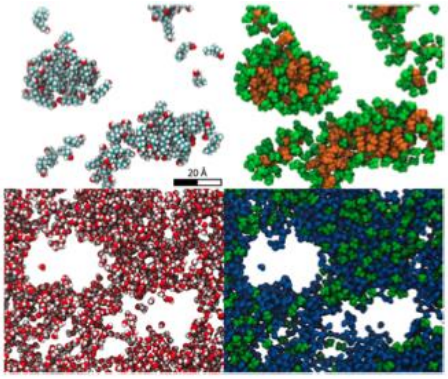
PhD position: **using ultraflexible microemulsions for liquid-liquid extraction methods: from self-association of pure components to nano segregation in solutions**

Insitut Laue Langevin and University of Grenoble-Alpes

UltraFlexible MicroEmulsions are a class of ternary or quaternary complex fluids that are also referred to as "surfactant-free microemulsion". The mixing of water, a partially miscible polar "oil" (such as octanol), and a co-solvent with "hydrotropic" property (as typically, ethanol) is representative of mixtures found in numerous important applications, as for example advanced metal extraction or depollution. The goal of this phD project, mainly experimental, is to provide a description of the system at the molecular level. Such investigation will enable to unravel the effect of molecular interactions by chemical substitution on the micro-structuration of the solution (hydrogen bonding, molecular branching, hydrophobicity), address fundamental characterization of the (nano)droplets formation and stability in view of establishing missing theoretical model in colloidal sciences, as proposed by the ienaics approach. Eventually, the molecular substitutions investigations and characterization of thermal behavior will provide new formulation in view of applications for green chemistry. This in-depth experimental study carried out by the PhD candidate, of the so-called “Ouzo” and “pre-Ouzo” effect will be approached by complementary experimental techniques enabling to probe both the structure and the dynamics of these complex liquids as the result of molecular interactions. Among various investigations including light scattering, dielectric spectroscopy or calorimetry, neutron scattering is the only technique enabling a simultaneous investigation of both of them at the microscopic scale thanks to small angle scattering, reflectometry and spectroscopic techniques. The results will also be supported by molecular dynamics simulations issued from collaboration.



The work will be performed in straight collaboration with the Laboratoire Léon Brilloin (Saclay) and the Institut de Chimie Séparative de Marcoule.

The phD candidate will be based in Grenoble, shared between LIPhy (UGA campus) and ILL (EPN campus).

Requested background: master in chemical-physics or related fields (from physics to chemistry including material science or chemical engineering).

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Funding: ILL (50%) and IDEX-UGA (50%), starting on Oct. 2020.

References:

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