

Influence of cold sintering parameters on the microstructure and transport properties in $\text{Li}_{1.3}\text{Al}_{0.3}\text{Ti}_{1.7}(\text{PO}_4)_3$ / LiFePO_4 composites for all-solid-state batteries

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The Cold Sintering Process (CSP)(1) is used to densify composite cathodes consisting of $\text{Li}_{1.3}\text{Al}_{0.3}\text{Ti}_{1.7}(\text{PO}_4)_3$ (LATP) as the solid-state electrolyte and LiFePO_4 (LFP) as the active cathode material. First, the parameters governing the CSP (pressure, temperature, nature and quantity of liquid phase) were optimized to densify each material independently. The (thermo-)chemical stability was determined by X-ray diffraction, and electrochemical impedance spectroscopy measurements provided information on the charge transport properties of bulk ceramics. In a second step, the predefined parameters were adjusted to densify, composite cathode. These tests yielded mechanical interfaces of quality high enough to obtain self-standing catholytes with tunable residual porosity at temperature low enough to prevent (thermo-)chemical reactivity.

The presentation focuses on the relationship between the sintering parameters, the microstructure and the transport properties, particularly at the various interfaces formed (grain boundaries & interfaces between the two materials) to better control the batteries performances and ageing.

(1) Joo-Hwan Seo et al. 2021 Jpn.J.Appl.Phys. 60 037001

Professional Status of the Speaker

Doctoral or Master Student

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