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RESEARCH TOPIC FOR THE PARISTECH/CSC PHD PROGRAM

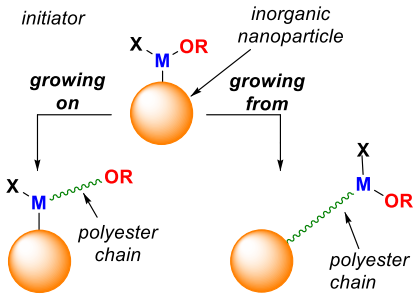
Field: Chemistry, Physical Chemistry and Chemical Engineering
Subfield: Chemistry and Materials Science
Title: Vectorizing nanoparticles using biocompatible and biodegradable polymer coating mediated by surface organometallic chemistry

ParisTech School: Chimie ParisTech | PSL

Advisor(s) Name: Dr. Régis Gauvin, Prof. Christophe Thomas
Advisor(s) Email: regis.gauvin@chimieparistech.psl.eu; christophe.thomas@chimie-paristech.psl.eu
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:

The design of efficient vectorizing agents is at the cornerstone of modern pharmaceutical agents. In this view, the tailoring of specific (molecular) objects by covalent bonding with polymer chains is of major interest, to confer them significant compatibility with physiological environments.[1]



In this view, biocompatible and biodegradable polymers are ideal candidates as components within such advanced formulations. These can be most efficiently prepared using ring opening polymerization (ROP) of lactones or lactides into polyesters or polylactic acid mediated by organometallic initiators.[2] On the top of that, immobilization of organometallics on inorganic surfaces via surface was demonstrated to boost stereoselectivity of these considered polymerization processes.[3] In this project, we propose to combine surface organometallic chemistry and ROP of polar monomers to design specific nanoobjects by "*growing from*" or "*growing on*" approaches, where chain growth is mediated by specifically designed supported organometallic entities. The ultimate goal will be the development of biopolymer-coated nanoparticles for future implementation into delivery systems.

Required background of the student: Organic Chemistry, Polymer Chemistry, Catalysis

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

1. *Chem. Sci.*, **2020**, *11*, 2657.
2. *Angew. Chem. Int. Ed.* **2019**, *58*, 12585.
3. *Chem. Commun.* **2010**, *46*, 1032.