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High Ionic Conductivity Composite LiLaZrBiO Garnet - Polymer Electroly

A flexible ceramic-polymer electrolyte offers order-of-magnitude higher ionic conductivity with safer, non-flammable operation.

Although lithium-ion batteries have great upside for power devices like automobiles, the flammable organic electrolytes commonly used in these batteries hinder their wider implementation in transportation.

Researchers at Purdue University have developed a non-flammable composite ceramic-polymer solid-state electrolyte for lithium-ion batteries comprising cubic phase bismuth doped lithium lanthanum zirconium oxide (LLZBO) meso-particles embedded in polyethylene oxide membranes. This technology is safer than many existing technologies due to its non-flammability, but it is also shows nearly one order of magnitude higher ionic conductivity, 1.09x10-4 S/cm at 35 degrees Celsius and 5.45x10-3 S/cm at 55 degrees Celsius, when compared to many competitors at only 5wt percent LLZBO polymer composite film. Furthermore, the overall membrane is mechanically flexible, requires no excessive sintering temperatures or prolonged sintering time, represents significant cost savings in materials and processing, and can be readily incorporated into lithium-ion batteries.

Advantages:

-High ionic conductivity

-Solid-state electrolyte

-Safe (non-flammable)

-Mechanically flexible

Potential Applications:

-Rechargeable batteries

Technology ID

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Category

Chemicals & Advanced Materials/Polymer Science & Smart Materials

Energy & Power Systems/Energy Storage

Materials Science & Nanotechnology/Composites & Hybrid Materials

Further information

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