Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Nanotube Forests for Electrochemical Energy Storage from Electrostatic Assembly[1] LIN SHAO, WOO-SIK JANG, Yale University, JODIE LUTKENHAUS, Texas A&M University — With increasing global energy consumption, efficient energy storage sytems are urgently needed. Currently, lithium-ion batteries are prevalent in many of these applications because of their established reliability and superior performance relative to older technologies; however, Li-ion batteries can be limited by mass transfer and safety concerns. Here, we present nanostructured polymer-based electrodes that potentially address these limitations. We apply layer-by-layer (LbL) assembly and nanotemplating to realize LbL-nanotube cathode arrays containing vanadium pentoxide and polyaniline. Both polyaniline and V2O5 store charge via doping/undoping and intercalation/deintercalation, respectively. The aim is to create high surface area electrodes that minimize the diffusion resistance of reactants, which could boost power density. The (LbL) growth profile was monitored using UV-Vis spectroscopy and profilometery. Electrochemical properties were characterized using cyclic voltammetery. Scanning electron microscopy images confirm that large areas of LbL nanotubes can be made. Future work will assess how nanostructured cathodes will behave electrochemically as nanotube aspect ratio is varied.

[1]NSF-CBET 0938842

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Date submitted: 26 Nov 2010 Electronic form version 1.4