

LEPMI – Antenne Phelma Campus
1130 rue de La Piscine – BP 75
38402 Saint Martin d'Hères Cedex

**Postdoc position at LEPMI laboratory (Grenoble, France) – 3 years positions -
May 2024 - May 2027**

Development of novel polymer chemistry for Li-metal batteries

With the advent of "Gigafactory" to produce European made batteries, the question is already being raised in the community if laboratories are ready to create new battery technologies (low TRL) that will meet the needs for the large-scale development of the electric vehicle and storage application. Regarding E-mobility, the main challenge remains the development of high energy density and high-power batteries, while storage can be provided by less expensive batteries or from second life batteries. The societal challenges are therefore multiple because it is necessary to rapidly create new generations of batteries enabling i) fast charge rates, ii) an energy density approaching the one provided by gasoline vehicles, and iii) while ensuring an end-of-life strategy for these batteries (recycling and second life). Lithium metal could answer many of these questions on its own such as high energy density, recycling, but it cannot ensure yet a safe usage. Replacing conventional liquid-based electrolyte by a solid one should answer to the safety issue. Solid state batteries are then envisioned now as a safer and more energetic system than their lithium counterpart. However, replacing liquid electrolyte by a solid state one is far from trivial, specifically when it comes to the solid-solid interfacial contact.

In this project, we will be developing novel polymer chemistry to ensure a proper control of the interface at the negative electrode (vs. Li metal) and at the positive electrode (i.e. high voltage electrode). Electrode engineering based on novel electrolyte chemistry will be the first milestone to achieve proper electrochemical performance combining electronic and ionic transport. Advanced electrochemical characterizations will be employed to assess the electrochemical performance such as galvanostatic cycling coupled to potentiostatic step and electrochemical impedance spectroscopy. The decomposition of the electrolyte, especially the solid electrolyte interphase, will be investigated by means of online electrochemical mass spectrometry coupled to post-mortem investigation by X-ray photoemission spectroscopy. Additional characterisation to monitor the morphological evolution of the polymer and of the battery stack during cycling will be also performed using Grenoble large scale facilities (ESRF and ILL).

We are looking for a postdoctoral researcher with knowledge on chemistry, materials science, or electrochemistry to work on developing novel polymer electrolyte for high energy batteries. Position will be located at LEPMI laboratory in Grenoble. The postdoc will be involved in a large national project including several industrial partners.

To apply please send your CV, motivation letters and 2 reference letters to Claire Villevieille (claire.villevieille@grenoble-inp.fr) and to Fannie Alloin (fannie.alloin@grenoble-inp.fr).