PRELIMINARY INVESTIGATIONS IN THE SYNTHESIS OF EPOXIDIZED NATURAL RUBBER BASED CONDUCTING POLYMER

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ABSTRACT

PRELIMINARY INVESTIGATIONS IN THE SYNTHESIS OF EPOXIDIZED NATURAL RUBBER BASED CONDUCTING POLYMER

The electrical conductivity and glass transition temperature of epoxidized natural rubber / poly(ethylene oxide) (ENR/PEO) blends and ENR/PEO blends doped with lithium perchlorate ($LiClO_4$) have been investigated by using solution casting method. Conductivities (σ) of the solid polymer electrolyte films were measured by impedance spectrometer and glass transition temperatures (T_gs) were measured by differential scanning calorimetry. ENR/PEO 40/60 shows the highest ionic conductivities at (4.02 ± 0.02) x 10^{-8} S/cm. Afterwards, ENR/PEO 40/60 was doped with various wt % of $LiClO_4$. 12 wt % of $LiClO_4$ relative to the dry weight of polymer film shows the highest conductivity for ENR/PEO 40/60 blends at (1600 ± 100) x 10^{-8} S/cm. The T_g for pure PEO is found at -54 °C, and the T_g for pure ENR is found at -19 °C. The addition of $LiClO_4$ salts in ENR/PEO blends causes the increases of T_g for PEO and ENR.

CHAPTER 1

INTRODUCTION

1.1 Background

A polymer is a material with long repeating chain of atoms, formed through the linkage of many identical or different molecules called monomers. Polymer blend is a mixture of two or more polymers together.

Polymer blends have played an important role in the development of new materials with designed properties during the past decade. The properties of polymer blends depend on the mixing degree of constituent polymers, and it is essential to investigate the miscibility and phase behavior of blend systems (Olabisi et al., 1979). Polymer blending is a popular industrial practice to obtain polymer with desired properties. The development and usage of polymer blends rely on the achievable synergistic property (Paul et al., 1996).

It is convenient to prepare polymer blend by combining crystalline polymers which have excellent chemical resistance and good mechanical properties with amorphous polymer which contain good dimensional ability and impact strength. Properties of these polymer blends can be tailored to specific applications (Silvestre et al., 1996).