

## Natural Rubber Latex-Based Particle Composites

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### Abstract

Research and development on natural rubber (NR) latex, which would lead to its use in biomedical and/or industrial fields, will be presented. Start from the knowledge on the structure, composition and morphology of NR latex particles, core-shell of NR-polychloroprene (CR) latex particles were fabricated via the heterocoagulation technique for improving the oil resistant property of NR latex film. A non-ionic surfactant whose molecules bear poly(ethylene oxide) was adsorbed on CR particles and allowed to form complex with indigenous surfactant (protein-lipid) on the NR particle surface. Replacing the CR with skim latex, the naturally abundant and low cost product, was also examined. The prevulcanized or cross-linked skim was used as agglomerating latex in the encapsulation of disinfectant agent for the preparation of NR medical gloves. The sulphur prevulcanized (SP) NR gloves possessing antimicrobial activity were then examined by depositing poly(methyl methacrylate) latex or silver nanoparticles stabilized by chitosan or *N,N,N*-trimethylated chitosan. Recently, hollow latex (HL) particles using NR as seeds have been synthesized in one-pot. Without core removal and solvent evaporation steps, the non-collapsed HL particles with double shell of polymer layers and a large void cavity were generated during polymerization of divinyl benzene/methyl methacrylate/acrylic acid monomers on the seed surface. The hollow structure could simply be tuned by selecting an appropriate initiation system and adjusting the monomers/seed (M/S) ratio. The HL-NR particles were successfully fabricated using *tert*-butyl hydroperoxide/tetraethylene pentamine redox initiation system with limited M/S weight ratio of 4/1. This process was further adapted for the synthesis of non-spherical HL particles, which would be potentially employed as a new type of photonic material.

**Keywords:** natural rubber latex particle; composite nanoparticle; hollow latex particle; heterocoagulation