

## Master's project/thesis call:

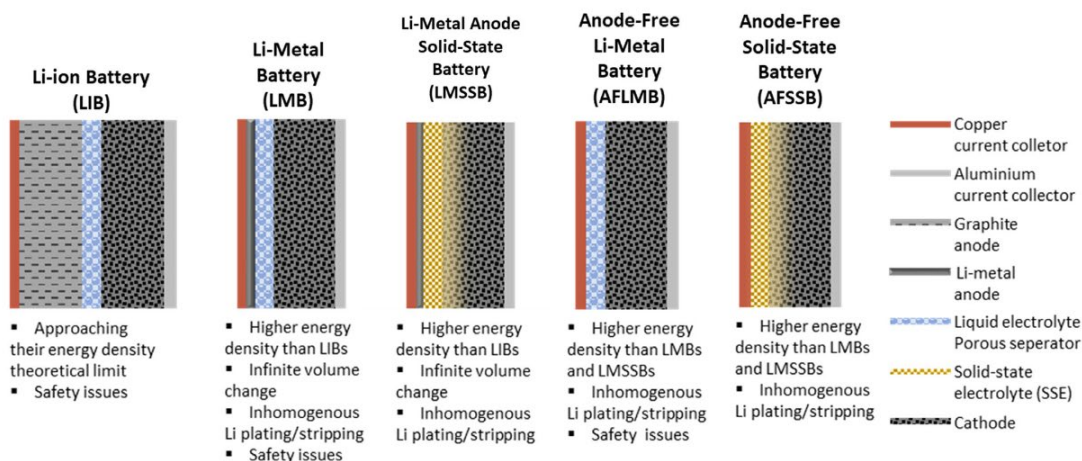
### Functional thin-film layers for anode-less solid state batteries

#### at the Laboratory for Thin Films and Photovoltaics, Empa (Dübendorf, Switzerland)

One of the main research topics in the Laboratory for Thin Films and Photovoltaics is solid-state thin-film batteries. We use the advantages of thin-film manufacturing processes to create micro- or nano-scale batteries that can find applications in wireless sensors and consumer electronics, but more importantly, serve as model systems to study the fundamental properties and phenomena governing the performance of specific battery materials and their interfaces.

Building on our previous work, this Master's thesis focuses on advancing anode-free solid-state battery (AFSSB) technology by interfacial engineering. The goal of this project is to improve lithium plating and stripping homogeneity and enhance cycling stability using thin, functional layers. Using magnetron sputtering and/or evaporation, the project will explore a diverse set of thin (<50 nm) lithiophilic seed layers. This project aims to identify new materials for seed layers that promote efficient lithium plating and stripping, minimize overpotentials, and enhance stability at high current densities for all solid-state batteries. Ultimately, the seed layers will also be applied with an 'artificial solid electrolyte interphase' layer as multifunctional coatings for current collectors for AFSSBs. The student will learn the basic principles of thin-film battery manufacturing, battery cycling and electrochemical characterisation (impedance spectroscopy and others).

This project requires multidisciplinary interests and will help you gather experience in many domains (physical vapour deposition, electrochemistry, materials science, data processing). Therefore we invite students with strong background in materials science, chemistry, and/or electrical engineering to apply. It is possible to tailor the project to your specific area of interest. Feel free to contact us for further information.



**Figure from:** Zor C. et al., Adv. Energy Sustainability Res. 2024, 5, 2300001, 10.1002/aesr.202300001

**Duration:** 6 months

**Starting date:** Anytime

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