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Characterization of PVC/MWCNTs Nanocomposite: Solvent Blend

Abstract:

Polyvinyl Vinyl Chloride (PVC) multiwall carbon nanotubes (MWCNTs) nanocomposite flexible films were prepared using the solvent blend technique. Chloroform (CHCl_3) and tetrahydrofuran ($(\text{CH}_2)_4\text{O}$) were used as solvents for MWCNTs and PVC, respectively. The effect of the solvents' blend on electrical, optical and thermal properties of PVC/MWCNTs were investigated. The results of the Raman spectrum showed that all the characteristic bands of PVC polymer have a slight shift due to addition of MWCNTs. Electrical results showed that the nanocomposite samples with chloroform volume ratios of 10% and 25% had nearly the same conductivity. This is attributed to the formation of the MWCNTs network, which assisted in electrical conductivity. The I-V hysteresis curve decreases as the temperature increases and as it approaches the glass transition temperature. The non-isothermal kinetics analysis

for PVC and PVC/MWCNTs were investigated by Thermogravimetry Analysis (TGA) using the model-free kinetic method. The non-isothermal measurements were carried out at five heating rates of 5 to 40°C/min. The results show that the main decomposition process has constant apparent activation energies for all samples. The use of the bisolvent method has improved the dispersion of untreated MWCNTs, and this has been reflected on the stability of both electrical and thermal properties.