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Low Temperature Lithium Secondary Battery with Ether-based Electrolyte

An ether-based electrolyte enables lithium cells to run efficiently at –20 °C without heaters.

Researchers at Purdue University have developed an electrolyte solution that allows lithium-ion batteries to function at low temperatures (-20 degrees C). Electrolytes of lithium-ion batteries typically are carbonate-based, which perform poorly at low temperatures. For operation at low temperatures, lithium-ion batteries are equipped with secondary heating systems, which add weight and reduce efficiency of the battery. The electrolyte solution developed at Purdue does not require the battery to be equipped with secondary heating systems. This technology provides potential uses in defense (submarine, lunar/Mars, exploration) and other extreme climate applications.

Technology Validation: Graphite half-cells with the novel structure exhibited 90% capacity retention after 300 charge-discharge cycles at room temperature. Also, 90% of the battery's room temperature capacity is retained at -20 degrees Celsius.

Advantages:

- Long cycle life

- Operable at low temperature

- Less weight

Applications:

- Defense

- Vehicles in extreme climates

TRL: 2

Intellectual Property:

Technology ID
2021-POL-69515

Category
Aerospace & Defense/Defense Electronics & Surveillance Technologies
Energy & Power Systems/Energy Storage

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View online

Provisional-Patent, 2022-05-16, United States

Utility-Gov. Funding, 2023-05-15, United States

Keywords: Chemical Engineering, Ether, Graphite anode, High concentration electrolyte, Lithium-Ion Battery, Low temperature