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### Title

(Invited) Recent Progress on Solid State Batteries - Challenges and Opportunities

### Permalink

<https://escholarship.org/uc/item/3411k6sw>

### Journal

ECS Meeting Abstracts, MA2020-02(5)

### ISSN

2151-2043

### Author

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### Publication Date

2020-11-23

### DOI

10.1149/ma2020-0251020mtgabs

Peer reviewed

# ***(Invited)* Recent Progress on Solid State Batteries - Challenges and Opportunities**

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## **Abstract**

All-solid-state batteries (ASSBs) have attracted enormous attention over recent years because they have many advantages over their liquid counterparts such as the enhanced safety and improved energy density by enabling the use of metallic anodes. However, the performance of ASSBs is still yet to meet the requirements for commercialization. Many challenges have remained in order to improve the interfacial properties, increase the cycling life and energy density. Herein, we demonstrate the progression to build practical ASSBs by using sulfide-based superionic conductors as electrolytes since they have high ionic conductivities, facile synthesis procedures, and favorable mechanical properties that allow intimate contact with cathode and anode materials. We show that each step is critical to achieving high-performance ASSBs, from synthesis optimization, interfacial engineering to scalable fabrication. We will also demonstrate the similar success in room temperature sodium solid state batteries and showcase their promising future for grid-scale energy storage.