Group of Catalysis for Energy and Environment – GCEE

Laboratory of Organometallic and Medicinal Chemistry - LCOM

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General area(s)
Inorganic chemistry
Physical chemistry

Research themes
Homogeneous catalytic reactions, in water and in various solvents, are widely applied in chemical industry and in environmentally important processes. Our research aims a better understanding of the fundamental aspects (and the possible applications) of the homogeneous catalytic activation of H₂, CO₂, CO and N₂, as well as small organic molecules (HCOOH, alkenes, alkynes, etc.) in different reaction media. The low solubility of the gaseous reactants is often a drawback; elevated pressures are beneficial for both kinetic and thermodynamic reasons.

Topics:
- hydrogen storage – hydrogen delivery
- carbon dioxide reduction
- kinetics and mechanisms of complex formation in water
- catalytic activation of gas molecules in solution

Methodology of work / instrumentation
- variable temperature and pressure (up to 2000 bar) FT-IR, UV-vis and NMR spectroscopy
- medium pressure multinuclear NMR spectroscopy
- improvement/development of high-pressure cells
- applications: engineering – prototypeSCALE up

Examples of MSc / PhD theses