

Structural, Morphological and FTIR of PVDF-HFP and Lithium Tetrafluoroborate Salt as Polymer Electrolyte membrane in Lithium ion Batteries

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Abstract: Thin film solid polymer electrolyte membrane used in Lithium ion batteries consisting of Poly (vinylidene fluoride-co-hexafluoropropylene) (PVDF-HFP) with various concentrations of lithium tetrafluoroborate (LiBF_4) salt have been prepared by solution casting technique. The structural and Morphological properties of the polymer films are studied by XRD and SEM. The result analysis of XRD reveals the amorphous nature of PVDF-HFP – LiBF_4 polymer-salt composite matrix. SEM studies reveals good blending of polymer - salt composite matrix and enhancing morphology. The complexation of the polymer and salt matrix was confirmed by FTIR analysis. Enhancement in ionic conductivity was explained on the basis of amorphous phase of PVDF-HFP complexed with LiBF_4 salt. The highest ionic conductivity was $1.965 \times 10^{-3} \text{ S cm}^{-1}$ for 60 wt% PVDF – HFP polymer: 40 wt of LiBF_4 salt at 363 K. The temperature dependence ionic conductivity of the polymer electrolyte obeys the Vogel – Tamman - Fulcher (VTF) relationship.

Keywords: Solution casting technique, PVDF-HFP, LiBF_4 , Morphology, XRD, SEM, VTF relationship and FTIR.