Chemo-mechanical challenges in solid-state batteries

Why do we need chemo-mechanical failure mechanisms in solid-state batteries?
Understanding these chemo-mechanical failure mechanisms of different anode architectures and the role of interphase formation helps to provide guidelines for the design of improved electrode materials. Solid-state batteries (SSBs) emerge as next-generation energy storage devices with high energy density and improved safety 1,2,3.

Can solid-state batteries overcome chemo-mechanical challenges?
Building on recent progress,overcoming chemo-mechanical challenges in solid-state batteries will require new in situ characterization methods and efforts to control evolution of interfaces. SSBs offer the potential for improved safety and energy density compared with lithium-ion (Li-ion) batteries.

What are chemo-mechanical problems in SSBs?
In this article we review the current state-of-the art modeling tools with a focus on chemo-mechanics. Some of the key chemo-mechanical problems in SSBs involve dendrite growth through the solid-state electrolyte (SSE), interphase formation at the anode/SSE interface, and damage/decohesion of the various phases in the solid-state composite cathode.

Are all-solid-state batteries chemo-mechanical?
Modeling the chemo-mechanical behavior of all-solid-state batteries: a review. Solid-state-batteries (SSBs) present a promising technology for next-generation batteries due to their superior properties including increased energy density, wider electrochemical window and safer electrolyte design.

What causes rapid capacity decay in Li-s battery?
Rapid capacity decay in Li-S solid-state batteries is widely reported and ascribed to chemo-mechanical failure. For the composite sulfur cathode using GPE electrolyte (GPE:S = 3 wt),the battery exhibited a low sulfur utilization (350 mAh g -1 at C/20).

Why are chemo-mechanics more important than conventional batteries?
Compared with conventional batteries having liquid electrolytes,chemo-mechanics plays a more prominent role due to rigid solid/solid contactsand often have fairly different mechanical properties of the cell components 4,5.

Solid-state batteries (SSBs) could exhibit improved safety and energy density compared with traditional lithium-ion systems, but fundamental challenges exist in integrating solid-state electrolytes with electrode materials. In particular, the ...

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