AN ELECTROCHEMICAL INVESTIGATION ON SALTED PLASTICIZED ENR 50 BASED POLYMER ELECTROLYTES

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ABSTRACT

An Electrochemical Investigation on Salted Plasticized ENR 50 Based Polymer Electrolytes

In this study, ENR-50 based polymer electrolytes containing different concentrations of lithium triflate ($LiCF_3SO_3$) 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 1 MHz at various temperatures ranging from 303 K to 383 K. The highest conductivity at room temperature for the sample containing 1 g ENR doped with 35 wt % $LiCF_3SO_3$ was 1.98×10^{-5} Scm^{-1} and its activation energy was 0.099 eV. Upon addition of 20 wt. % EC as a plasticizer, the plasticized salted sample exhibited the highest electrical conductivity of 2.41×10^{-4} Scm^{-1}. The highest conducting of the plasticized sample would then be used as a gelled electrolyte for fabrication of lithium – air cell. The capacity of the fabricated lithium – air primary cell was 1098 mAh/g.

CHAPTER 1

INTRODUCTION

1.1 Background

A polymer salt that exhibit good electrical conductivity is useful for the development of the electrochemical devices. Polymers are being used increasingly as solid media for substituting the liquid component of electrochemical devices such as sensors, super capacitors and rechargeable batteries. Most recent research and development activities have been focused on the improvement of the ambient temperature conductivity of polymer electrolyte systems.

The improvements of the ionic conductivity of the polymer electrolyte have been achieved by the addition of large quantities of liquid plasticizers to a polymer host structure, leading to the formation of gel polymer electrolyte systems (Fauteux et al., 1995). These systems have shown improved ionic conductivities over previous conventional solid polymer electrolyte systems (Glasse et al., 2002). The gel is a particular state of matter, neither liquid nor solid, or conversely both liquid and solid. The selection of polymer electrolytes is due to:

i. High ionic conductivity.
ii. High electrochemical stability.