

Thermo-Mechanical Characterization of MWCNTs-Modified Epoxy Resin

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Abstract : An industrial epoxy adhesive used in Carbon Fiber Reinforced Polymer (CFRP)-strengthening systems was modified by dispersing multi-walled carbon nanotubes (MWCNTs). Nanocomposites were fabricated using solvent-assisted dispersion method and ultrasonic mixing. Thermogravimetric analysis (TGA), dynamic mechanical analysis (DMA) and tensile tests were conducted to study the effect of nanotubes dispersion on the thermal and mechanical properties of the epoxy composite. Experimental results showed a substantial enhancement in the decomposition temperature and tensile properties of epoxy composite, while, the glass transition temperature (T_g) was slightly reduced due to the solvent effect. The morphology of the epoxy nanocomposites was investigated by SEM. It was proved that using solvent improves the nanotubes dispersion. However, at contents higher than 2 wt. %, nanotubes started to re-bundle in the epoxy matrix which negatively affected the final properties of epoxy composite.

Keywords : carbon fiber reinforced polymer, epoxy, multi-walled carbon nanotube, DMA, glass transition temperature

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