Involvement of ethylene carbonate on the enhancement H^+ carriers in structural and ionic conduction performance on alginate bio-based polymer electrolytes

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ABSTRACT

This study investigates the structural and ionic conduction performance with the involvement of ethylene carbonate (EC) in a bio-based polymer electrolytes (BBPEs) system, based on alginate doped glycolic acid (GA). The solution casting technique was used to successfully prepare the BBPEs which were characterized with various approaches to evaluate their ionic conduction performance. It was revealed that at ambient temperature, an optimum ionic conductivity of 9.06×10^{-4} S cm^{-1} was achieved after the addition of 6 wt% EC, with an observed improvement of the amorphous phase and thermal stability. The enhancement of ionic conduction properties is believed to be due to the protonation (H^+) enhancement, as proven by FTIR and TNM studies. The findings show that the developed alginate-GA-EC is a promising candidate for use as electrolytes in electrochemical devices that are based on H^+ carriers.

KEYWORDS

Biopolymer materials; Protonation (H^+); Transference number; Ionic conduction performance

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