

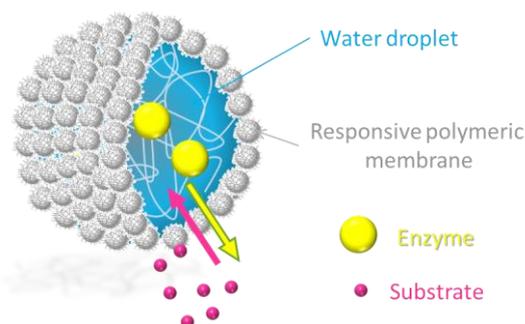
PhD offer in Soft Matter / Synthetic artificial cells

Cell-like responsive water-in-water emulsions for the control of enzymatic reactions

Keywords: Soft Matter, Stimuli-responsive polymers, Water-in-water emulsions, Bioreactors, Enzymatic reactions, Membrane permeability, Assembled systems.

Context: The University of Bordeaux is building a consortium aimed to build artificial cells with a bottom-up approach. In this context, the combination of soft matter, with chemistry and biochemistry approaches, allows to build new cell-like compartments in which some biological components can be inserted, in order to mimic some functions of biological cells. In this thesis, we will focus on the mimicry of cell metabolism.

Summary of the project: The project will be devoted to the development of cell-like aqueous micro-compartments, made of water-in-water emulsions, stabilized by a membrane of stimuli-responsive polymers. The membrane permeability will depend on the state of the polymer. It will control the diffusion of the reaction substrate which will tune the kinetics of the enzymatic reaction. From this concept, we expect to build out-of-equilibrium compartmentalized aqueous systems, whose properties will be coupled with enzymatic reaction.



The thesis will be divided into 3 parts: 1) the synthesis of stimuli-responsive polymers and their characterization (NMR, scattering techniques, electron microscopy, interfacial studies); 2) the elaboration of aqueous micro-compartment and the study of their properties (stability, mechanical properties, permeability), 3) the study of enzymatic reactions within the micro-compartments, especially via confocal microscopy, electrochemistry and microfluidic techniques.

Supervisors:

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Host Laboratory: Institut des Sciences Moléculaires (ISM, CNRS UMR 5255), NanoSystèmes Analytiques group (NSysA ; <http://nsysa.ism-bordeaux.cnrs.fr/>), located at ENSCBP, Pessac, France.

Applicant profile: Master or equivalent in physical-chemistry with a solid background in colloid and polymer science. Knowledge in biochemistry is a plus. Excellent academic records required.

Application: CV+ Motivation letter + 2 recommendation letters + last 2 years academic records

Starting date: 2020-10-01 - **Application deadline:** 2020-05-15