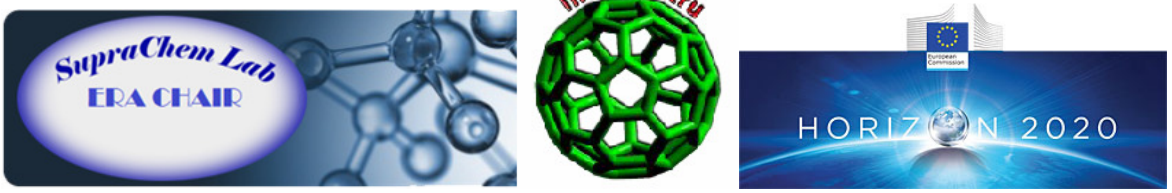

The first Romanian ERA CHAIR initiative
SupraChem Lab
Laboratory of Supramolecular Chemistry for Adaptive Delivery Systems
ERA Chair initiative(H 2020 WIDESPREAD 2-2014: ERA Chairs Project no 667387)

The strategic objective of the SupraChem Lab Project is to unlock and foster excellent research in PPIMC IntelCentre by setting up a strong research group in the field of hybrid materials for adaptive self-organized supramolecular structures.

It is an already stated political demand to support the public or private R&I performers in the convergence regions in exploiting their potential to fully contribute to the development of their country/region and to the overall European research effort. Romania joined this policy through the Sectorial Operational Programmes and the National Research Programmes that stipulate measures to increase the R&I capacity of the country, to stimulate the cooperation between RTD institutions and enterprises, and to increase the access of enterprises to research and innovation. However the participation of Romania in the European Research Area is still low due especial to the lack of experience in research management and marketing.

The funding, coming from the EU's research and innovation funding programme, Horizon 2020, has offered the opportunity for excellence institutions from the European converging regions to attract top academics so that they can compete with centres of excellence elsewhere in the European Research Area (ERA). The selected institutions have to award ERA Chairs to outstanding academics who have the capacity to raise standards and attract more high level staff as well as money from other sources, such as EU research funding or regional funds[1]. The Pilot Action for the ERA CHAIRS initiatives was opened in the last FP7 call and the first 11 ERA CHAIR projects have been selected. A total of 88 a**p**plications were received for the 1st Horizons 2020 Call for ERA CHAIR (Widespread 2-2014) that was opened on 11 December 2013. The final result was the selection of 13 projects (16.9% success rate). SuparChem Lab is one of these project and is the only Romanian ERA CHAIR for the moment.

The SupraChem Lab Proposal project will implement a structural change within in “Petru Poni” Institute of Macromolecular Chemistry - IntelCentre, Iasi, Romania by setting up a competitive research group in the field of supramolecular chemistry.

The Scientific challenge of the SupraChem Lab Project is to improve PPIMC research agenda in the field of supramolecular chemistry - hybrid materials for adaptive self-organized supramolecular structures. The new research team benefits of the competitive research infrastructure of the ***Centre of Advanced Research in Bionanoconjugates and Biopolymers (IntelCentre)*** and the scientific supervision of ***Prof. Jean Marie-Lehn (Nobel Prize in Chemistry 1987)***

[1] **http://ec.europa.eu/research/era/era-chairs_en.html**

The implementation of the project will reinforce the staff skills by (**a**) rejuvenation of the decision staff by the ERA Chair recruitment; (**b**) recruitment of new researchers with different scientific expertise; (**c**) enrich the young researcher's analytical knowledge and skills in mastering modern equipment.
The project will also increase PPIMC and IntelCentre visibility due to the fact that the new group has dedicated activities targeting the **c**onnection of the SupraChem Lab group to PPIMC national and international cooperation network and also to enlarged this network
The project started July 2015 and in october Dr. Mihail Dumitru Barboiu was appointed as the ERA CHAIR of the SupraChem Lab group. His first task was to establis a strong **Scientific and Management plan for the SupraChem Lab group.**
In this document the SupraChem Lab Group Scientific Agenda explains that new research group will explor the **Dynamic Interactive Systems-(DIS)** operating under the natural selection to allow structural/functional adaptability in response to internal constitutional or stimulant external factors. It combines state-of-the-art of **complex scefic and technological areas operating at the interface between chemistry, biolgy/medicine and physics in an unprecedented cross-disciplinary effort**. This fundamental and applicative research project aims mastering **multivalent reversible interactions** by using a **Dynamic Constitutional Chemistry approach** to create functional adaptive systems: surfaces, pores and materials with potential applications in biosensors and membranes.
The key and direct objective of SupraChem Lab research agenda is to provide a high research programme with a deep knowledge and expertise on **Dynamic Interactive Systems** which might provide new insights into the basic features that control in real-time the specific **multivalent dynamic recognition toward** the **natural selection of specific complex structures/functions.** Research will be guided by the ambitious scientific goal of creating a new generation of **highly functional systems**. The schientific agenda of the SupraChem Lab group will expose researchers to the process of design, generation, and optimization, application of a variety of systems opening the door to the emerging areas paralleling those of chemistry, biology, health, environmental sciences and biotechnology. The main targets demonstrating the ground-breaking nature of the SupraChem Lab research project are: (a) Improve the understanding of the adaptive functional self-organization toward the natural selection of the components by exploring the synergistic influence of internal structural self-assembly based on constitution and of self-evolutive behaviors on the addition of stimuli; (b) Accurate control of functional responses through dynamic platforms developed through tuned incorporation of responsive components into nanostructures, with the extension toward the construction of appropriate micro-scaffolds; (c) Investigation of application avenues towards larger impact of developed bio- and environmental responsive "smart" systems like membranes and delivery systems cell recognition and cell growing devices.
A substantial part of the activities will be performed within research projects. Though separated tasks, there will be a permanent cross-talk in between the different subprojects[2] to adjust the achievement of SupraChem Lab goals. To obtain a view as general as possible, different families of Dynamic Interactive Systems will be investigated:

- **Project 1: Dynamic Interactive Systems for Constitutional Water and Ion Channels -** The goal of such studies is directed by natural selection of functions with constitutional selective artificial superstructures for water/proton transport like in the natural ones. Mimicking the complex superstructures of proteins is an important exploring challenge. It is more than meaningful to mimic the key parts of active filters, giving of chemical selectivity, to understand the dynamics of orientating water dipoles and their role for ion/proton pumping along the channel.
- **Project 2: Constitutional systems for DNA transfection and drug delivery –** the subproject intend to reach the next goal of making more selective DCFs carriers and to transport them across the cell membranes and to delivery those directly toward nucleus with controlled properties**.**
- **Project 3. Dynameric networks and gels for delivery, cell recognition and cell growing -** This project also focus on the advancement of technologies to prepare breakthrough nanostructured dynamic interactive systems (dynamers, gels, hybrid systems) adaptively and functionally stabilized in onb surfaces or macroporous supports.

[2] **http://www.intelcentru.ro/suprachem_lab/index.php**

- **Project 4. Modelling and Theoretical chemistry of constitutional systems**
  In order to elucidate the behavior of ion/water confined within the artificial channels or of hybrid biomolmecular platforms different theoretical and molecular simulations will be performed.

The implementation of the SupraChem Lab project is expected to have a high impact in the future development of PPIMC IntelCentre and also to have an important impact on the Romanian chemical network. All these will equally contribute to the increase of the quality of research according to the ***Romanian Smart Specialisation Strategy objectives*** and to the creation of a working environment attractive for both experienced researchers and ambitious young researchers.

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