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Chemically bonded aramid-MWCNTs nano-composites: Morphology and thermal-mechanical properties**Z Ahmad, F Al-Sagheer and J Shiju M S**
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Aramid-multiwalled carbon nanotubes (Ar-MWCNT) nano-composites using functionalized and pristine CNTs with different loadings have been prepared. High molecular weight amine terminated aramid chains were prepared by the reaction of mixture of meta- and para-phenylene diamines with terephthaloyl chloride in the solvent dimethylacetamide. These chains were linked chemically with the acid-functionalized MWCNTs. Thin composites films with different MWCNT loadings were prepared by the solvent elution technique. The effect of interfacial interaction on the composite morphology was investigated by scanning electron microscope (SEM). Dynamic thermal mechanical analysis (DMTA) showed a higher increase in the storage modulus and the temperature involving α -relaxations on CNTs loading in comparison to the system where pristine CNTs were used. The depression in the tan delta peak indicates the polymer material in composite material participating in the glass transition was reduced on loading with the MWCNT. The maximum tensile strengths with 7.5 wt% of CNTs were 166.8 MPa. Thermal mechanical analysis showed a drop in coefficient of thermal expansion, prior to glass transition temperature and was reduced to 39.8 ppm/°C that is consistent with immobilization of polymer material present at the CNT interface. The thermal decomposition temperature of these composites was around 533°C. Strong interfacial interactions of the matrix with the functionalized CNTs in the composite materials resulted in higher viscoelastic properties and a reduction in the coefficient of thermal expansion of aramid on loading the MWCNTs.

Biography

Z Ahmad is working on Polymeric Nano-Composite Materials. He is a Professor in Kuwait University. He did his PhD from Manchester University, UK in 1978 and Post-doctoral work from the Institute of Mechanical Process Engineering and Mechanics, Germany. He was a Senior Fellow in the Polymer Research Center, University of Cincinnati, USA and has worked as a Visiting Professor in the Saarland University and in the Max Planck Institute for Polymer Research, Germany.

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