Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Flow Based Control of Conductivity in Nanotube Composites
KALMAN MIGLER, SAM KHARCHENKO, JAN OBRZUT, JACK DOUGLAS, NIST — Nanotube composites are finding applications due to their ability to enhance the electrical conductivity of polymeric materials. They exhibit a percolation threshold in both rheological and electrical properties at mass fractions less than 0.01. We study the interrelationship between these two coupled transport properties by simultaneous dielectric spectroscopy and rheology. We find that the frequency dependent electrical conductivity is quite sensitive to shear flow near the percolation threshold; it can reversibly vary by six orders of magnitude and can become highly anisotropic. Interestingly, the shear dependence of the viscosity and the conductivity show distinct behaviors, indicating that different aspects of the nanotube network are probed by these two transport coefficients.

Kalman Migler
NIST

Date submitted: 06 Dec 2004 Electronic form version 1.4