Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Microscopic Mechanism of Reinforcement and Conductivity in Polystyrene/Carbon Nanotube Composites T.-E. CHANG, S. RHODES, A. KISLIUK, W. J. BRITTAIN, A. P. SOKOLOV, University of Akron — Carbon nanotube (CNT) is one of the most studied materials for the polymer reinforcement due to their extraordinary mechanical properties, superior thermal and electronic properties, and high aspect ratio. However, to unlock the potential of CNTs for applications, CNTs must be well dispersed in polymer matrix and the microscopic mechanism of polymer reinforcement by CNTs must be understood. The main goal of the presented research is to analyze structure and conductivity and enhance mechanical properties of polystyrene/carbon nanotube composites. Polystyrene matrix composites reinforced with single-wall carbon nanotubes (SWNTs) were prepared with different nanotubes concentrations. Microscopic structure and conductivity of composites is analyzed using Raman scattering and dielectric measurement. Studies on the tangential mode in the Raman spectra indicated well-dispersed SWNTs in polymer matrix. We show that conductivity appears in composites already at very low concentrations, hinting at the formation of a 'percolative' network even below 0.5% of the SWNT.

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Date submitted: 30 Nov 2005 Electronic form version 1.4