IMIDAZOLIUM-BASED MONO AND DICATIONIC IONIC LIQUID SODIUM ELECTROLYTES

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Sodium and sodium-ion batteries have emerged as low-cost candidates for medium and large-scale stationary energy storage because of their safety, long-cycle life and versatile geometries. Is well known that apart of electrodes, the electrolyte play a fundamental role in terms of current (power) density, the time stability, and the safety of the battery. Inorganic and polymer electrolytes are commonly used in high temperature molten Na cells based on Na–S and Na–$NiCl_2$ [1], while liquid electrolytes are usually preferred for the room temperature ones [2].

Ionic liquids, known as molten salts at room temperature, have recently been of great interest for energy-storage applications due to their high electrochemical stability, high thermal stability, low volatility, non-flammability, and good contact/wetting properties, even their lower ionic conductivity and high viscosity compared to classical organic carbonate solvent electrolytes limit their use as high-performance electrolytes. In this present work, we report on the synthesis, thermal and electrochemical characterization of imidazolium-based mono and dicationic ionic liquids doped with sodium bis(trifluoromethylsulfonyl) imide (NaNTf2) as a potential electrolyte for sodium secondary batteries. All synthesized electrolytes are highly viscous liquids at room temperature, no melting or crystallization being detected even at temperatures as low as -150ºC, and stables up to temperatures well above the operation window, with ionic conductivity comparable to that of the corresponding lithium electrolytes.

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References

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