

Postdoc Offer

Advanced characterization of cellulose-based membranes for fuel cells

The objective of this research project, which is funded by the French National Scientific Research Agency (ANR), is to develop proton exchange membranes for fuel cells (PEMFC) based on cellulose materials. The immediate goal is to replace the polyfluoroalkylated substances (PFAS) that are currently used in Nafion and Aquivion membranes.

The ANR ionMcell, which has been certified by the Axelera label, brings together two academic partners CERMAV, SyMMES, and two technology centers, CTP and FCBA. To achieve the project's objectives, two approaches will be explored. The first will focus on composite membranes made of sPEEK and cellulose nanocrystals (CNC). The second will explore 100% cellulose membranes composed of cellulose fibrils, nanofibrils, and/or nanocrystals. In both cases, chemical surface functionalization methods will be employed to achieve high proton conductivity on cellulose while ensuring that the membranes remain mechanically stable in a humid environment and are impermeable to gases.

The SyMMES laboratory is responsible for conducting in-depth studies of the structure-properties-durability relationship of these membranes. This will enable us to improve performances and durability.

The structure of the nanocomposite membranes will be characterized using scattering techniques at cutting-edge large-scale facilities (SANS@ILL) and diffractometers (SAXS/WAXS@CEA platforms). Fuel cell tests will be conducted in close collaboration with CEA-Liten.

As a PhD in polymer physical chemistry, you are interested in pursuing an ambitious research project that addresses current societal issues. We invite you to join us. You will work with two research teams at the cutting edge of their respective fields, and have access to state-of-the-art tools and platforms.

- The **SyMMES** is a **fundamental research laboratory** that specializes in the **advanced multiscale characterization of the structure and degradation** of polymeric and composite materials.

- The **CEA/Liten** is a **technological research laboratory** that has gained recognition for its expertise in fuel cell operation, particularly in the fields of electrochemistry and the preparation of membrane/electrode assemblies.

This research project will allow you to invest in the heart of current challenges: Energy Environmental impacts / Durability / Recyclability of materials.

Funding acquired

Duration: 2 years. **Location:** CEA Grenoble, SyMMES Laboratory - **Starting date:** End 2024

Application: provide a CV, a covering letter, 2 letters of recommendation

Contacts:

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