

Symposium Interfacial Challenges in Solid-State Li Ion Batteries (SYLI)

jointly organized by
the Metal and Material Physics Division (MM),
the Surface Science Division (O), and
the Semiconductor Physics Division (HL)

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The electrification of road transportation is generally considered the next important frontier for electrochemical energy storage, and it is currently debated whether prevailing Li ion batteries will ever be suitable for full mass-market electrification. Presently, a wave of optimism is building in the battery community that most of the limitations of conventional Li ion batteries for electric vehicles (safety, limited energy densities) can be addressed by using a solid-state electrolyte (SSE) in place of the traditional liquid one. Unfortunately, present-day all-solid-state batteries are still largely characterized by extremely low current (power) densities. This is ascribed to interfacial resistances, possibly arising from imperfect morphology or chemistry (in particular Li depletion layers) at the interfaces. The use of super-ionic SSEs, nanostructured interfaces, or blending with ion-conducting polymer gels appear as promising routes to overcome these resistances. However, as the exact reason for interfacial resistances is not even known for simple model systems, research along these lines is thus far largely empirical. A more directed exploration and therewith shortened innovation cycles require a detailed, atomic-scale characterization and concomitant understanding of the structures and the ionic transport at the buried electrode-SSE interfaces. This symposium will highlight corresponding studies and discuss current frontiers.

Overview of Invited Talks and Sessions

(Lecture room HSZ 02)

Invited Talks

SYLI 1.1	Mon	9:30–10:00	HSZ 02	Interfacial challenges in solid-state Li ion: some perspectives from theory — •ALAN LUNTZ, SASKIA STEGMAIER, JOHANNES VOSS, KARSTEN REUTER
SYLI 1.2	Mon	10:00–10:30	HSZ 02	Will solid electrolytes enable lithium metal anodes in solid state batteries? — •JÜRGEN JANEK, DOMINIK WEBER, WOLFGANG ZEIER
SYLI 1.3	Mon	10:30–11:00	HSZ 02	Hybrid Electrolytes for Solid-State Batteries — •HANS-DIETER WIEMHÖFER
SYLI 1.4	Mon	11:15–11:45	HSZ 02	Neutron diffraction on solid-state battery materials — •HELMUT EHRENBERG, ANATOLIY SENYSHYN, MYKHAILO MONCHAK, SYLVIO INDRIS, JOACHIM BINDER
SYLI 1.5	Mon	11:45–12:15	HSZ 02	Sulfate-based Solid-State Batteries — •YUKI KATOH

Sessions

SYLI 1.1–1.5	Mon	9:30–12:15	HSZ 02	Symposium Interfacial Challenges in Solid-State Li Ion Batteries
SYLI 2.1–2.4	Mon	15:45–16:45	IFW A	Interface-dominated behaviour
SYLI 3.1–3.3	Mon	17:15–18:00	IFW A	Sulphate- and phosphate-based electrolytes
SYLI 4.1–4.5	Tue	10:15–11:30	IFW A	NMR studies
SYLI 5.1–5.4	Tue	11:45–12:45	IFW A	Structure - property relationships I
SYLI 6.1–6.5	Wed	10:15–11:30	IFW A	Defects, structure and thermodynamics
SYLI 7.1–7.4	Wed	11:45–12:45	IFW A	Hybrid and structured electrolytes
SYLI 8.1–8.4	Wed	15:45–16:45	IFW D	Structure - property relationships II