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**Advances in
Nanotechnology and
its Applications**

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ADVANCES IN NANOTECHNOLOGY & ITS APPLICATION

EDITORS

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CHAPTER 4

Tensile and Impact Properties Enhancement of Crosslinked High Density Polyethylene and Ethylene Propylene Diene Monomer Nanocomposites via Electron Beam Irradiation

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Introduction

Growing interest towards nanocomposite materials has led to extensive research in this area. Nanocomposites promise either comparable or even better advantages than traditional or microcomposites in terms of strength, stiffness, thermal and gas barrier properties. Because of less amount required for the development of nanocomposites, a good combination of desired properties and processability at moderate cost can be achieved. Most traditional or microcomposites are primarily consist of fillers either fibrillar type such as glass, carbon or kevlar fibres or particulate type such as talc, mica, calcium carbonates and glass beads in which the size of these fillers are greater than or equal to one micrometer. In contrast, nano fillers are within the size of one to hundred nanometers (1-100 nm).

However, research on microcomposite have reached the limit of optimization in property enhancement because the achieved properties usually involved a lot of trade off (Pulickel et al., 2005). For instance, stiffness is traded for toughness, or toughness is obtained at cost of optical clarity and sometimes, flexural strength is traded off for tensile property (Olalekan et al., 2010). On the other hand, the matrix can be either the polymer alone or the combination of two or more polymers which also known as polymer blending. In the current