

Multi-Wall Carbon Nanotubes/Styrene Butadiene Rubber (SBR) Nanocomposite

ABSTRACT

A floating catalyst chemical vapor deposition (FC-CVD) method was designed and fabricated to produce high-quality and -quantity carbon nanotubes. The design parameters like the hydrogen flow rate; reaction time and reaction temperature were optimized to produce high yield and purity of Multi-Wall Carbon Nanotubes (MWCNTs). Multi-Walled Carbon Nanotubes (MWNTs) were used to prepare natural rubber (NR) nanocomposites. Our first efforts to achieve nanostructures in MWNTs/styrene butadiene rubber (SBR) nanocomposites were formed by incorporating carbon nanotubes in a polymer solution and subsequently evaporating the solvent. Using this technique, nanotubes can be dispersed homogeneously in the NR matrix in an attempt to increase the mechanical properties of these nanocomposites. The properties of the nanocomposites such as tensile strength, tensile modulus, elongation at break and hardness were studied. Using different percentages of carbon nanotubes from 1 wt% to 10 wt%, several nanocomposites samples were fabricated. Significant improvements in the mechanical properties of the resulting nanocomposites showed almost 10% increase in the Young's modulus for 1 wt% of CNTs and up to around 200% increase for 10 wt% of CNTs.

Keyword: Multi-wall carbon nanotubes, styrene butadiene rubber, nanocomposites, Young's modulus