PHYSICAL AND ELECTRICAL PROPERTIES OF MG30 BASED SOLID POLYMER ELECTROLYTES

MUHAMMAD ASYRAF AL-WAFIY BIN LAUTHFI

BACHELOR OF SCIENCE (Hons.) PHYSICS
FACULTY OF APPLIED SCIENCES
UNIVERSITI TEKNOLOGI MARA

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ABSTRACT

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The focus of this research is on the electrical and physical properties of a new polymer electrolyte based on MG30 with ammonium nitrate NH_4NO_3. This study used ammonium nitrate as the doping salt and poly (methyl methacrylate) grafted natural rubber (MG30) as the host polymer. To create solid polymer electrolyte, grafted natural rubber (MG30) and a thin film of ammonium nitrate salt were created using a solution casting approach. The organic components and electrical conductivity of all samples was measured using Fourier Transform Infrared Spectroscopy (FTIR) and electrochemical impedance spectroscopy (EIS) respectively. A temperature of 25 °C was used for the impedance measurement. Using the bulk resistance value computed from the intercept of the complex impedance plot, the electrical conductivity of the samples was determined. The optimum conductivity of the MG30+NH_4NO_3 thin film is 6.3641 x10^{-6} Scm^{-1} which is sample A7 with 35 wt% NH_4NO_3. A higher level of electrical conductivity is a result of the salt concentration increasing. The samples were able to reach the maximum electrical conductivity of x10^{-6} Scm^{-1}. In conclusion, NH_4NO_3 has a maximum electrical conductivity of about 6.3641x10^{-6} Scm^{-1}. It proves that when MG30 is salted, the conductivity value is higher than pure MG30. The electrical conductivity was improved by the doping salt addition of NH_4NO_3. The conductivity of the MG30-salt system is temperature dependent and follows thermally assisted VTF behaviour.

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