



TECHNOLOGY

Safe, Low-Cost, High-Energy-Density, Solid-State Li-ion Batteries

OVERVIEW

Background

The adoption of the lithium-ion batteries in the consumer electronics, electric vehicle, and aerospace industries has grown exponentially over the years. Despite this growth, a call for a safer and more efficient rechargeable battery solution is at hand since lithium-ion batteries' dangerous pressurized flammable liquid electrolytes are known to ignite under some conditions. Solid state lithium-ion batteries are considered to be the next generation solution due to its potential to produce three times the energy density of a typical 2011 lithium-ion battery and non-flammable electrolytes. However, certain detrimental factors still exist with current solid state lithium-ion batteries, including high cost of manufacture stemming from dry room or vacuum equipment costs, mechanical cycling fatigue, high impedance, and low room temperature conductivity concerns.

Innovative Technology

Researchers at the University of Maryland Energy Research Center have designed an intrinsically safe, robust, low cost, high energy solid state lithium-ion battery. Fabrication processes are done with conventional ceramic processing equipment in ambient air without the need of dry rooms, vacuum deposition, or glove boxes. Thus, the cost of manufacturing is dramatically reduced below an estimated \$100/kWh. This new approach promises to dramatically alter the solid state lithium-ion battery landscape with an expected effective energy density of 2050Wh/L for a 300 Volt battery pack with an approximate 200 m/repeat unit. The result is increased discharge ability without mechanical cycling fatigue, while possessing improved thermal uniformity, strength, weight, and form factor.

APPLICATIONS

Electric Vehicles
Consumer Electronics
Aerospace Power Systems
Renewable Energy Storage

ADVANTAGES

Reduced manufacturing cost
Higher depth of discharge
Less mechanical fatigue
Smaller form factor

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Additional Information

INSTITUTION

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CATEGORIES

- Devices
- Engineering
- Microelectronics
- Power Electronics

EXTERNAL RESOURCES

PS-2013-033