

RESEARCH TOPIC FOR THE PARISTECH/CSC PHD PROGRAM

Field: Chemistry, Physical Chemistry and Chemical Engineering

Subfield: Chemistry

Title: Smart multi-catalytic systems for the production of biocompatible polymers

ParisTech School: Chimie ParisTech | PSL

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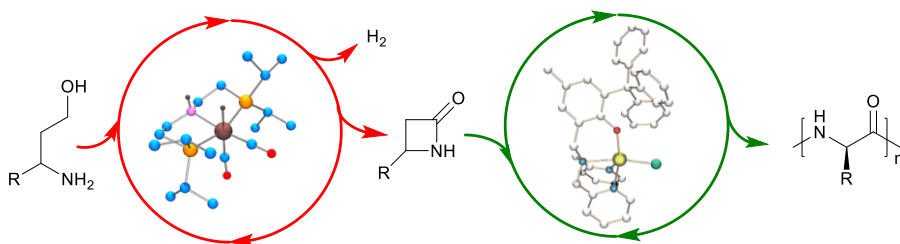
Research group/Lab: Organometallic Chemistry and Polymerization Catalysis

Lab location: 11 rue Pierre et Marie, 75005 Paris

(Lab/Advisor website): <http://www.ircp.cnrs.fr/la-recherche/equipe-cocp/>

Short description of possible research topics for a PhD:

Biocompatible materials such as polyesters and polyamides hold a prominent position in the portfolio of specialty and commodity polymers. Controlling their structural features such as chain size and microstructure is key in establishing specific properties. In this context, **organometallic catalysis** is instrumental, thanks to its outstanding ability to achieve both high degree of stereoselectivity and mass control. Smart approaches such as **tandem catalysis** can be game changers: Combining several complementary systems is a unique opportunity to perform series of chemical reactions with higher efficiency. In this project, **hydrogen borrowing**, a clean, atom-economical technology, will be harnessed in a first step to synthesize lactones or lactames monomers from biosourced raw materials. These will then be polymerized via **stereoselective ring opening polymerization**, affording novel polyesters or polyamides. A strong emphasis will be put on the design of novel organometallic catalysts based on **Earth-abundant metals**, as well as on establishing catalysts structure and polymers' physicochemical properties relationships.



Required background of the student: organic and polymer synthesis.

A list of 5 (max.) representative publications of the group:

1. *Nature Comm.*, **2011**, 2, 586.
2. *J. Am. Chem. Soc.* **2017**, 139, 6217.
3. *ACS Catal.*, **2017**, 7, 2022.
4. *Angew. Chem. Int. Ed.* **2019**, 58, 12585.