361d Crystallization and Orientation Studies in Swnt Based Polymer Nanocomposites

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Single walled carbon nanotubes (SWNTs) based polymer nanocomposites are attractive for their improved mechanical, electrical and thermal properties. We have obtained well-dispersed SWNTs samples in two semi-crystalline polymers: poly(ε-caprolactone) (PCL) and poly(ethylene oxide) (PEO). Crystallization studies on bulk unoriented samples demonstrate that the nanotubes act as a nucleating agent for PCL whereas it hinders nucleation of PEO crystals. The crystallization studies of the nanocomposites, previously drawn as fibers using extensional flow in the melt, are performed using synchrotron small angle x-ray scattering. Further, the alignment of nanotubes and polymer crystals in those samples are studied using Raman Spectroscopy. Interestingly in both systems, the polymer crystals exhibit preferred orientation and implicate the nanotubes in templating the polymer crystals.