Dr. Kepa Ruíz Mirazo (Universidad del País Vasco, UPV), we are starting to explore this field from both theoretical and experimental points of views. With regards to the origins of life, we are revising recent findings in prebiotic systems chemistry, pointing out the potential of this systems perspective at every level of the biogenesis process. Experimentally, a pertinent question is whether protocells could be constructed from non-natural components. Research on nucleic acid analogues, metabolic networks based on chemistries different from the current biochemistry, and protein compartments instead of lipid membranes, is an interesting approach because it allows exploring some properties of life without the restrictions of the historical pathway that Darwinian evolution took. As such, we are starting to evaluate the use of protein cages as alternative compartments never explored before in this emergent field.

Call
Main calls of interest are those in NMBP work programme 2016-17. The group has previous experience in:

- COST Action OC-2012-2-13844: Emergence and Evolution of Complex Systems;
- FET OPEN Project;

- Marie Curie ITN »SO2S: The Single Oxygen Strategy - Sustainable Oxidation Procedures for Applications in Material Science, Synthesis, Wastewater treatment, diagnostics and therapeutics« (Ref.: FP7-PEOPLE-2012-ITN, Nº: 316975);
- FP7 NMBP Cooperation project: Novel Nanotechnology-Enabled System for Endovascular In Vivo Near-Infrared Fluorescence Molecular Imaging and Endovascular Near-Infrared Targeted Photodynamic Therapy of Atherosclerotic Heart Disease (FP7-NMP-2012-LARGE-6, Nº: 310337-2);

Deadline to respond
Friday, 15 July, 2016

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Date of publication
Thursday, 5 November 2015

ERRIN Member
Comunidad de Madrid