Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Macroscopic Ordering of CNTs in a Liquid Crystalline Polymer Nano-Composite by Shearing P. KALAKONDA, S. SARKAR, G.S. IANNACCHIONE, WPI, E. GOMBOS, G.S. HOONJAN, G. GEORGIEV, Assumption College, P. CEBE, Tufts U. — We present a series of complimentary experiments exploring the macroscopic alignment of carbon nanotubes (CNTs) in a liquid crystalline polymer (isotactic polypropylene - iPP) nano-composites as a function of temperature, shear, and CNT concentration. The phase behavior of iPP+CNT, studied by Modulated Differential Scanning Calorimetry, revealed the evolution of the α-monoclinic transition and its dynamics, which are dependent on CNT content and thermal treatment. These results indicate that the CNT nucleates crystal formation from the melt. Spectroscopic ellipsometry reveals a change in the optical constants that are connected to the ordering of CNTs when the iPP+CNT is sheared. This anisotropy is also exhibited in measurements of the electrical and thermal conductivities parallel and perpendicular to the shear direction. The amount of order induced into the dispersed CNTs is relatively low for these low concentration samples (< 5 wt%).

Germano Iannacchione
Worcester Polytechnic Institute

Date submitted: 29 Nov 2011 Electronic form version 1.4