Abstract Submitted
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Preparation, Structure and Properties of Carbon Nanotube Polymer Composites[1] YAYONG LIU, HOWARD WANG, KAIKUN YANG, ZHIYONG XU, NARAYAN DAS, SUNY at Binghamton, KUNLUN HONG, GYULA ERES, DAVID UHRIG, Oak Ridge National Laboratory — Carbon nanotube (CNT)-polymer composites could possess a unique combination of mechanical and transport properties. We have investigated various CNT/polymer composites using randomly oriented and vertically aligned CNTs (VACNTs) via both solution processing and in situ polymerization. VACNTs remain largely unaltered upon forming composites. Nanoindentation tests show that both the elastic modulus and hardness vary along the CNT growth direction due to the varying tube density, alignment order and entanglement. The mechanical properties show an average increase of ca. 60% over the neat polymer, whereas the electric and thermal transport properties increase by several orders of magnitude. Randomly oriented CNT-Polyimide (PI) composites have increased stiffness but decreased toughness comparing to plain PI. Morphology studies on fracture surfaces show weak interfacial adhesion between CNTs and polymer matrix, which might cause the reduced toughness.

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