EFFECT OF ZINC OXIDE (ZnO) NANOFILLER ON THE IONIC CONDUCTIVITY OF CARBOXYMETHYL CELLULOSE – LiTFSI SOLID POLYMER ELECTROLYTE

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ABSTRACT

EFFECT OF ZINC OXIDE (ZnO) NANOFILLER ON THE IONIC CONDUCTIVITY OF CARBOXYMETHYL CELLULOSE – LiTFSI SOLID POLYMER ELECTROLYTE

Semi-crystalline properties of SPE impedes the ionic mobility and hence reduces its ionic conductivity. Addition of filler is an established method to improve ionic conductivity of SPE. In this study, composite polymer electrolyte comprising of CMC as polymer host, LiTFSI as charge carrier and ZnO as filler were prepared using solution casting method and characterized using EIS, FTIR, XRD and tensile strength measurement. The effect of concentration of ZnO in the composition was observed. This combination; CMC-LiTFSI-ZnO had never been found in literature. In the present work, the highest ionic conductivity of CMC-LiTFSI-ZnO was achieved at 1.94209 x 10^{-6} S/cm with 4wt.% ZnO. The FTIR spectra showed the occurence of complexation between the CMC, LiTFSI salt and ZnO nanofiller. XRD analysis indicated that amourphous nature is higher in CMC-LiTFSI-ZnO. The presence of 2wt.% ZnO content within CMC-LiTFSI increases the tensile strength from 798.164 MPa to 1013.427 MPa and optimum value of 4wt.% ZnO is 13.924% for elongation at break. It can be concluded that ZnO are the promising nanofiller to enhance ionic conductivity and mechanical properties of CMC-LiTFSI SPE system.