CONDUCTIVITY STUDIES OF CELLULOSE ACETATE BASED COMPOSITE POLYMER ELECTROLYTES

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ABSTRACT

In this study, Cellulose Acetate (CA) based polymer electrolytes containing different concentrations of ammonium trifluoromethanesulfonate ($NH_4CF_3SO_3$) were prepared by the solution casting technique. An impedance investigation was conducted to determine the electrical conductivity of each sample. The conductivity was calculated using bulk resistance value in the frequency range between 100 Hz and 1MHz at various temperatures ranging from 303 K to 383 K. The highest conductivity at room temperature for the sample containing 1g CA doped with 35% $NH_4CF_3SO_3$ was 1.29×10^{-4} Scm^{-1} .Upon addition of 3% Silicon Dioxide (SiO_2) exhibited the highest electrical conductivity of 2.51×10^{-3} Scm^{-1}.

CHAPTER 1

INTRODUCTION

1.1 Background

Polymer can be defined as a class of material that is made up of large number of molecules, which is formed from the repetition of small and simple chemical call monomer linked together by covalent bond to form long chain. Polymers are used for preparation of polymer electrolytes which have widely researched during the last 20 years. This is due to some possible application of polymer electrolyte in electrochromic devices such as fuel cells and rechargeable batteries. According to Wright (P.V Wright el al, 1973), they become ionically conducting when inorganic salts are dissolved in them. The polymer acts as a host, while the inorganic salt dissociate in them to provide the ions necessary for conduction.

In the polymer electrolytes system, function of polymer is an immobile solvent for the ionic salt. The good characteristics of polymer electrolytes are ionic conductor and electronic insulators. In addition, polymer electrolytes have many advantages which are ease preparation, flexibility, no-leakage of electrolyte, higher energy density, flexible geometry, improved safety hazards and enhance high ionic conductivity when adding plasticizer or filler. Among the conducting polymers, cellulose acetate will be used as the polymer host,