

Physical Properties of Pyridinium Fluorohydrogenate, Pyr(HF)₃

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Ionic liquids (ILs), also referred to as molten salts, have found application as electrolytes for batteries and super-capacitors, in electroplating baths, as designer solvents, and as reaction media. A few of the desired properties of a super-capacitor electrolyte are nonflammability, thermal stability, and electrochemical stability. ILs containing aromatic cations have been shown to have low viscosities, which results in a high electrochemical conductivity. There is a delicate balance between increasing the thermal stability, or decreasing the melting point, and increasing the electrochemical conductivity of the IL.

This study focuses on pyridinium fluorohydrogenate, Pyr(HF)₃. Pyr(HF)₃ has been synthesized by the reaction of pyridine and anhydrous hydrofluoric acid (HF). This IL has a relatively high electrical conductivity (~100 mS/cm), wide electrochemical window, and a boiling point of 186 °C. A stable gel can also be formed by combining Pyr(HF)₃ with a super absorbent polymer, such as poly acrylic acid. The gel adds mechanical stability to the matrix, while not greatly affecting the conductivity of the IL.