INTERNSHIP PROPOSAL

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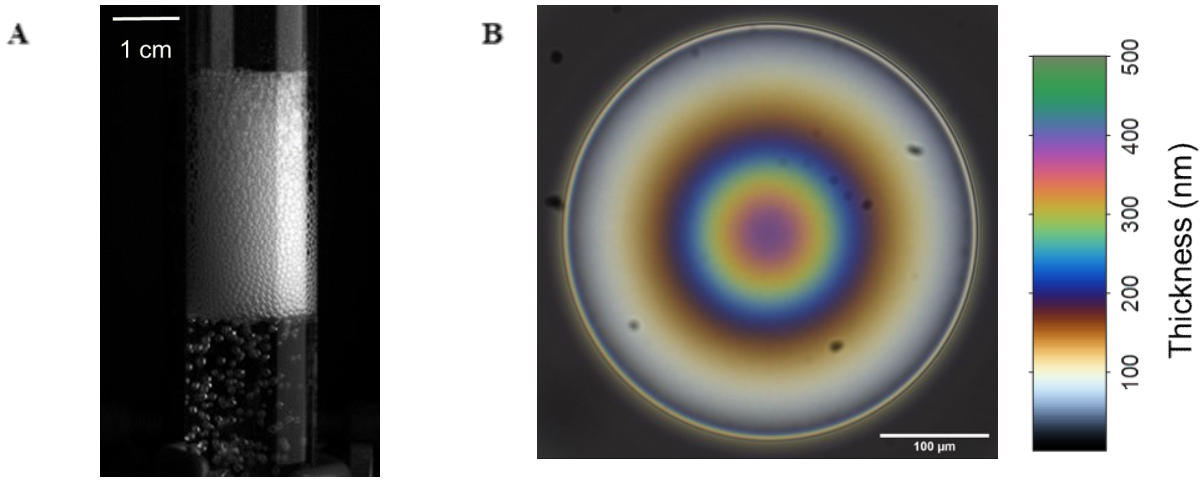
Thesis possibility after internship: Yes
Funding: If YES, which type of funding: CIFRE

Understanding the destabilization of oil foams

Industrial processes involving liquids often face unwanted foaming issues which are solved by adding anti-foaming agents. On the other hand, the development of electric car engines has challenged the formulation of new lubricants. Indeed, these engines operate at high rotation speed, which favors the production of foam in gears and, as a consequence, a drastic decrease of the lubricant efficiency. Classical antifoaming additives are thus used but, surprisingly, they sometimes lead to a pro-foaming effect in new lubricant formulations. Moreover, whereas the destabilization of aqueous foams using these additives has been extensively studied [1], the mechanisms at stake in the case of oil foams is still poorly understood.

Our goal is to develop a comprehensive description of the antifoaming effects of immiscible liquid droplets added to oils [2,3] in order to account for the effect of different properties such as surface tension, viscosity or solubility on the dynamics of foaming and anti-foaming. Experiments will be performed based on different setups developed in the lab to study the foamability of a liquid or the bursting of bubbles and thin liquid films. These experiments will be analyzed and interpreted to improve our understanding of the antifoaming mechanisms in oil foams.



(A) Measurement of the foamability of a liquid mixture in a column by air injection from the bottom: we measure the height of foam depending on the liquid composition. (B) Observation of a thin liquid film using white-light interferometry, allowing for the reconstruction of the film thickness profile: bursting is observed when the thickness decreases down to 50 nm.

[1] N. D. Denkov, Langmuir, 2004, 20, 9463-9505.
[2] Tran et al, Physical Review Letters, 2020, 125, 178002
[3] Delance et al, Soft Matter, 2022, 18, 5060-5066

Please, indicate which speciality(ies) seem(s) to be more adapted to the subject:

Condensed Matter Physics:	NO	Soft Matter and Biological Physics:	YES
Quantum Physics:	NO	Theoretical Physics:	NO