

**INVESTIGATIONS ON THE MORPHOLOGY AND
CONDUCTIVITY OF PEO/ENR-25/LiClO₄ BLEND IN
RELATION TO ATR-FTIR STUDY ON THE BLENDS**

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ABSTRACT

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Blends of PEO/ENR/LiClO₄ were prepared by solution casting technique. Conductivity (σ) of poly(ethylene oxide) (PEO), a semicrystalline polymer and an amorphous epoxidized natural rubber with 25 mol% epoxidation level (ENR-25) doped with $Y = 0.00$ to $Y = 0.20$ (lithium perchlorate) LiClO₄ were studied by Impedance spectroscopy. The conductivity results show that the Li salt dissociates more in PEO than in ENR-25. The morphology of the blends were studied using polarized optical microscope (POM). Incorporation of LiClO₄ to neat PEO and the PEO/ENR blends suppress the crystallinity of PEO leading to the observation of widening area of amorphous region in the once volume filled morphology of PEO. The Fourier transform infrared (FTIR) studies were carried out using Nicolet FTIR and data from the FTIR spectra show a reduction in the crystallinity of PEO as observed in the changes in the characteristic peaks assigned to the crystalline region of PEO. No dipole-dipole interaction between PEO and ENR-25 were observed from the FTIR spectra of the various composition of the blend.

CHAPTER 1

INTRODUCTION

1.1 Background

Since World War Two, polymer had been introduced into the market and had brought a massive change towards the lifestyle and the standard of living globally. Polymer is a large molecule (macromolecule) composed of a large number of repeating structural units referred to as monomers, typically connected by covalent bonds.

Polymer can be divided into three different classes namely thermoset, thermoplastic, and elastomer. Polymer that consists of crosslinks and cannot be softened by heat is a thermoset. The individual chain is joined to each other by covalently bonded crosslinks, for instance, vulcanized rubber. On the other hand, a linear polymer with long, continuous and covalently bonded atoms is a thermoplastic. Poly(ethylene oxide) (PEO) is an example of thermoplastic. Elastomer is an amorphous polymer with the property of elasticity. Elastomer is soft and is able to retain its original shape after deformation. Examples of elastomer are epoxidized natural rubber (ENR), polybutadiene (PBD) and polyisoprene (Billmeyer, 1984).