Solid Polymer Electrolyte Lithium Ion Battery
Technology #6774-8039

Applications

Solid polymer electrolytes are used to create solid-state batteries that bypass many problems associated with liquid electrolyte batteries, including safety. This invention can be used in lithium-ion batteries for cellular phones, laptop computers and other consumer electronic products.

Problem Addressed

Existing rechargeable lithium-ion batteries use a liquid electrolyte, which is disadvantageous as it is extremely volatile at high temperatures, exhibits electrochemical breakdown at high voltages, and can react with other components in the battery causing a reduction in battery capacity. Block copolymer electrolytes alleviate many concerns associated with liquid-containing rechargeable lithium-ion cells.

Technology

These inventions provide novel designs and fabrication methods for solid-polymer electrolyte lithium-ion batteries. The technology provides a method to reduce resistance across the electrode by introducing novel block copolymer electrolytes for solid state rechargeable lithium batteries. The technology also presents a modification of the chemical structure of the block copolymer electrolyte conceived in the first invention to create a self-doped polymer electrolyte. The technology presents methods of predicting the potential utility of metal dichalcogenide compounds for use in lithium intercalation compounds and for processing lithium intercalation oxides with the structure and compositional homogeneity to increase the formation energies of said compounds. Moreover, the novel technology provides enhanced ion host particles, polymer electrolytes, and electrodes for lithium batteries. The host particles can be made by dispersing precursor powders, drying the suspension, heating the powder to cause crystallization and other precipitation and co-precipitation techniques, and are then arranged as an electrolyte in a battery.

Advantages

- Robust microstructure reduces failure due to loss of electrical contact with integrated circuit particles
- Use of self-doped block copolymer electrolytes in lithium battery cathodes improves efficiency and safety of the electrolyte
- Increases the formation energies of metal dichalcogenide compounds
- Improved ion host particles and electronic and mechanic properties of lithium solid polymer electrodes

Categories For This Invention:

Energy
Energy Storage
Batteries
Lithium Batteries
Materials
Polymers (Materials)

Intellectual Property:
A self-doped microphased separated block copolymer electrolyte
Issued US Patent
6,361,901
Non-crosslinked, amorphous, block copolymer electrolyte for batteries
Issued US Patent
7,026,071

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Publications:
Graft Copolymer-Based Lithium-Ion Battery for High-Temperature Operation
Journal of Power Sources
Vol. 196 (13), 2011: p. 5604 - 5610

External Links:
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