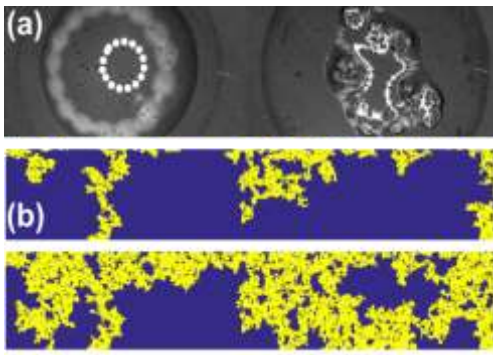
Postdoc position available

Patterns, dynamics and phase transitions of nano-confined, salty water

Keywords. Condensed & soft matter physics, percolation, nucleation, metastability, surface and capillary phenomena, porous media, thermodynamics, fluid dynamics, optics.



(a) Evaporation of a droplet of salty water in contact with a substrate with self-organized nanostructures of typical size 3 nm. (b) Monte Carlo simulations of phase percolation in random networks reproducing the essential features of the nanostructures (blue: fluid; yellow: non-wetting phase, e.g. vapor, crystal).

CONTEXT

In our team, we are interested in a variety of fundamental problems that are relevant in various important societal and engineering contexts. In particular, we study how evaporation and condensation of salty water happen in complex nanosystems, coupled to potential crystallization/deliquescence of the salt.

These phenomena are crucial for e.g. water harvesting in dry climates, cloud formation in the atmosphere, new strategies for energy production/conversion, smart optical/mechanical metamaterials, sustainable architecture & heritage conservation, etc. but raise basic, unexplored question with rich physics.

PROJECT & TASKS.

The postdoctoral researcher will be in charge of experiments probing with various optical methods the dynamics and patterns of evaporation/condensation in model nanomaterials containing salt. Particular research directions include:

- Elucidating the conditions (humidity, chemical potential, temperature) for phase change at the nanoscale,
- Understanding the collective patterns emerging in disordered systems due to percolation-like effects,
- Characterizing transport phenomena of salt solutions under nanoscale confinement.

Optical methods include interferometry, microscopy, image analysis, light scattering and potentially holography. X-ray diffraction/tomography measurements or Raman spectroscopy are also considered as complements.

Involvement in related modelling activities is also possible, e.g. to develop analytical models (coupling capillarity, osmotic/colligative effects, surface phenomena, phase transitions etc.), or run Monte Carlo numerical approaches in disordered 2D or 3D networks. The hired postdoc will also be in charge of scientific communication, general lab management, and mentoring of PhD student/interns working on this project.

PROFILE.

We are looking for a motivated candidate holding a PhD in experimental physics (or related discipline: physical chemistry, materials science, chemical engineering, mechanical engineering etc.), who is able to run independent scientific investigations in a collaborative context. The candidate should have specific knowledge in at least one of the following fields: optical measurements, physics of liquids & soft matter, interfacial physics, thermodynamics of solutions, porous media. Solid knowledge of *python* and *git* is highly appreciated. Proficiency in English and oral scientific communication are expected due to the project's international and collaborative framework.

ENVIRONMENT & SUPPORT.

The postdoctoral researcher will be part of the *Liquids and Interfaces* team of the Light & Matter Institute (CNRS & Univ. Lyon 1, Lyon, France), will interact with researchers, engineers and students in the team and will participate in established international collaborations. The work environment is thus stimulant and multidisciplinary. The project is funded by Agence Nationale de la Recherche (ANR) and is developed in close relationship with another project funded by the European Union (FET-Open).

MORE INFORMATION.

For now, interested candidates should contact O. Vincent (see below). Soon, the official application website will open on the CNRS hiring portal (link-to-be-updated). The application will require a CV, a brief cover letter and contact information of at least 2 references for recommendations. Expected start date is Summer 2022 (Spring/Fall 2022 also possible). Duration (~2 years) and salary (~32-48k€ gross/year) depend on experience.

CONTACT

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