Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Nanohybrid shish kebab paper: Crystal growth and film properties[1] ERIC D. LAIRD, BING LI, SHAN CHENG, BIN DONG, RANJITA K. BOSE, KENNETH K.S. LAU, CHRISTOPHER Y. LI, Drexel University — Polyethylene single crystals were uniformly grown heterogeneously from carbon nanotubes (CNTs) in solution, forming the nanohybrid shish kebab (NHSK) structure. We demonstrate that highly uniform, free-standing nanohybrid buckypaper with high CNT contents (13-70%) could be produced from vacuum-filtrated polymer single crystal-decorated CNTs. In this way, polymer crystals served as unique spacers for CNTs so that uniform hybrid buckypaper films could be obtained without CNT agglomeration. Wetting techniques, thermal analysis, and scanning electron microscopy were used to elucidate the effect of polymer single crystals on the resultant structure. Surface roughness of NHSK paper could be controlled by tuning the polymer single crystal size (CNT separation distance). Superhydrophobic NHSK papers were obtained with high surface adhesion, which mimics the rose petal effect. Conductivity of the NHSK papers also varied with polymer crystal size. Great enhancement of important properties could be achieved through the formation of ternary hybrids. To that end, initiated- and oxidative chemical vapor deposition methods extend NHSK buckypaper applicability by providing functional polymer surfaces. NHSK papers may find applications in sensors, electrochemical devices and coatings.

[1]NSF-IGERT DGE-0221664, NSF DMR-0804838

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Date submitted: 15 Dec 2011 Electronic form version 1.4