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EFFECT OF FUNCTIONALIZED MWCNT ON THE ELECTRICAL AND RHEOLOGICAL PROPERTIES OF POLYCARBONATE NANOCOMPOSITES

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Multiwall carbon nanotubes (MWCNTs)tend to form agglomerates duringprocessing of composites because of van der Waals attractionbetween nanotubes. This nanotube agglomeratereduces the surface area and interrupts formation of the networkstructure which is essential to improve electrical andmechanical properties and to induce efficient transfer oftheir superior properties through polymer matrix. Uniformdispersion and improved interfacial characteristics of the MWCNTare required to realizethe potential of MWCNTs as reinforcing filler. Functionalization of the MWCNT surfacecan reduce tendency to form agglomeration and increase interfacial interaction between MWCNTs andthe polymer matrix. Theimproved interactions between MWCNTs and the polymermatrix govern the load-transfer from the polymer to thenanotubes and hence increase the reinforcement efficiency.

In thiswork various chain length of poly(styrene-co-acrylonitrile)(SAN) was synthesized onto the surface of MWCNT via atomic transfer radical polymerization (ATRP). The role of the SAN-grafted-multiwalled carbon nanotubes (MWCNTs) on the rheological and electrical percolation behavior of the PC composites has been investigated. Fourier transform infrared spectroscopy (FT-IR) and thermogravimetric analysis (TGA) were used to characterize SAN-g-MWCNT. PC/MWCNT nanocomposites were prepared by melt blending and various properties, such as mechanical, rheological, dynamic mechanical and electrical properties, are analyzed. Morphology change is also investigated using SEM and TEM.

Addition of SAN-g-MWCNT results in uniform dispersion of MWCNT in PC nanocomposite and improved mechanical properties. Lower percolation threshold and electrical resistance are also observed by the addition of SAN-g-MWCNT, especially with increasing amount of grafted SAN.