



PhD position Institut Laue-Langevin (Grenoble France) 36 months (M/F)

Foam up Project – an alternative to solvent extraction

Foams structures are ubiquitous and of high technical relevance. Their understanding and control of their properties is a fundamental aspect of very diverse areas of research: from separation chemistry (foam flotation), to detergency, firefighting, to the production of multi-scaled materials (solid foams for catalysis or thermal and sound insulation). The properties of foams are intimately linked to their structure and physico-chemical properties. Bubble size and bubble size distribution, viscosity of the liquid within the foam, as well as the presence of nanostructure in the liquid film have a profound impact on the foam properties. Thus, the characterization of the interactions at the liquid/gas interface and between facing interface at a molecular and macroscopic scale is of outermost importance for the understanding of foams and for their subsequent application in the different domains.

Research Project The project consists of two phases. In the first one, the commercial Foamscan apparatus will be adapted to be employed at small-angle neutron scattering beamlines. This step, in cooperation with the producer, Teclis-Scientific, will allow the simultaneous determination of the macroscopic foam properties (bubble size, bubble size distribution) and the investigation of its structure at the nanometre scale. The second part will be dedicated to the investigation of foams based on PolyOxoMetalates, a class of very large ions, which may serve simultaneously as foam stabilizers and complexing agents for the recovery of valuable metal ions, such as lanthanides and others transition metals (Mo, V, W, Ta ...).

The project results from a cooperation of the Institut Laue-Langevin (www.ill.eu) and the Institut de Chimie Separative de Marcoule (ICSM), a joint research unit involving the CEA, the CNRS, the University of Montpellier and the National Graduate School in Chemistry of Montpellier (www.icsm.fr) and TECLIS Scientific (www.teclis-scientific.com), french industrial company specialises in measuring instruments for interface science. The position will be located at the Institut Laue-Langevin, Grenoble. However, the project foresees some working periods of few months at ICSM in Avignon area, few weeks at Teclis-Scientific in Lyon. The student will be employed under generous conditions by the ILL, with a gross salary of approximately 2400 €/month in addition to numerous benefits (see employment conditions) at *). We are seeking for motivated candidates with a very good MSc/diploma in physical chemistry and physics (or a related field) and ideally some previous expertise in foam characterization or colloid/polymer science. As data analysis represents an important aspect of the project, previous knowledge or willingness to learn programming languages such as Python or C are a strong asset.

For more information, please contact Dr. Olivier Diat (olivier.diat@cea.fr), or Dr. Leonardo Chiappisi (chiappisil@ill.eu). Applications including a motivation letter should be sent by email with the reference "PhD project201_23" in the subject.

Suggested References

1. C. Micheau, et al. Specific Salt and pH Effects on Foam Film of a pH Sensitive Surfactant. *Langmuir*, 2013, 29, 8472-8481.
2. C. Micheau et al, Ion foam flotation of neodymium: From speciation to extraction. *J Mol Liq* 2018, 253, 217-227.
3. C. Micheau et al, Nanoparticle foam flotation for caesium decontamination using a pH-sensitive surfactant. *Environ Sci-Nano* 2019, 6, 1576-1584.
4. M. Hohenschutz et al, *Angewandte Chemie*, Int. Ed. accepted; DOI: 10.1002/anie.201916193

*Employment conditions available at: <https://www.ill.eu/careers/all-our-vacancies/phd-recruitment/phd-work-at-the-ill/>