

Long-Lasting Lithium Primary Batteries

With Organosilicon-Based Electrolytes

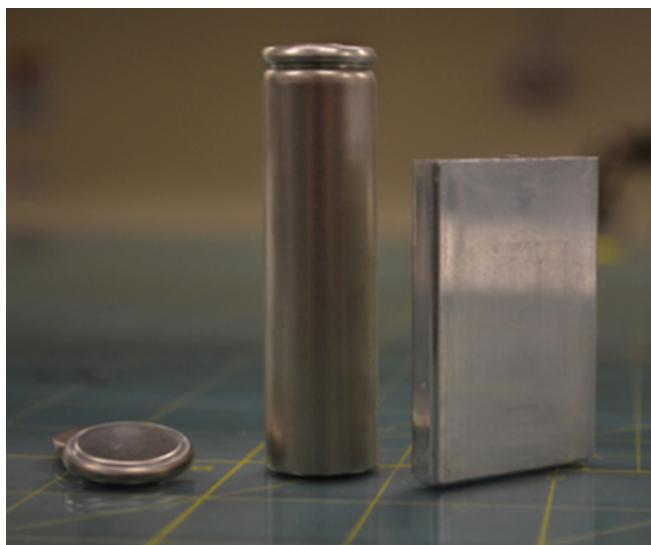


Long-lasting lithium primary batteries with a wide operational temperature range and increased safety.

US Patent 10,862,163

Technology Readiness Level 2

There is an ever-growing need to produce safer batteries that have longer run times and better temperature responses. Many current systems use lithium primary batteries because of their high energy densities and wide operational temperature range. However, many of these systems are inefficient in chemical safety or electrochemical utilization of the cathode material. In particular, many lithium carbon monofluoride (LiCF_x) batteries do not use the available capacity of the electrochemical couple. As a result, the performance increase of a lithium battery is directly related to the composition of the electrolyte.



Researchers at Sandia have developed organosilicon-based electrolytes for lithium batteries that increase electrochemical performance and primary battery safety. The development of joined anion receptors with a non-flammable electrolyte backbone introduces an innovative dual functionality to battery electrolytes. This development allows for safe, non-flammable primary lithium batteries while also retaining a high capacity and wide operational temperature range. This technology has numerous applications for defense missions and industry commercialization. For example, the safe and long-lasting battery could be used in power systems, medical devices, automotive and transportation systems, or electrical utility systems. Expansion of this technology would allow for electrolyte concepts that can provide a tunable property to performance relationship with respect to performance and safety.

Next Steps

Sandia is seeking partners to develop and commercialize this technology. To learn more, contact Sandia National Laboratories' Licensing and Technology Transfer office.

A range of cell test platforms are planned for the program. From left to right: 2032 coin cell tests, 18650 large format tests, and custom sized, application-specific prismatic cells.

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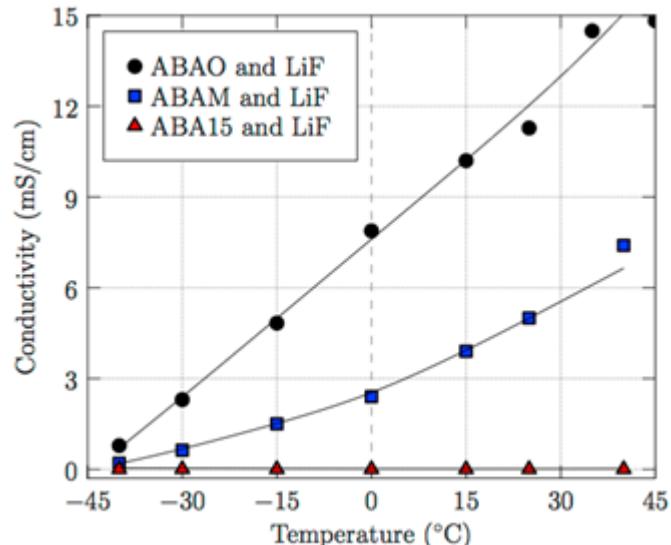


Technical Benefits

- Increased primary battery safety
- High battery capacity
- Wide operational temperature range

Applications & Industries

- Storage Battery
- Electric Utility
- Medical Devices
- Transportation and Automotive



Contact Us SD#12924

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Electrolyte conductivity: Black, blue, and red represent 1.0 M ABAO, ABAM, and ABA15 added to the electrolyte (30:70 weight % EC/DMC), respectively.