



Non-Aqueous Electrolyte Solution for Rechargeable Lithium Batteries

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Intellectual Property Status

Patent Pending

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Background

The process of using Tetraalkylammonium ("TAA") based ionic liquids as a solvent to dissolve lithium salts has been shown to render an electrolyte solution having a wide electrochemical window for high voltage applications; however, in practice, the high viscosity of the electrolyte solution has limited the viability of the solution for many such applications. Consequently, modifications to or improvements on this process are necessary if this electrolyte solution is to obtain commercial relevance in high voltage applications.

Invention Description

Researchers at Arizona State University have developed an alternative process for using TAA based ionic liquids and lithium salts to render an electrolyte solution. Specifically, adding non-fluorinated, or preferably, fluorinated alkyl sulfone to the TAA provides a modified solvent that renders a less viscous electrolyte solution than if applying TAA alone. Meanwhile, because the sulfones also possess a wide electrochemical window, the electrolyte solution does not lose its electrochemical advantages. In fact, the addition of the sulfones, particularly fluorinated sulfones, actually serves to lower the mixture's melting point as well as to increase its ionic

Potential Applications

The Non-Aqueous Electrolyte Solution produced using this alternative process may have various high voltage applications. In particular, these solutions should have utility for Rechargeable Lithium Batteries.

Benefits and Advantages

- **Lower Viscosity** – opens up the potential to use these solutions for high voltage applications
- **Lower Melting Point** – certain combinations of sulfones and TAA can push the melting point well below room temperature, which is almost a prerequisite for practical low temperature applications
- **Increased Ionic Conductivity** – resulting electrochemical window will actually exceed that of solution produced using TAA alone