PROBING SOAPY INTERFACE AT THE NANOSCALE WITH NON-LINEAR OPTICS

LABORATORY : Institut Lumière Matière

LEVEL : M1 / M2
TEAM(S) : LIQ@INT

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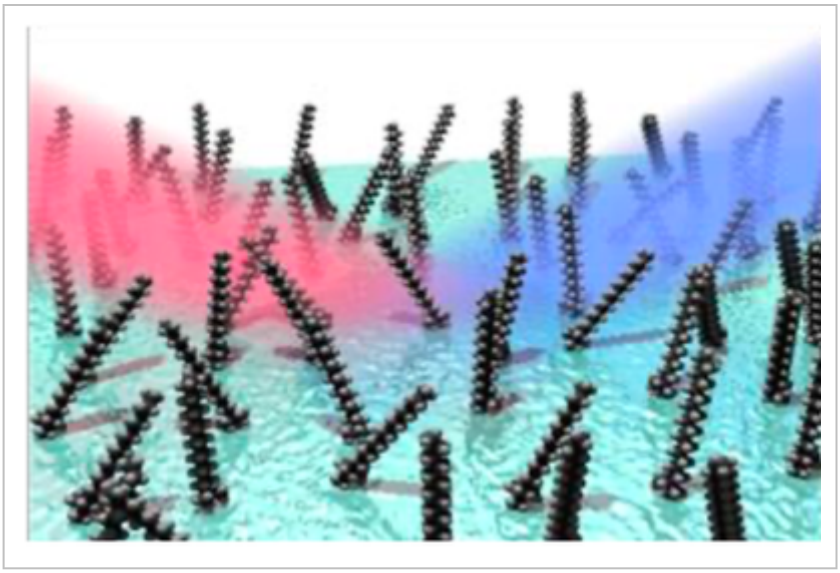
KEYWORD(S) :

SCIENTIFIC CONTEXT :



Soap films are of great interest, either as nanometer-thick membranes or as foam building blocks. It is therefore essential to understand, and even control, their stability. The formulation of soapy solutions is essential to adjust this stability by modifying the thermodynamics and the mechanical properties of the liquid/air interfaces. Furthermore, numerous studies prove that the structure and dynamics of adsorbed surfactants are crucial to understand these macroscopic changes. If the link between micro and macro scale is commonly admitted, it is still not fully revealed. Direct experimental investigations of the adsorbed layer structure and its role on the macroscopic properties of the interface, and particularly soap film stability, are still lacking notably because of the lack of surface-specific tools which are also sensitive to the spatial organization of the surfactants.

In that context, SOLSTICE ANR project aims to develop a molecular description of soap film stability, with Second Harmonic Generation (SHG) experiments. It consists on the conversion of two photons at a fundamental frequency to a photon at the harmonic frequency . Since this elementary process is forbidden in centrosymmetric media, this technique is thus a tool of choice to probe interfaces and then tackle questions addressed in SOLSTICE project.

MISSIONS :

Previous studies have shown that such technique is sensitive to the concentration and organization of amphiphile molecules, and among them surfactants, at interface or in bulk. In this internship, we plan to probe the surfactant organization and dynamics at interface on single interface and on soap film. The intern will use an existing setup and perform SHG experiments on soapy interfaces to evidence and study spatial heterogeneities, such as molecular aggregates or interfacial concentration gradient at the origin of Marangoni stresses.

OUTLOOKS :

The project may be continued as a thesis if a doctoral school grant is obtained.

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