

ABSTRACT

The main focus of this work is to study the immobilization of anions there by improve the electrical properties of solid polymer electrolyte (SPE). There are three polymer electrolyte systems in this project. Poly (ethylene oxide) with salt lithium iodide (PEO-LiI), to the high conducting ratio of this system, inorganic filler aluminium oxide (Al_2O_3), and organic macro molecule calix4 arenes, and calix6 arenes added one at a time. Sample films are prepared using solution casting technique. X-ray diffraction (XRD) studies have shown that all the samples prepared are amorphous. Fourier transform infrared spectroscopy (FTIR) indicated complexation between component materials in the polymer electrolytes based on the changes in peak locating and intensity and formation of new peaks. The conductivity of PEO-LiI is about $1.54 \times 10^{-4} \text{ Scm}^{-1}$ at room temperature, with 15 wt.% of Al_2O_3 exhibits the highest ionic conductivity of $3.30 \times 10^{-4} \text{ S cm}^{-1}$. The highest ionic conductivity of 3 wt.% calix4 arenes exhibit $4.56 \times 10^{-5} \text{ S cm}^{-1}$ at room temperature and for 3 wt.% calix6 arenes it is $2.87 \times 10^{-5} \text{ Scm}^{-1}$. The ionic conductivity of all samples increased with increasing temperature. When organic macromolecule is added into the high conducting PEO-LiI salt system the ionic conductivity decreased by one order magnitude shows that the immobilization might have taken place. The dielectric behaviour is analyzed using dielectric permittivity and dielectric modulus of the samples.