

TITLE: Polymer Electrolyte Membranes based on Ionic Liquid synthesized from Sulfoacetic Acid and 2 Methyl-1-Limidazole.

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Polymer electrolyte membranes have been prepared using polyvinylidene fluoride (PVDF) as the polymer matrix, supporting a combination sulfoacetic acid (SAA) with 2 methyl-1-imidazole (MeIm) producing the ionic liquid.

Binary electrolyte systems were synthesized from various combinations of polymer-acid (PVDF-SAA), polymer-base (PVDF-MeIm) and acid-base (SAA-MeIm). The maximum conductivity value obtained from the polymer-acid systems was 2.38×10^{-3} S/cm (for PVDF:SAA::6:4), with the polymer-base and acid-base systems producing maximum conductivity of 6.20×10^{-9} S/cm (for PVDF:MeIm::8:2) and 1.36×10^{-3} S/cm (for SAA:MeIm::9:1) respectively.

Ternary system based polymer electrolyte membranes were developed by the in situ synthesis of various weight % combinations of PVDF, SAA and MeIm. The maximum conductivity obtained for this system was 1.36×10^{-5} S/cm at room temperature. Ionic liquid formation was confirmed by (NMR) analysis. Scanning electron microscopy (SEM) and x-ray diffraction (XRD) were carried out to analyze the morphology of the membranes and thermal gravimetric analysis (TGA) investigated the thermal and chemical stability in order to investigate the suitability of the films for use as fuel cell electrolytes.