INSTITUT LAUE – LANGEVIN

INTERNSHIP (REF. LSS_4) POLYSACCHARIDES, SURFACTANTS AND CYCLODEXTRINS ASSEMBLIES INTO ORDERED STRUCTURES

The preparation of functional supramolecular aggregates is based on the co-assembly of simple molecules through different interaction mechanisms. Cyclodextrins are widely used building block in supramolecular chemistry and have an important role in self-assembly systems of amphiphiles. The structure of cyclodextrins provides distinguished physicochemical properties, including the ability to form host-guest complexes. Surfactants are particularly attractive host molecules due to their wide variety, availability, versatility, responsiveness to different stimuli, and high relevance in different fields. Polyoxyethylene alkyl ether carboxylic acids (CiEjCH2COOH) – a class of highly water-soluble and pH-responsive surfactants – and cyclodextrins are able to spontaneously assembly in well-defined structures, which strongly respond to pH and pressure changes. In an electrostatically driven assembly, polyoxyethylene alkyl ether carboxylic acids were also reported to co-assembly in highly organized complex structures with the cationic polysaccharide chitosan, responding to pH and hydrostatic pressure changes. Since both interesting assemblies were shown to form distinct supramolecular structures, novel materials based on polysaccharides, surfactants and cyclodextrins can be developed and have a large potential of application over a range of fields. The aim of this project is the preparation and characterization of these assemblies with particular interest in their structure and responsiveness to different stimuli.

Activities of the trainee:

* Preparation of the surfactant, polysaccharide and cyclodextrins assemblies;
* Phase determination by UV/VIS spectroscopy;
* Thermodynamic investigation of the interactions between the components by calorimetry methods (Differential Scanning Calorimetry) and densitometry.

Level required: 3 year university studies in Chemistry, Physical Chemistry, Physics, Material Science or related fields
Notes: This post is an internship with an approximate duration of 5 months

Please send your application directly to the supervisor:
Larissa dos Santos Silva Araujo, email: araujo@ill.fr