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Thermal Conductivity of Single-Walled Carbon Nanotube / Polyethylene Nanocomposites RETO HAGGENMUELLER, JOHN E. FISCHER, KAREN I. WINEY, Materials Science and Engineering, University of Pennsylvania, Philadelphia, Pennsylvania, JESSE J. CUGLIOTTA, JENNIFER R. LUKES, Mechanical Engineering and Applied Mechanics, University of Pennsylvania, Philadelphia, Pennsylvania — The thermal conductivity of nanocomposites with single walled carbon nanotubes (SWNTs) and polyethylene are being investigated with attention to the effect of the degree of PE crystallinity and the alignment of both the PE and SWNT. The nanocomposites were prepared via the hot-coagulation method, resulting in a good dispersion of the SWNTs in the polymer matrix. Characterization methods include the comparative and modulated thermo-reflectance method to measure thermal conductivity, x-ray scattering to quantify SWNT and PE alignment, and SEM and AFM to determine SWNT dispersion. SWNTs act as nucleation sites for the PE and this crystalline interface might enhance heat transfer between the SWNT and matrix. At 30 wt% SWNT, isotropic composites made with low density and high density PE have thermal conductivities of 1.8 and 3.5 W/m-K, respectively, clearly demonstrating the importance of degree of PE crystallinity. Alignment of both the SWNT and PE was produced by melt fiber spinning and results show that the thermal conductivity increase with orientation.

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