

# Preface

Elastomers are a very important class of polymer materials and the generation of their nanocomposites by the incorporation of nano-fillers has led to the enhancement of their properties significantly and hence expansion of their application potential. The book aims to specifically review the recent progresses in the synthesis, processing as well as applications of the elastomeric nanocomposites. The contents of the book are classified into three broad categories: first one dealing with introduction and preparation of the elastomeric nanocomposites, the second one focusing on the characterization and properties of the formed composites, whereas the third one describing the application potential of these materials.

[Chapter 1](#) describes the role of different nanoparticles in reinforcing elastomers. Homogenous dispersion of the filler and subsequent microstructure development in the composites have been focused upon. [Chapter 2](#) explains the important synthesis methodology of in situ preparation of elastomeric nanocomposites. Other synthesis methodologies have also been described in brief. [Chapter 3](#) focuses on the relaxation phenomena in elastomeric nanocomposites. The results are presented for both non-polar and polar polymer matrices. Modeling and simulation of nanocomposite processing have been described in [Chap. 4](#) using molecular dynamics and Monte Carlo methodologies. [Chapter 5](#) shows the deformation induced structural changes in elastomeric nanocomposites. Polymer matrices reinforced with various fillers like clay, nanofibers, nanotubes, carbon black, etc. have been considered. Thermally stable and flame retardant elastomeric nanocomposites are the focus of [Chap. 6](#) whereas recycling of the elastomeric nanocomposites has been demonstrated in [Chap. 7](#). In the applications section, [Chap. 8](#) describes the considerations for the use of elastomeric nanocomposites in tyre applications. Subsequently, synthesis of nanocomposites suitable for use in tyre applications has been reported. [Chapter 9](#) shows the use of elastomeric nanocomposites made from polyurethane and epoxy matrices for potential use in packaging applications. Elastomeric nanocomposites suitable for biomedical applications have been described in [Chap. 11](#). Considerations of elastomeric nanocomposite systems for use in aerospace applications have been focused in [Chap. 12](#). [Chapter 13](#) describes the friction and wear of polymer nanocomposites

containing clay and nanotubes as fillers thus providing the potential of their use in such applications.

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