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Salle 4-A014, Institut Jean Lamour, Campus Artem

All solid-state batteries - Current issues and perspectives

The massive electrification we are currently witnessing, particularly in the field of mobility, places the issue of electricity storage at the center of attention, whether in research, industry, or geopolitics. The development and commercialization of efficient, robust, and environmentally friendly batteries (in terms of recycling and resource extraction) represent tremendous challenges that society must address within an extremely tight timeframe.

Today, liquid-electrolyte Li-ion batteries constitute the majority of batteries on the market. However, the performance of these systems is nearing their theoretical limits. Continuing to improve electrochemical storage systems therefore requires the development of new concepts and technologies. In this context, so-called “all-solid-state” systems are emerging as highly promising alternatives, paving the way for lighter batteries with better energy density, longer lifespan, and enhanced safety. Despite their numerous advantages, the mass commercialization of all-solid-state batteries remains distant, due to several still-unsolved challenges. The most critical issues include (i) interface management, (ii) control of manufacturing processes, and (iii) resource management and recyclability.

In this seminar, after a brief introduction and contextual overview, I will present the challenges and potential solutions for addressing interface problems linked to mechanical constraints that arise during the charge/discharge cycles of all-solid-state batteries.

In the second part, I will look further ahead by exploring current approaches for developing lithium-free all-solid-state batteries.

Séminaire organisé par le Département Chimie et Physique des Surfaces et des Solides