CURRENT RESEARCH AND DEVELOPMENT IN BIOTECHNOLOGY ENGINEERING AT IIUM

VOLUME IV

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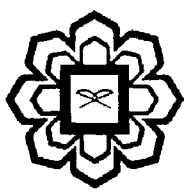

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CONTENTS

CHAPTER 38

EFFECT OF CARBON NANOTUBES LOADING ON THE MECHANICAL PROPERTIES OF ETHYLENE VINYL ACETATE/EPOXIDIZED NATURAL RUBBER NANOCOMPOSITES

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ABSTRACT

In this research, investigation on the effect of CNTs as nanofillers in Ethylene Vinyl Acetate/Epoxidized Natural Rubber has been carried out. CNTs at various amount (2, 3, 4 and 6 wt%) were incorporated into ENR, which were then blended with EVA by mixing in a Brabender Plasticoder at 120°C. The changes in mechanical properties including tensile strength (Ts), modulus at 100% elongation (M100), elongation at break (Eb) and hardness were studied as a function of CNTs content. Results show that Ts, M100, Eb and hardness of the new nanocomposites increased with the addition of CNTs until the optimum weight of 4% but declined thereafter. This was attributed to the well-dispersed of CNTs nanofillers in the rubber particles.

Keywords: (CNT), epoxidised natural rubber, EVA, nanofiller, nanocomposite

INTRODUCTION

Nanostructured carbon materials especially carbon nanotubes (CNTs) have been gaining considerable commercial importance since the discovery of buckminsterfullerene. CNTs are molecular-scale tubes of graphitic carbon with outstanding properties. They are among the stiffest and strongest fibers known. Since carbon-carbon covalent bonds are one of the strongest in nature, a structure based on a perfect arrangement of this bonds oriented along the axis of nanotubes would produce and exceedingly strong material. The one-dimensional structure of CNTs, their low density, their high aspect ratio and extraordinary mechanical properties make them being seen as an ultimate carbon fiber ever made and particularly ideal candidates for structural applications. For these reasons, preparations of CNT/polymer has been important subject of investigation especially with respect to reinforcement by CNTs.

Recent studies have shown that when CNTs were incorporated into Standard Malaysian Rubber Latex (SMR L), it resulted in the enhancement of their mechanical properties (Atieh et al., 2010). In the case of natural rubber (NR), Bokobza (2007) have made detailed investigation of the reinforcing effect by CNTs. Bhattacharyya et al. (2009) observed a significant increase in the mechanical properties of rubber latex film at low concentration of CNTs. They proposed that the level of reinforcement in their case was due to the formation of a CNT rigid network probably by rubber or protein molecules adsorbed on the surface of