

Reference Electrode Embedded in All-solid-state Batteries

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Three-electrode setup is used to measure working electrode potential with respect to reference electrode. A reference electrode is utilized to understand reaction mechanism of single electrode (working electrode). Three-electrode cell is universally used in lithium ion batteries based on liquid electrolyte¹⁻³, whereas this kind of analysis has not been applied for all-solid-state batteries. The electrochemical performance of solid state batteries is inferior because of high interfacial resistance between solid electrolyte. Thus, it is important to in-situ measure the working electrode potential and interfacial resistance between electrode and electrolyte, in all-solid-state system.

In the present study, we fabricated all-solid-state batteries consisting of 70Li₂S-30P₂S₅ solid electrolyte, lithium silicide anode and TiS₂ cathode, with indium reference electrode embedded in the solid electrolyte. The voltage between the reference electrode/anode and the cathode/reference electrode were measured using In probe under open circuit condition and as a function of current density (C-rate).

References:

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