Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Wrinkling instabilities in compressed networks of polymer supported single-wall carbon nanotubes[1] JOHN HARRIS, SWATHI IYER, NDSU, JI YEON HUH, JEFFREY A. FAGAN, JUN YOUNG CHUN, STEVEN D. HUDSON, JAN OBRZUT, CHRISTOPHER M. STAFFORD, NIST, ERIK K. HOBBIE, NDSU — Strain-induced structural and electronic changes in polymer supported membranes of purified single-wall carbon nanotubes (SWCNTs) are evaluated through the wrinkling instabilities that develop under both uniaxial and isotropic compression. Nanotubes that have been purified by length or electronic type using density-gradient ultracentrifugation are assembled as surfactant-free thin membranes on prestrained polydimethylsiloxane (PDMS) substrates, and the strain response is measured using a broad range of techniques. The small-strain behavior is inferred from kinetic changes in the wrinkling topography of the SWCNT membranes during the slow drying of pre-swelled polymer supports. The measurements suggest a remarkable degree of strain softening that strongly couples to the anisotropic sheet resistance of the films, which we in turn relate to the microscale anisotropy that develops through excluded volume interactions.

[1]Supported by the NSF through CMMI-0969155 and the DOE through DE-FG36-08GO88160

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Date submitted: 19 Nov 2010 Electronic form version 1.4