

SEMINAR

**Development of a New *Closo*-Borate Solid Electrolyte
and its Implementation in All-Solid-State Batteries**
PhD Thesis Seminar

Speaker	Léo Duchêne, Materials for Energy Conversion
Moderator	Corsin Battaglia, Materials for Energy Conversion
Date	Thursday October 3, 2019, 15:30
Venue	Empa, Dübendorf, VE 102

Abstract

All-solid-state batteries promise to simultaneously yield higher energy and power density as well as improved safety as compared to state-of-the-art lithium-ion technologies based on organic liquid electrolytes. A competitive all-solid-state battery requires a solid-state electrolyte with high ionic conductivity near room temperature and high thermal and electrochemical stability. Meeting these requirements simultaneously represents a major challenge. *Closo*-borates represent a promising, yet underexplored, class of solid electrolytes. Specifically, their high ionic conductivity, wide electrochemical stability window, and advantageous processing properties make them serious candidates to address the major challenges faced by all-solid-state batteries.

I will present my PhD work during which I developed a new solid electrolyte within this family, namely $\text{Na}_4(\text{B}_{12}\text{H}_{12})(\text{B}_{10}\text{H}_{10})$. I will demonstrate that this material possesses the appropriate combination of properties to develop a 3 V all-solid-state battery and discuss aspects related to the assembly and successful cycling of such a device.

Bio

Léo Duchêne obtained his bachelor's degree (2013) and master's degree (2015) in Materials Science and Engineering at the École Polytechnique Fédérale de Lausanne (EPFL) in Switzerland. During his studies, he visited the University of Waterloo in Canada and completed his master's thesis at Lawrence Berkeley National Laboratory (LBNL) as part of the Joint Center for Artificial Photosynthesis (JCAP), where his work focused on microstructure engineering of organo-lead halide perovskite for solar cells applications.

Léo started his PhD in the Laboratory Materials for Energy Conversion at Empa in January 2016 and defended his PhD thesis successfully at the University of Geneva in September 2019. His work focuses on all-solid-state batteries with a particular interest in the development and device integration of new solid state electrolytes.