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Melt-mixed composites of multi-walled carbon nanotubes and thermotropic liquid crystalline polymer: morphology, rheology and mechanical properties

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Abstract

Thermotropic liquid crystalline polymer (LCP) was melt-mixed with multi-walled carbon nanotubes (MWCNTs) in a conical micro-compounder. The state of dispersion of MWCNTs in the LCP matrix was characterized using transmission electron microscopy. FTIR spectroscopic analysis revealed the nature of interaction between the LCP phase and the MWCNTs. The rheological properties of the nanocomposites showed a significant dependence on the MWCNTs content. The 'network-like' structures could be assigned to 'nanotube-nanotube' and 'polymer-nanotube' interactions. Nanoindentation studies indicated an increase in Young's modulus and hardness of LCP/MWCNTs composites. DMTA studies showed an increase in the storage modulus in the composites as a function of nanotube content.

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