C2P2
CHEMISTRY, CATALYSIS, POLYMERS & PROCESSES

| GROUP

C2P2 - SURFACE ORGANOMETALLIC CHEMISTRY (COMS) GROUP

UMR 5265, CPE LYON - CNRS - UNIVERSITÉ CLAUDE BERNARD LYON 1

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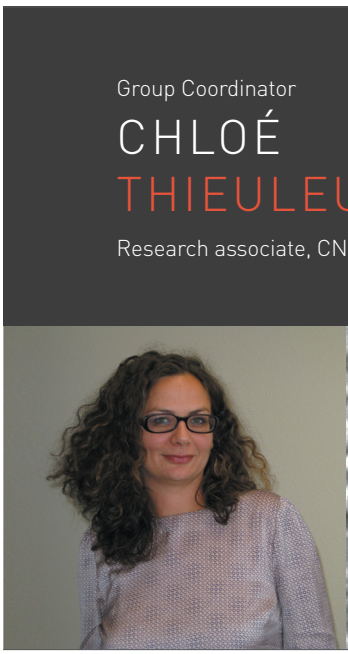
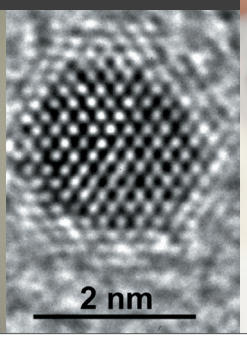




The Surface Organometallic Chemistry group is one of the two teams that form the Chemistry, Catalysis, Polymers and Processes laboratory (C2P2 UMR 5265). The SOMC researchers develop a rational approach for the design of well-defined, innovative functional materials. To reach this goal, the understanding of the structure and formation of active sites are central to our scientific strategy.

SCIENTIFIC APPROACH

SOMC relies on the development of well-defined single sites such as:

- organometallic complexes
- nanoparticles
- polyanions
- main group reaction intermediates

Methods used to ensure uniformity in composition and distribution of the targeted active species are:

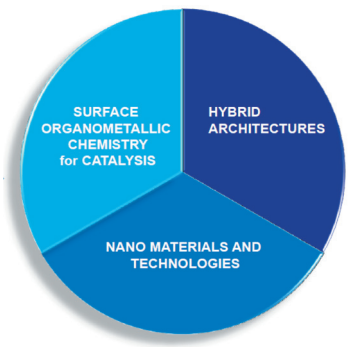
- design of solid supports
- control of active sites grafting.

This approach, based on understanding the reactivity of molecules or objects on surfaces, has lead to the discovery of new catalytic reactions (alkane metathesis, Ziegler-Natta de-polymerisation). This approach is used to tackle fundamental, challenging issues related to many fields, including green chemistry and sustainable development.

APPLICATIONS

Current examples of the fields of application include:

- Catalysis for petrochemistry, fine chemistry and biomass conversion.
- Energy Storage: ionic liquids and new electrolytes, production of H_2
- Microelectronics: Bottom-up approach for the design of devices
- Physics: luminescence



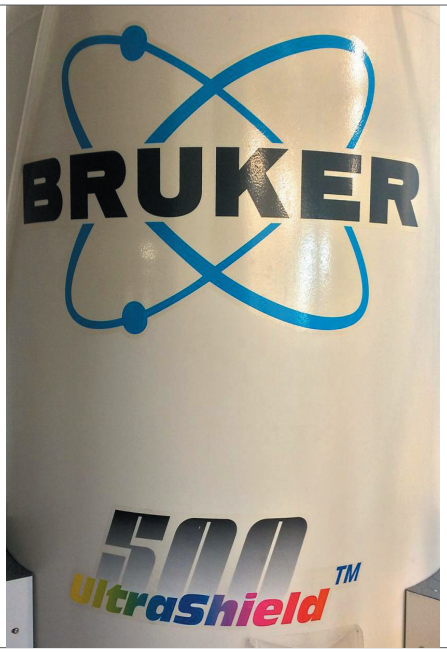
OUR RESEARCH

SOMC on oxides and metals for catalysis:

Surface organometallic chemistry on oxides and metals involves the development of new supported catalysts, understanding the related reaction mechanisms, evaluating the catalytic perfomance in specifically developed reactor test beds.

| Figures

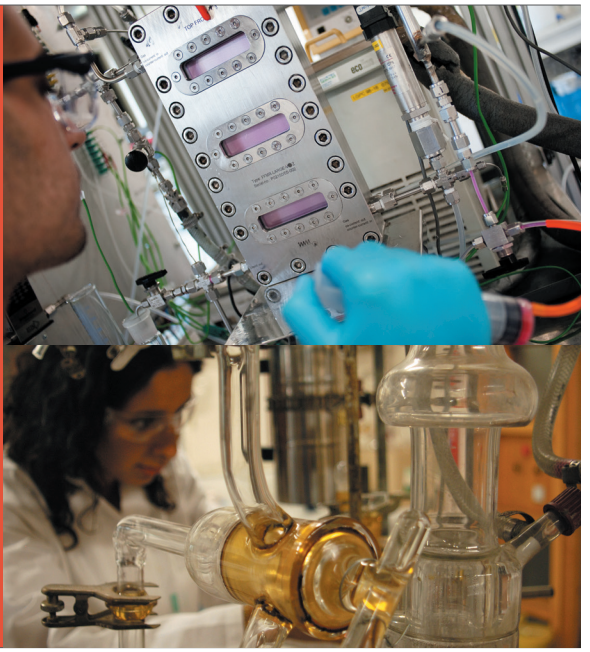
Left: Metallic particle
Centre: Dynamic reactor for catalyst testing
Right, top: Flame sealing of an ampule
Right, bottom: Vacuum lines



| EQUIPMENT

The SOMC approach requires constant development of tools and methods for characterization and the establishment of a reliable relationship between the structure of the active site and its activity/property. Some equipment:

- equipment for the synthesis of air sensitive compounds (argon/vacuum lines, glove boxes...)
- RMN spectrometers : 300 MHz liquid state NMR, 300 and 500 MHz solid state NMRs
- continuous flow reactors parallel reactors working at low and medium pressure
- numerous gaz-phase chromatography apparatus, gaz adsorption aparatus (in flow and static conditions)...
- transmission and diffusion reflectance FT-IR spectrometers, UV-vis spectrometers...



Hybrid architectures:

This research aims at rationnally developing hybrid systems by self-assembly of organic/organometallic components to inorganic parts. Innovative mono- or pluri-functional materials/objects are thus obtained from functional molecular bricks using a bottom-up approach.

Nanomaterials and nanotechnologies:

Among the large spectrum of well-defined molecular objects and materials that we have developed, some have their most distinctive feature at the nanometric scale: nanoparticles and nano-devices. Over the past five years we have developed a new research line centered on the design, synthesis and embedding of nano-objects inside or on the surface of 2D materials for their applications in catalysis and microelectronics.

SKILLS

- Organic and organometallic chemistry
- Surface chemistry
- Synthesis of materials
- Ionic liquids
- Homogeneous and heterogeneous catalysis
- Molecular modeling
- Characterization of solids

SOME OF OUR PARTNERS

We are involved in several National academic projects (ANR, ARC ...) and European consortia. Industrial partners include: Aroma, Dow, IFPEN, BP, UOP, Ineos, CEA, Sasol, Synthopetrol, Total, Toyota. The SOMC team is also part of the Labex iMust.

STAFF

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I Figures

Left: Magnet for the 500 MHz solid state NMR
Right, top: Liquid dinitrogen loading in a dewar
Right, bottom: catalyst evaluation

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