Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Carbon Nanotube-templated Polymer Single Crystals Serve as Controllable Spacers to Form Novel Battery Architectures[1] ERIC D. LAIRD, CHRISTOPHER Y. LI, Drexel University — One of the many challenges in battery cathode architectures lies in creating a porous structure with tunable features on the 10-100 nm length scale. Stable features of this size are desirable for engineered surface topology as well as charge storage applications. Few materials exist that can satisfy this requirement. Fewer still have high enough electron conductivity to be of use without adding an additional conducting phase. The "nanohybrid shish kebab" (NHSK) structure may be a solution to this obstacle. This physical functionalization technique for carbon nanotubes uses polymer single crystals grown from solution to produce a controllable spacer. In our previous work, it was shown that NHSKs can be controllably tuned to have average diameters ranging from 18 to 94 nm for single-walled carbon nanotubes. Films of these materials can easily be made free-standing and are highly flexible. Recent work in extending the functionality of these materials through the formation of ternary composites for battery applications will be presented. Pulsed electrodeposition of MnO2 onto the surfaces of these films forms an electrochemically active layer for lithium cells. High specific cathodic capacity has been observed in a rechargeable battery based on these materials.

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

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Date submitted: 11 Dec 2012 Electronic form version 1.4