

Challenges for solid state battery and future development kelsey hatzell





Overview

Kelsey Hatzell, assistant professor of mechanical engineering and chemical and biomolecular engineering, led a survey of developments in the field to present an expert opinion on what is most important for researchers to study, and how to mitigate roadblocks to success in the proliferation of this new, promising technology. What are the challenges of solid state batteries?

Besides resolving the issues of affordability and scale, solid state batteries also have technological challenges. Solid state batteries are much safer, but there is the matter of dendrites, a build-up of lithium metal crystal in the anodes that form as the battery charges and discharges.

Are solid-state batteries the future of energy storage?

After years of promises, solid-state batteries are now seen as the future of energy storage by many. Countries like China, Japan, and South Korea have near-term plans to bring solid-state batteries to market.

Why do solid-state batteries fail?

Solid-state batteries can fail due to two main reasons: low pressure causes insufficient contact between the electrolyte and current collector, while high pressure results in excessive contact. Both failure modes provide insights into improving anode-free solid-state batteries.

Can anode-free solid-state batteries improve manufacturability?

A Princeton research group has revealed fundamental insights into anode-free solid-state batteries, paving the way for efforts to improve their manufacturability. The work was supported by the MUSIC Energy Frontier Research Center, funded by the Department of Energy.

Are inorganic and hybrid solid electrolytes suitable for next-generation solid-state batteries?

Hatzell's group has been examining novel inorganic and hybrid solid



electrolytes for next generation solid state batteries. Dixit, Marm B., Jun-Sang Park, Peter Kenesei, Jonathan Almer, and Kelsey B. Hatzell. "Status and prospect of in situ and operando characterization of solid-state batteries."

Are solid-state batteries anode-free?

Anode-free solid-state batteries avoid using a lithium metal foil anode, which is a major bottleneck to deployment compared to standard solid-state batteries. The anode in most solid-state batteries requires specialized manufacturing approaches.



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Kelsey B. Hatzell

Hatzell's group is interested in emerging decarbonization technologies for transportation, fuel, and direct air capture applications. The group has a significant focus on energy storage ...

Prospects on large-scale manufacturing of solid state batteries

This review discusses transport and chemo-mechanical challenges associated with energy dense solid state batteries. In particular, this review focuses on summarizing work which provides design strategies for ...



Lecture Series: Plenary

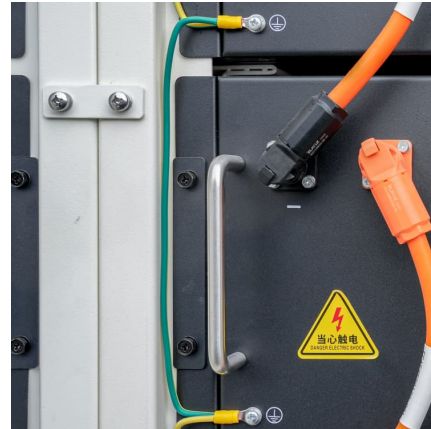
Silicon anode offers a possibility to overcome the challenges that lithium metal anode faces. In this talk, we will highlight solutions to these existing challenges and several ...

Kelsey B. Hatzell

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(batteries/thermal) and is interested at ...



Elasticity-oriented design of solid-state batteries: challenges and

This review discusses transport and chemo-mechanical challenges associated with energy dense solid state batteries. In particular, this review focuses on summarizing work ...

Prospects on large-scale manufacturing of solid state batteries

This perspective highlights the state-of-the-art for solid-state battery manufacturing approaches and highlights the importance of utilizing conventional battery manufacturing approaches for ...



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A team led by Kelsey Hatzell, an associate professor of mechanical and aerospace engineering and the Andlinger Center for Energy and the Environment, has ...



Prospects on large-scale manufacturing of solid state ...

The authors highlighted the state-of-the-art solid-state battery manufacturing approaches and the importance of utilizing conventional battery manufacturing approaches for achieving price



Prospects on large-scale manufacturing of solid state batteries

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Research powers progress of advanced solid-state battery

By understanding how these advanced solid-state batteries operate and fail under different conditions, Hatzell's research is informing efforts to improve their performance and ...



Kelsey B. Hatzell , ScienceDirect

Long term, for solid state batteries to become economical, conventional manufacturing approaches need to be adapted. In this perspective we discuss how material selection, ...



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