Carbon Nanotube Reinforced Nanocomposite with Controlled CNT Dispersion

LINGYU LI, WENWEN CAI, STEPHEN KODJIE, KISHORE TENNETI, CHRISTOPHER LI, Department of Materials Science and Engineering, Drexel University, Philadelphia, PA 19104 — Carbon nanotubes (CNTs) are considered an ideal reinforcing fillers in polymer nanocomposites because of their high aspect ratio, nanosize diameter, very low density and excellent physical properties (such as extremely high mechanical strength, high electrical and thermal conductivity). However, in order to achieve homogeneous dispersion of CNTs without damaging their extraordinary properties, non-covalent functionalization is an essential step. Our study of functionalization of CNTs via controlled polymer crystallization method has resulted in the formation of “nano hybrid shish-kebab” (NHSK), which is CNT periodically decorated with polymer lamellar crystals. Preliminary results show that the periodicity varies from 20-70nm. By tuning the experimental parameters such as concentration of polymer and crystallization temperature, hybrid polymer spherulite with CNT inside was achieved. This can be considered as CNT reinforced composite with ideal CNT dispersion. Both Nylon 6, 6 and PE were used as matrix materials. Structure and properties of this novel composite were studied using varieties of characterization techniques.

Supported by NSF DMR-0239415, ACS-PRF and 3M

Lingyu Li
Department of Materials Science and Engineering, Drexel University
Philadelphia, PA 19104

Date submitted: 06 Dec 2004

Electronic form version 1.4