

Stabilizing of Lithium-Solid-Electrolyte Interfaces by Atomic Layer Deposition Prepared Nano-Interlayers for a Model All-Solid-State Battery

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Abstract : In order to understand the electrochemistry of all-solid-state batteries (ASSBs), the use of electrochemical equivalent circuits with a physical meaning is essential. A model battery is needed whose characterization is independent of the influence of the complex battery assembly. Lithium-Ion Conducting Glass-Ceramic (LICGC), a model solid electrolyte, is chosen for its stability in the air, but on the other hand, it is also well-known for its instability against metallic lithium upon direct contact. Hence, as a first step towards a model ASSB, the interface between lithium and the solid electrolyte (SE) is stabilized with thin (5 nm and 10 nm) coatings of titanium oxide (TO) and lithium titanium oxide (LTO). Impedance data shows that both materials are able to protect the SE surface from rapid degradation due to reducing lithium and, therefore, can serve as a protective interlayer on the anode side of a model ASSB.

Keywords : all-solid-state battery, lithium anode, solid electrolytes, interlayers

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