

The Effect of Interfacial Chemistry on Mechanical Properties of Epoxy Composites Containing Poly (Ether Ether Ketone) Grafted Multiwall Carbon Nanotubes

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Abstract : In this work, carboxyl functionalized multiwall carbon nanotubes (a-MWNTs) covalently grafted with hydroxylated functionalized poly (ether ether ketone), HPEEK, which is miscible with the pre-polymer (epoxy) through the esterification reaction. The functionalized MWNTs were systematically characterized using spectroscopic techniques. The epoxy composites containing a-MWNTs and HPEEK grafted multiwall carbon nanotubes (HPEEK-g-MWNTs) were formulated using mechanical stirring coupled with a bath sonicator to improve the dispersion property of the nanoparticles and were subsequently cured at 80°C and post cured at 180°C. With the addition of 0.5 wt% of HPEEK-g-MWNTs, an impressive 44% enhancement in the storage modulus, 22% increase in tensile strength and 38% increase in fracture toughness was observed with respect to neat epoxy. In addition to these mechanical properties, the epoxy composites displayed significant enhancement in the hardness without reducing thermal stability. These improved properties were attributed to the tailored interface between HPEEK-MWNTs and epoxy matrix.

Keywords : epoxy, MWNTs, HPEEK-g-MWNTs, tensile properties, nanoindentation, fracture toughness

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