

Carbon Nanofibers Reinforced P(VdF-HFP) Based Gel Polymer Electrolyte for Lithium-Ion Battery Application

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Abstract : The effect of carbon nanofibers (CNFs) on the electrical properties of Poly(vinylidene fluoride-hexafluoropropylene) (P(VdF-HFP)) based gel polymer electrolytes has been investigated in the present work. The length and diameter ranges of CNFs used in the present work are 5-50 μm and 200-600 nm, respectively. The nanocomposite gel polymer electrolytes have been synthesized by solution casting technique with varying CNFs content in terms of weight percentage. Electrochemical impedance analysis demonstrates that the reinforcement of carbon nanofibers significantly enhances the ionic conductivity of the polymer electrolyte. The decrease of crystallinity of P(VdF-HFP) due the addition of CNFs has been confirmed by X-ray diffraction (XRD). The interaction of CNFs with various constituents of nanocomposite gel polymer electrolytes has been assessed by Fourier Transform Infrared (FTIR) spectroscopy. Moreover, CNFs added gel polymer electrolytes offer superior thermal stability as compared to that of CNFs free electrolytes as confirmed by Thermogravimetric analysis (TGA).

Keywords : polymer electrolytes, CNFs, ionic conductivity, TGA

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