

Low-Temperature Lithium-Ion Battery

Track Code: 2021-POL-69515

Categories:

- Chemical Engineering
- Electrical Engineering

Keywords:

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

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

People:

- Pol, Vilas G (Project leader)
- Kim, Soohwan

Intellectual Property:

Application Date: May 15, 2023

Type: Utility-Gov. Funding

Country of Filing: United States

Patent Number: (None)

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