# Article information:

A durable and safe solid-state lithium battery with a hybrid electrolyte membrane - ScienceDirect  
<https://www.sciencedirect.com/science/article/pii/S2211285518300387>

# Article summary:

1. A garnet-based hybrid solid electrolyte (HSE) membrane has been developed for high-performance solid-state lithium batteries.

2. The HSE membrane is composed of Li7La3Zr2O12 (LLZO) particles and a PVDF-HFP polymer matrix, which improves flexibility and reduces solid/solid interfacial resistance.

3. The solid-state lithium battery with this HSE membrane exhibits an initial reversible discharge capacity of 120 mA h g−1 at a charge/discharge current density of 0.5 C at room temperature and can efficiently store pulsed energy, especially for output at high frequencies.

# Article rating:

Appears moderately imbalanced: The article provides some useful information, but is missing several important points or pieces of evidence that would be required to present the discussed topics in a balanced and reliable way. You are encouraged to seek a more balanced perspective on the presented issues by exploring the provided research topics and looking at different information sources.

# Article analysis:

The article discusses the development of a solid-state lithium battery with a hybrid electrolyte membrane composed of garnet-based Li7La3Zr2O12 (LLZO) particles and PVDF-HFP polymer matrix. The authors claim that this composite electrolyte offers high ionic conductivity, good interfacial and mechanical properties, fine thermal and electrochemical stabilities, as well as safety. They report an initial reversible discharge capacity of 120 mA h g−1 at a charge/discharge current density of 0.5 C at room temperature for the solid-state lithium battery with this HSE membrane.

The article provides detailed information on the synthesis and characterization of the LLZO powder and hybrid electrolyte membranes. The authors also present results from various electrochemical measurements to support their claims about the performance of the solid-state lithium battery with this HSE membrane.

However, there are some potential biases in the article that need to be considered. Firstly, the authors only focus on the advantages of their proposed hybrid electrolyte membrane without discussing any potential drawbacks or limitations. This one-sided reporting may lead readers to believe that this technology is flawless when in reality, there may be some challenges that need to be addressed.

Secondly, while the authors mention that solid-state lithium batteries offer better safety than traditional Li-ion batteries due to their use of solid state electrolytes, they do not provide any evidence or discussion on how this technology addresses other safety concerns such as thermal runaway or fire hazards.

Thirdly, while the authors claim that their proposed HSE membrane offers high mechanical strength and flexibility for flexible battery applications, they do not provide any data or analysis on how this material compares to other existing materials used in flexible batteries.

Overall, while the article presents promising results for a durable and safe solid-state lithium battery with a hybrid electrolyte membrane, it is important to consider potential biases and limitations in interpreting these findings. Further research is needed to fully understand the performance and limitations of this technology before it can be widely adopted in practical applications.

# Topics for further research:

* Safety concerns of solid-state lithium batteries beyond the use of solid-state electrolytes
* Limitations and challenges of hybrid electrolyte membranes in solid-state lithium batteries
* Comparison of mechanical properties of different materials used in flexible batteries
* Thermal runaway and fire hazards in lithium-ion batteries
* Performance and limitations of solid-state lithium batteries in high-temperature environments
* Environmental impact of solid-state lithium batteries compared to traditional Li-ion batteries

# Report location:

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