Synthesis and Characterization of Natural Rubber/ Silica/Graphene-Based-Materials Nanocomposites (Latex Based)

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Silica is used as a filler for reinforcement of Natural Rubber Latex (NRL) for non-black products. But silica is an inorganic compound and NRL is organic. Furthermore, silica has high filler to filler interactions so that silica doesn't disperse well in the NRL and agglomerations occur. Therefore, nowadays coupling agents like "silane" are used for dispersing silica uniformly in NRL without agglomeration. In this research Graphene Oxide (GO) is used as a graphene-based material to improve filler rubber interactions and to disperse silica in the NRL.

GO was synthesized using improved Hummer's method as a pre-development method. There graphite was used as the main raw material. Then several samples of GO modified micro-silica (GOMS) and nano-silica were synthesized by sonication method. Compounded NRL films were then prepared according to a formula by varying the filler amount and vulcanized in an oven. GO, GOMS are characterized by Fourier Transform Infra-Red (FTIR) and X-ray Diffraction (XRD). Further GO, GOMS and GOMS added NRL vulcanized films were characterized by Scanning Electron Microscope (SEM). Mechanical properties of GOMS fillers added NRL vulcanized films were also tested. Some improvement in mechanical properties were observed in GOMS added NRL vulcanized films.

Keywords: Natural rubber latex, Graphene oxide, Nano-silica