Studies on ionics conduction properties of modification CMC-PVA based polymer blend electrolytes via impedance approach

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ABSTRACT

In this study, the modification of cellulose derivative namely carboxymethyl cellulose (CMC) blended with polyvinyl alcohol (PVA) and doped with different content of NH_4Br based solid polymer electrolytes (SPEs) prepared via solution casting method is investigated. The FTIR analysis demonstrated the interaction between CMC-PVA and NH_4Br via COO^-. The optimum ionic conductivity at ambient temperature is found to be 3.21×10^{-4} S/cm for the sample containing 20 wt% NH_4Br with the lowest percentage of crystallinity and total weight loss. The conductivity-temperature relationship for the entire SPEs system obeys Arrhenius behaviour. Besides that, based on the Nyquist fitting analysis, it is shown that the ionic conductivity of the SPEs is primarily influenced by the ionic mobility as well as the ions diffusion coefficient. The H^+ transference number obtained using non-blocking reversible electrode is 0.31, which further indicates that the conduction species is predominantly due to the cationic conduction.

KEYWORDS

Blending; Polymer characterization; Ionic conduction properties; H^+ transference measurement

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