

Ionic transport properties of protonic conducting solidm biopolymer electrolytes based on enhanced carboxymethyl cellulose - NH₄Br with glycerol

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ABSTRACT

The present work investigates the ionic conductivity as well as its transport properties of carboxymethyl cellulose–NH₄Br plasticized with various weight percentage of glycerol for solid biopolymer electrolytes (SBEs) prepared by solution-casting technique. It was shown from the FTIR analysis that the complexation transpires at C=O and C–O–from COO[–] of CMC upon the addition of glycerol into the SBEs system. The highest room temperature ionic conductivity of $\sim 10^{-3}$ S cm⁻¹ was achieved at 6 wt.% of glycerol owing to the broadening in the amorphous state as demonstrated in the XRD analysis. The conductivity-temperature plots were found to be in good agreement with the conventional Arrhenius relationship. It was further shown that the conducting element is mainly due to the protonation of H⁺ where ionic mobility and diffusion coefficient was found to contribute towards the enhancement in the ionic conductivity of SBEs system.

Keywords : Solid biopolymer electrolytes; Ionic conductivity; Deconvolution method; Transport properties