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Investigation of Dispersibility of Multi-Walled Carbon Nanotubes Using Polysulfones with Various Structures

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To overcome the strong van der Waals interactions of carbon nanotubes (CNTs) that hinder them from dissolving and dispersing in solvents, organic molecules used as dispersants are attached to the CNT surface by noncovalent interactions. In this study, polysulfones were selected as the dispersants, and the relationship between polymer structure and CNT dispersibility was investigated. We prepared nine types of polysulfones to study the dispersibility of multi-walled CNTs (MWCNTs). Polysulfones having sulfide bonds exhibited the highest MWCNT dispersibility. This result is due to the existence of donor–acceptor interactions between sulfide groups and MWCNTs, along with π – π interactions between aromatic rings and MWCNTs. The MWCNT solution in *N,N*-dimethylacetamide, dispersed by polysulfones, could be used for the preparation of MWCNT-containing films. The resulting films showed higher tensile strength and modulus than those of corresponding non-MWCNT-containing films. This result clearly indicates that MWCNT-dispersed solution using polysulfones can be used to prepare CNT/polymer composites.

Key Words : Carbon nanotube, Polysulfone, Composite, Filler effect