ICSM
Institut de Chimie Séparative de Marcoule
Marcoule, France

ABOUT

The ICSM, Institut de Chimie Séparative de Marcoule, is a mixed research unit (UMR 5257) supported by the University of Montpellier, Ecole Nationale Supérieure de Chimie de Montpellier, the CNRS and the CEA.

Created in March 2007 and operating in a dedicated building since mid-2009, the ICSM is in charge of research linked to new aspects and needs of renewal of processes implying complex fluids and heterogeneous multiscale solids needed to carry out several missions on energy issues:

- Developing fundamental research in chemistry and in physical chemistry, necessary for the rise of carbon-free energies in a world context of natural resources become more rare
- Developing research into a sustainable nuclear industry and alternative energies where major advances in separation chemistry and material science are required
- Developing new paradigms for resource saving by enhancing the value chain of recycled reusable materials

EXPERTISE

To achieve these research objectives, the ICSM has implemented a strategy by developing five research lines.

1. **Understanding separation**
   The main topic is to understand and to model in a predictive way the mechanisms that take place at several scales (atomic, molecular and supra-molecular) in an ion or a metal separation process. A specific focus will be made on complex fluids and the interactions between the system components during a separation by a liquid-liquid, a solid-liquid or a precipitation by metal-assembling approach.

2. **Optimising separation**
   This axis calls for the development and the formulation of organised molecular and material systems for their efficient implementation in the framework of their recycling using dedicated technologies.

3. **Anticipated material life cycle**
   Research focuses on innovative processes to prepare materials, check the relation between their structures, composition, microstructure and their physical and chemical properties particularly in order to adapt their use and recycling.

4. **Integrate green principles**
   This focal area addresses the use of sonochemistry, alternative extraction approaches and advanced materials development in order to reduce the ecological impact of separation, recycling or energy uses processes.

5. **Development of observation and characterisation tools**
   This part deals with the development of experimental and theoretical methodologies needed to establish separation chemistry and material properties evolution theories.

The ICSM brings together multidisciplinary high level scientific skills:

Synthesis
- Molecular: Organic, organometallic, coordination chemistry
- Supramolecular: Self-assemblies, metal-assemblies
- Materials: Coordination polymers, MOF, oxides, carbides…

Physics and physical chemistry
- Aggregation characterisation
- Interfaces (liquid-liquid, solid-liquid)
- Irradiation

Separation techniques
- Liquid-liquid and solid-liquid
- Precipitation
- Membrane filtration
- Flotation

Methodology development
- Mesoscopic modelling
- Electronic microscopy
- Non-linear optics
- Scattering/Diffraction

The ICSM is already involved in several separation and materials projects in collaboration with national and international academic organisations (Regensburg University, Potsdam, Berlin, Barcelona, ITU Karlsruhe,…) or industrial partners (TND-TerraNova, VEOLIA/SARPI, CTI, Renault, Arcelor Mittal…). It is also involved in the French national LABEX project named CHEMISYST and a European Research Council grant REE-CYCLE (Rare Earth).

MORE INFORMATION

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