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

https://lepmi.grenoble-inp.fr/

Sergio F. Mayer / Benjamin Mercier-Guyon
sergio-federico.mayer@grenoble-inp.fr/ benjamin.mercier-guyon@grenoble-inp.fr

Saint Martin d'Hères, le 16 septembre 2024

Preparation and Characterization of Composite Electrodes for Na-ion all-solid-state batteries

Keywords: solid state batteries, electrochemistry, Na-ion battery, thioantimoniate

Offer description

Na-ion batteries present a promising alternative to Li-ion batteries (LIBs) due to their lower cost, abundance, and availability. However, Na-ion batteries are not safer than Li-ion ones and to address this point, the liquid electrolyte needs to be replaced by a solid one. However, solid state battery technology is not yet under development due to the poor control of the interface at the electrode level, hindering the ionic/electronic transport.

This research focuses on preparing composite negative electrodes for Na-ion batteries using a mixture of sodium solid electrolyte and electroactive materials. The final goal is to develop conditions for tape-casting negative electrodes in air without the need for specialized environments like dry rooms or gloveboxes.

The master student will work on composite negative electrodes using moisture-resistant thioantimoniate solid electrolytes that can be processed in air. Tasks include synthesizing of the solid electrolyte via ball milling or aqueous methods, preparing the electrodes in various atmospheres and using different solvents, and assessing their electrochemical performance in symmetrical and half-cells. Characterization will involve measurements in laboratory instruments including SEM imaging, XPS and X-ray tomography.

The thesis work will be conducted at the LEPMI laboratory in Grenoble.

Goals

- Synthesis of solid electrolytes
- Preparation of composite electrodes, including atmosphere and solvent selection
- Electrochemical measurements on symmetric and half-cells
- Laboratory scale characterizations; data processing
- Writing experimental protocols and reports

Student profile: We are looking for a Master student with background in material science and/or chemistry. Electrochemical experience is an asset.

Duration: 6 months

Location: LEPMI (laboratory on Grenoble Campus, France)

Starting date: February 2025

To apply to this master thesis please send your CV and motivation letter to Sergio F. Mayer (sergio-federico.mayer@grenoble-inp.fr) and Benjamin Mercier-Guyon (benjamin.mercier-guyon@grenoble-inp.fr).