# Post-doctoral fellowship (12 months)

## *Microfluidic directional drying/ultra-filtration of colloidal dispersions*

Within the framework of an ANR project in collaboration with Solvay and the LGC, we have developed microfabrication protocols to integrate nanoporous membranes into microfluidic chips. These methods are based on 2 different techniques: spatially-resolved photopolymerization of nanoporous hydrogels [1,2], and spatially localized self-assembly of nanoparticles in a microfluidic channel [3]. The goal of this post-doctoral project is to exploit these nanoporous membranes to address mass transport issues in colloidal systems.

In a first part, we want to perform measurements of water permeation through these membranes when an air flow of imposed humidity downstream induces evaporation and drives a flow. We expect non-trivial effects, especially for the case of membranes made of nanoparticles, related to the confinement of water in the nanoporosity [4]. In a second part, we intend to use these same devices to trap upstream of the membrane a stationary gradient of colloids in a configuration close to ultra-filtration. Concentration profile measurements should then allow novel measurements of the collective diffusion coefficient of the colloidal dispersion [5], in a configuration close to the Donnan equilibrium. Such measurements will be compared to theoretical predictions in the case of charged dispersions, in close collaboration with LGC.

***Keywords***
microfluidics, soft matter physics & mass transport.

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***Required qualifications***

We are looking for a candidate with a Ph.D. in soft matter physical-chemistry and with possibly a strong background in microfluidic development.

Expected starting date: oct-2021/jan-2022

***To apply:*** https://bit.ly/3BWglw9

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[3] Choi, Wang, Chang, Park, Nano Lett. 16, 2189 (2016)
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[5] Sobac, Dehaeck, Bouchaudy, Salmon, Soft Matter 16, 8213 (2020)