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A novel iodide iron conducting polymer electrolyte based on polyacrylonitrille (PAN)

Polyacrylonitrile (PAN) based "gel" electrolytes incorporating plastizicers belong to an interesting class of materials in the field of polymer electrolytes. Although a number of Lithium ion conducting polymer electrolytes based on PAN have been investigated, not much work has been reported on PAN based systems containing other ions, especially anions. In this work the ionic conductivity of PAN based electrolytes with plastizicers Ethylenecarbonate (EC), Propylencecarbonate (PC) and incorporating the salt Tetrapropylammonium Iodide (Pr_4N^+I), has been studied. The measured ionic conductivities are of the order of 10^{-3} S cm^{-1} at room temperature.

PAN, EC, PC and Pr_4N^+I, all with purity 98% (Aldrich) were used I moisture free dry conditions. Various compositions of constituents were used to prepare the electrolyte samples. Various compositions of constituents were used to prepare the electrolyte samples. The complex impedance measurements have been carried out in order to investigate the electrical properties in the frequency range from 20 Hz to 10 MHz by using the Schlumberger SI1260 impedance-gain phase analyzer. The dc polarization technique was used to establish the ionic nature of the electrolyte.

The highest room temperature conductivity of $1.0x10^{-3}$ S cm^{-1} was observed for the composition, PAN (18%): EC (36%): PC (36%): Pr4N+I- (10%), by weight ratio. This is an impressive conductivity value, especially promising for room temperature applications of solid polymer electrolytes. The temperature dependence of the ionic conductivity follows a VTF shape.