

Effect of Length and Shape of MWCNT on the Thermal Properties and Electrical Conductivity of Polycarbonate/MWCNT Composite Films

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We study the effect that mesoscopic shape of individual multi-walled carbon nanotubes (MWCNTs) has on their collective thermal and electrical properties when they are fabricated composite films blended with polycarbonate. We prepared polycarbonate/MWCNT nanocomposite films by solution blending method. The thermal and electrical properties depend both on the mesoscopic shape of the MWCNTs. The mesoscopic shape is represented by static bending persistence length (l_{sp}) and the assemblage structure is represented by network length (l_e). It is demonstrated that various thermal properties depend on $n^* = 2l_{sp}/l_e$. Films' electrical conductivities increase with increasing n^* . On the contrary films' thermal conductivities decrease with increasing n^* .