ELECTRICAL MEASUREMENTS OF POLY (ETHYLENEOXIDE) (PEO) BASED POLYMER ELECTROLYTE

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Most "solid" termed polymer electrolytes are microscopically amorphous or gel electrolytes. Poly (ethylene oxide) (PEO), Poly (vinyl chloride) (PVC), Poly (propylene glycol) (PPG), Poly (propylene oxide) (PPO), Poly (methylmetha acrylate) (PMMA) based solid polymer electrolytes are amorphous or have amorphous like a structure with partial crystalline regions. Only a very few polymer electrolytes like PAN based electrolytes belong to gel solid polymer electrolytes where salt and ion complexes are trapped in the gel polymer structure making a convenient medium for high ionic conductivity of the order 10^{-3} S cm^{-1}.

Poly (ethylene oxide) (PEO) shows a uniformly distributed high crystalline structure at room temperature and most salts complexed in PEO have semi-crystaline structures. In this study PbI_2 was used as the salt to prepare PEO based solid polymer electrolytes. Samples were prepared by the solvent casting method and, dimethylsulfoxide (DMSO) was used as the solvent. The ac complex impedance analysis method was used to study the electrical properties of this PEO:PbI_2 solid polymer electrolyte samples within the temperature range 25 °C to 110 °C with the aid of stainless steel blocking electrodes. To estimate the nature and the transference numbers of the charge carrier, the dc polarization method was used.

The PEO based PbI_2, polymer electrolytes show extra crystallinity and ionic conductivity of the order of 10^{-9} - 10^{-6} S cm^{-1} within the temperature range used. The conductivity of the solid polymer electrolyte of the composition $(PEO)_{90}PbI_2$ was 5×10^{-6} S cm^{-1} at 100 °C. The results of the dc polarization measurements, taken at 25, 60 and 110 °C with non blocking Pb electrodes, show that all the PEO:PbI_2 solid polymer electrolytes studied have high ionic conductivity with negligible electronic conductivity.

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