



Polymer Electrolytes with Anion Traps and High Alkali Ion Conductivity

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Background

As mobile electronics continue to evolve, the need for safe, long-lasting rechargeable batteries has grown tremendously. To meet this need, one popular group of electrolytes is based on the dissolution of salts in polyethers. High-conductivity electrolytes can be formed in this manner. However, these salt-in-ether solid electrolytes have the disadvantages of the lithium being strongly chelated by the ethers and the conductivity being dominated by the motion of the anions. Despite significant research in the area, there remains a need for improved electrolyte solvents that can be easily incorporated into voltaic cells without significant extra cost.

Invention Description

Researchers at Arizona State University have utilized certain Lewis acid chain polymers to impart "solidity" to a melt of an alkali cation salt mixture. The liquid is stable at ambient temperature, and the cationic motion is decoupled from the anionic motion such that the conductivity is cationic as in the popular "superionic glass" electrolytes. The resulting electrolyte exhibits desirable properties of stability, conductivity, and ion mobility, making it well suited for use in rechargeable batteries. Longer-lasting, higher-output batteries can now be constructed.

Development

This technology is part of a suite of electrolyte and battery technologies developed at Arizona State University. Significant testing has been completed, and the results have been published. At this time, AzTE is seeking potential partners and licensees for this technology and related patented technologies.

Benefits and Advantages

- **Higher Conductivity** – Competitive conductivities have been achieved.
- **Higher Solubility** – These solvents can dissolve large mole fractions of most electrolyte solutions including alkali salts.
- **Longer Cycle Life** – The solvents remain highly effective even after hundreds of charge / discharge cycles.
- **Lithium Compatible** – These solvents work well with alkali metals in general, and with lithium and lithium-ion products in particular.
- **Lower Volatility** – The solvents exhibit high thermal stability and low ambient temperature volatility.