Preface

The field of material science has become quite popular and pragmatic with a tremendous lust for composite materials that exhibit the positive characteristics of both the components. Of late world-wide attempts were made to tailor the structure and composition of materials of nanometer scale. Composites that exhibit a change in composition and structure over a nanometer scale have shown remarkable property enhancements relative to conventional composites. Nanocomposites are a combination of two or more phases containing different compositions or structures where at least one of the phases is in the range of 10 to100 nm. Fillers with a particle size in the nanometer range have small number of atoms per particle and for this reason they have different properties than the bulk material and strong interactions with the matrix. The separation of filler particles is of the order of molecular dimensions, which may modify the properties of polymers. Nanostructured composites based on clay and polymers from methyl methacrylate, styrene, acrylonitrile and pyrrole have been receiving much research attention in view of many improved bulk properties of these composites compared to those of the base polymer.

In this work for the preparation of natural rubber nanocomposites two nanoclays were used: one synthetic (fluorohectorite) and the other natural (bentonite) in origin. English Indian clay, also called china clay, which is amorphous in nature was used as the reference material. These materials are mixed with prevulcanized natural rubber latex and also blended with chloroprene latex. In these studies more emphasis is given to layered silicates with sulphur prevulcanized latex.

The present study is divided into 10 chapters and is described under different headings as follows. First chapter gives a general introduction to nanocomposites. Second chapter deals with the experimental techniques used throughout the study. In the third chapter, the preparation of prevulcanized latex nanocomposites and their characterization using TEM and XRD are given. The mechanical properties are also discussed in this chapter. The preparation of radiation vulcanized latex nanocomposites and their characterization using TEM, XRD are given in the chapter 4. The mechanical and dynamic mechanical properties are also discussed. Fifth chapter is devoted to the rheological properties of sulphur prevulcanized latex compounds. The dipping characteristics of layered silicates nanocomposites using an automatic dipping machine is given in chapter 6. Dipping characteristics such as immersion and withdrawal speeds of the former, immersion time, concentration of the coagulant etc of the layered latex nanocompounds are demonstrated. The effect of layered silicates on the ageing of latex films with degrading agents such as UV, γ- radiations, autoclave ageing, higher temperature, ozone, chlorine, solvents etc are discussed here in chapter 7. Mechanical and morphological properties of natural rubber/chloroprene latex blends nanocomposites are given in chapter 8. In this chapter the effect of layered silicate on chloroprene latex and its blends with natural rubber latex in different proportions is given. The morphological studies were done using FTIR, XRD, TEM and SEM analysis. Finally a suitable latex compound with nanoclays has been developed for the production of Foley catheters and their technological properties are evaluated (chapter 9). The overall conclusion of the research work and future scope are discussed in chapter 10.