



TECHNOLOGY

Multiple-Electron Aqueous Battery

OVERVIEW

Background:

Lithium-ion batteries power much of our digital and mobile lifestyle. However, their adoption in more strategically important applications such as vehicle-electrification and grid-storage has been slower, mainly due to the concerns raised over their safety, cost, and environmental impact, which mostly arise from the non-aqueous electrolytes. The use of aqueous alternatives is limited by their narrow electrochemical stability window (1.23 Volts), which sets an intrinsic limit on the practical voltage and energy output.

Innovation:

Researchers at the University of Maryland have developed a multiple-electron aqueous battery. This battery contains a highly-concentrated aqueous electrolyte, whose window was expanded to approximately 3.0 Volts with the formation of an electrode/electrolyte interphase. A full Lithium-ion battery of 2.3 V using such aqueous electrolyte was demonstrated to cycle up to 1000 times, with nearly 100% Coulombic efficiency at both low (0.15 C) and high (4.5 C) rates. This battery will be fundamentally safe and cheaper due to the thermal runaway hazard being essentially eliminated with the use of an aqueous electrolyte and the absence of a battery management system

APPLICATIONS

- Electric Vehicles
- Energy Storage

ADVANTAGES

- No battery management system
- High energy density
- Intrinsically safe
- Low Cost

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INSTITUTION

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PATENT STATUS

Pending

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CATEGORIES

- Power Electronics
- Engineering
- Chemical
- Materials

EXTERNAL RESOURCES

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