Effect of carbon-based nanofillers on rheological and electrical properties of polymer nanocomposites *via* latex technology

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Three types of carbon-based nanofillers, namely, carbon nanotues (CNTs), graphene oxide (GO) sheets and graphite nanoplatelets (GNPs), were introduced to compare the effect of nanofiller types and their dispersion on the rheological and electrical properties of polymer nanocomposites. CNTs and GNPs were used commercial grade whitout chemical modification. GO sheets were synthesized by using the modified Hummers' method from a commercial graphite. Polymer nanocomposites were prepared of monodisperse PS particle and nanofiller. The PS/CNT showed enhanced rheological and electrical properties after physical dispersion whith surfactant. The PS/GO also showed enhanced electrical properties in spite of the decrease of electrical conductivity of GO layer caused by acid treatment. On the other hand, the PS/GNP did not show such substantial enhancement because GNP is an aggregate of graphene layers bonded by van der Waals force. Electrically conductive pathways in PS/CNT and PS/GO nanocomposites prepared via latex technology were achieved at the electrical percolation thresholds of 0.23 and 0.50 wt%, respectively.