

Post-doc Position « Gas separation and filtration with soap films »

Project summary

Gas separation or filtration processes refer to techniques used to separate or filter gases, either to give multiple products or to purify a single product. Membranes can also be used for separating gas mixtures where they act as a permeable barrier through which different compounds move across at different rates or not move at all. The gas molecules penetrate according to their size, diffusivity, or solubility into the membranes, which can either be nanoporous or polymeric. Liquid membranes have also been studied and the most common type is the Suspended Liquid Membrane (SLM) consisting in liquid films supported on a rigid frame (for example a rigid polymer films with liquid pores).

The aim of this project is to experimentally achieve a Suspended Liquid Membrane out of a soap film and to assess its efficiency to separate gases in a microfluidic device. We propose two different experimental procedures. In the first one, two reservoirs containing two different gases are separated by a soap film used as a SLM. The deflection of the soap film will give access to the gas transfer rate through the membrane. In the second configuration, we propose to realize a continuous version of the experiment above using a microfluidic version. In this configuration, the liquid membrane is embedded into a microfluidic chip in which the two gases are flown.

The influence of the chemistry of the surface active agents used to stabilize the soap film will be explored in particular concerning the dynamics of the experiment. Indeed, recent experiments devoted to the measurement of gas permeability of soap films stabilized by various surfactants reveal subtle dependency of the chemistry of the surfactants and thickness of the soap film. If successful, these data will be analyzed and modelled with the help of the theoretician Benoit Coasne, DR CNRS at LiPhy, specialist in simulations in nanoporous media, who recently highlighted different selective mechanisms for gas uptake in a solvent confined in mesopores due to selective interaction between the gas and the molecular structure of the gas/liquid interfaces

Location and practical aspects

The experimental work will be carried out at LiPhy and LRP both depending on universit  Grenoble-Alpes. The experimental data will be modeled with Benoit Coasne who is an international expert in the field of adsorption. The gross salary will be 2518 euros/months, equivalent to a net salary of 2037 euros/month.

Qualifications of the applicant

The ideal candidate should have some experience in microfluidics, small volume fluid handling/ manipulation as well as a back ground in soft matter physics and fluid dynamics.

Applications

Interested candidate should send their CV and cover letter to elise.lorenceau@univ-grenoble-alpes.fr and Hugues.bodiguel@univ-grenoble-alpes.fr.

Deadline for the application: 30th of December 2017

