

High performance epoxy nanocomposites with amine-functionalized graphenes

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Graphene, consisting of a single layer of carbon in a two-dimensional lattice, has been emerging as a fascinating material with many unique physical, chemical and mechanical properties. In this study, graphenes were prepared by a chemical method. To develop high performance polymer nanocomposites reinforced by graphenes, adequate dispersion of the fillers and strong interfacial bonding between the fillers and the polymer matrix are essential. The purpose of this study was to examine the influence of introducing amine groups on the surfaces of graphenes. FT-IR spectroscopy, TGA and SEM were used to confirm the functionalization. Epoxy nanocomposites comprising the graphenes were prepared and their characteristics were investigated by DSC, DMA and TMA. Fracture surfaces of the nanocomposites were investigated by SEM. The functionalized graphenes induced strong interfacial bonding than the pristine graphenes and resulted in considerable improvements in the performance of the nanocomposites.