Ionic Conductivity Study of Ethylene Carbonate as A Plasticizer in Alginate Bio-Based Polymer Electrolytes

Ahmad Faizrin Fuzlin[1] , Yuki Nagao[2] , Ahmad Salihin Samsudin[1]
1 Faculty of Industrial Sciences and Technology, Universiti Malaysia Pahang, Pahang, 26300 Malaysia
2 School of Materials Science, Japan Advanced Institute of Science and Technology, 1-1 Asahidai, Nomi, Ishikawa, 923-1292 Japan

ABSTRACT
In this present work, the study of ionic conductivity based on bio-based Polymer electrolytes (BBPEs) containing with alginate doped glycolic acid (GA) and plasticized with ethylene carbonate (EC) is presented. The ionic conductivity of present work is determined through impedance spectroscopy over a frequency range from 50 Hz to 1 MHz. The addition of EC has improved the Cole-Cole plot for entire samples where it revealed the combination of CPE and bulk resistant in series for their electrical equivalent circuit. It is shown that the ionic conductivity increased from 10^{-5} to 10^{-4} S cm^{-1} upon addition of plasticizer into BBPEs system with the optimum conductivity is obtained at 9.06×10^{-4} S cm^{-1} for sample containing 6 wt.% of EC. The findings show that the present system has great potential to be used in application of polymer electrolytes system.

KEYWORDS
Alginate; Biopolymer electrolytes; Ionic conductivity; Plasticizer

ACKNOWLEDGEMENT