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ELECTRICAL AND ELECTROMAGNETIC INTERFERENCE SHIELDING PROPERTIES OF FLOW-INDUCED ORIENTED CARBON NANOTUBES IN POLYCARBONATE

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The focus of this work is to investigate the electrical and electromagnetic interference shielding effectiveness (EMI SE) properties of multi-walled carbon nanotubes/polycarbonate composites. The composites were prepared by diluting masterbatch (15 wt%) using a Haake mixer and then injection-molded into a dog-bone mold. Electrical resistivity measurements were carried out at three different regions with various CNT alignments at both parallel and perpendicular to the flow direction. The results displayed that higher resistivity and percolation threshold take place at higher alignments in both parallel and perpendicular to the flow direction. Applying Ohm's law disclosed that after percolation the field emission mechanisms are more important at higher orientations. Higher CNT alignments, in areas with higher resistivities, were proved using SEM, TEM, raman spectroscopy and XRD techniques. Additionally, EMI SE measurements were done on compression-molded samples at different concentrations and thicknesses. The results showed that both EMI SE by reflection and absorption increased with increase in CNT loading and also shielding material thickness at constant filler loading. Higher EMI SE at greater filler content is ascribed to higher conductivity, permittivity and magnetic permeability while increase in shielding by reflection with thickness increase at constant CNT loading demonstrates the dominant influence of reflection over multiple-reflection