

## Research of Ionic Liquid with Unsaturated Bonds as Electrolyte Additive for Lithium Batteries

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1-Allyl-3-ethyl imidazolium bis(trifluoromethanesulfonyl) imide (AEIMTFSI) ionic liquid was synthesized. The water content of AEIMTFSI was 19.2 ppm. The physical and electrochemical properties were characterized by cyclic voltammetry, thermal analysis, conductivity test, viscosity measurement as well as charge/discharge tests. Meanwhile, AEIMTFSI as a film-forming additive for graphite anode in lithium-ion batteries was investigated. Comparative experiments of electrolytes of 1.0 M LiPF<sub>6</sub> dissolved in ethylene carbonate (EC): ethyl methyl carbonate (EMC): dimethyl carbonate (DMC) (1:1:1, wt%) with and without ionic liquid were performed. The electrolyte with 3wt% AEIMTFSI was regarded as an effective SEI forming improver, because it could be reduced prior to the solvent on the surface of graphite electrode to suppress co-intercalation of solvent and solvated lithium ions to graphite. The favorable SEI was formed on the graphite electrode. The cells containing the electrolyte with 3wt% AEIMTFSI showed better performances.