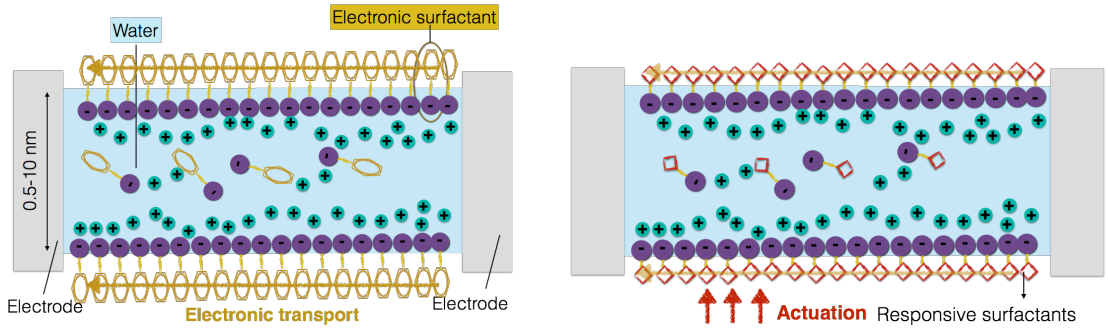
Post-doc position (European project) at iLM, université Lyon 1, France

The FET Open project PROGENY (https://progeny-project.eu) aims at designing new "proton based" opto-electro-mechanical sensors. For this, we plan to use soap films for its many useful aspects, for example because it is intrinsically nanometrically thin.
Based on our know-how in characterizing ionic transport in soap films (1-4), we plan at iLM (https://ilm.univ-lyon1.fr) to create "electronic soap films" by using surfactants that can transport electronic current, and which are synthesized by chemists of the project consortium.



Schemes of soap films covered with electronic (left) and electroreponsive (right) surfactants.

We will characterize their physics-chemical properties (surface properties, equilibrium thickness of the soap film, organization of surfactants at interfaces) and the coupling between ionic and electronic transport in these nanometrically thin liquid layers. We will use commercial apparatus available at iLM for characterization (surface rheometer, Langmuir through, confocal microscope) and specific home-made set-ups (thin film balance, second harmonic generation set-up (2), conductivity measurements (3-4)).
We then plan to design new efficient soap film- based sensors. From a fundamental point of view, some generic features on the coupling between ionic transport in liquid under strong confinement and electronic transport at the interfaces will highlight the limits of continuum description of transport properties and confront them with recent alternative models (5).

As the subject is multidisciplinary, we are looking for a candidate with a strong taste for experiments and with some experience in one (or more) following fields: nanofluidics, electrokinetics, optics/ non-linear optics, physico-chemistry of soap films, interfacial rheology, soft matter, microfluidics.

Collaborative work abilities and good communication skills to interact within the project consortium are required. On a day-to-day basis, interactions with two PhD students and one post-doc working on related topics are expected.
Candidate can apply following this link: https://bit.ly/3kDhpxM and/or contact Anne-Laure Biance (anne-laure.biance@univ-lyon1.fr) or Oriane Bonhomme (Oriane.Bonhomme@univ-lyon1.fr) for details.

(1) Thermally enhanced electroosmosis to control foam stability, O. Bonhomme, L. Peng, A.-L. Biance, Phys. Rev. X 10, 021015 (2020)
(2) Electroosmosis near stress-free surfaces at the molecular and macroscopic scales, B. Blanc, O. Bonhomme, P.-F. Brevet, E. Benichou, C. Ybert, A.-L. Biance. Soft Matter, 14, 2604-2609, (2018)
(3) Surface conductivity measurements in nanometric to micrometric foam films, O. Bonhomme, A. Mounier, G. Simon and A. L. Biance. Journal of physics condensed matter., vol. 27, p. 194118 (2015).
(4) Soft nanofluidic transport in a soap film. O. Bonhomme, O. Liot, A. L. Biance, and L. Bocquet. Phys. Rev. Lett., 110 :054502, (2013).
(5) Modeling of emergent memory and voltage spiking in ionic transport through angstrom-scale slits, P Robin, N Kavokine, L Bocquet, Science. (2021)