

## Post-Doctoral Position

# Structuring hydrophobic nanoporous particles within cellulose-based composites

### Project summary

Nanofluidics open new opportunities for water treatments, desalination and energy harvesting but also for energy storage. In this framework Heterogeneous Lyophobic Systems (LHS) stands as an original approach for quick storage of mechanical energy at interfaces. LHS are based on forced intrusion and spontaneous expulsion of water, or brine, at pressure of several hundreds of bar in and out of ultrahydrophobic nanoporous particles. LHS are currently prepared as dense suspensions of ultra-hydrophobic nanoporous particles in water. Such preparation approach gives a poor control of inter-particles voids, and limits the full exploitation of intrusion/extrusion cycles within intra-particle nanopores. This project, based on a collaboration between the [Laboratoire Interdisciplinaire de Physique](#) (LIPhy) and the [Laboratoire Rhéologie et Procédés](#) (LRP) in Grenoble campus, aims at initiating a new strategy to optimize the inter-particle structure by means of cellulose-based scaffold and to understand the fully multi-scale liquid transport within the nanoporous particles/cellulose composite.

The postdoc role will be to develop composite material and optimize their structure and organization in relation to their functional properties (mechanical strength, micro/nano void fractions). To do this, he/she will implement nanocrystals or nanofibrils celluloses combined with ZIF-8 nanoporous particles.

Implementation will be carried out by a tangential ultrafiltration process. She/he will use either in situ characterizations during the processing by in situ small-angle X-ray and light scattering (SAXS-USAXS and SALS) or direct ex situ observations of composite films made, by electron microscopy (SEM and TEM) and X-ray diffraction (WAXS).

The postdoc will interact with an engineer hired on a pre-maturation CNRS project working on the energetic valorization of intrusion/extrusion phenomena.

### Location and practical aspects

The successful applicant will be hosted by the LRP, Grenoble, France. He/she will work in this laboratory with Dr. Frédéric Pignon in collaboration with Dr. Cyril Picard from the LIPhy.

The position is for 12 months. The gross salary will be 2650 euros/months.

### Qualifications of the applicant

The candidate must hold a PhD with experimental skills in fluid mechanics, physico-chemistry, soft matter and/or processes engineering. Experience in structural and/or mechanical characterization of colloids, and possibly in membrane separation processes, would be appreciated. We expect from the candidate to be rigorous and to be able to work meticulously.

### Applications

Interested candidates should send their CV, a cover letter and contacts of 2 referees to F. Pignon and C. Picard. Deadline for the application: 15/07/2021

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### Références

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