Effect of multi-wall carbon nanotubes on the mechanical properties of natural rubber

ABSTRACT

Multi-walled carbon nanotubes (MWNTs) were used to prepare natural rubber (NR) nanocomposites. Our first effort to achieve nanostructures in MWNTs/NR nanocomposites were formed by incorporating carbonnanotubes in a polymer solution and subsequently evaporating the solvent. Using this technique, nanotubess 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, tear strength, elongation at break and hardness were studied. Mechanical test results show an increase in the initial modulus for up to 12 times in relation to pure NR. In addition to mechanical testing, the dispersion state of the MWNTs into NR was studied by transmission electron microscopy (TEM) in order to understand the morphology of the resulting system. According to the present study, application of the physical and mechanical properties of carbon nanotubes to NR can result in rubber products which have improved mechanical, physical and chemical properties, compared with existing rubber products reinforced with carbon black or silicone.