Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Effects of stoichiometry and crystalline morphology on transport in topological insulator nanowires[1] INNA KORZHOVSKA, HAIMING DENG, LUKAS ZHAO, The City College of New York, MARCIN KONCZYKOWSKI, TRAVIS WADE, Ecole Polythechnique, France, LIA KRUSIN-ELBAUM, The City College of New York — In nanostructured topological insulators with increased surface-to-volume ratio the contribution of charge transport through topological surfaces relative to the bulk will be enhanced. Here we report on electrochemical synthesis and characterization of Bi_2Te_3 and Sb_2Te_3 nanowires in which the effect of materials' stoichiometry as well as nanowire size was investigated. Nanowires were grown in porous anodic aluminum oxide membranes with pore diameters varying from 18 to 150 nm. Stoichiometry and the wire morphology were tuned by electrochemical cell voltages in the 30 - 150 mV range. Topological signatures and surface conductance are affected by both crystallinity and chemical composition. We found that in the narrow range of the electrochemical potential (130 mV-150 mV) when stoichiometry changes were very small the nanowire conductance could still be hugely different. The results of high-field magnetotransport and I-V characteristic measurements on nanowires with crystallinity and morphology controlled by a suitable annealing protocol and imaged using transmission (TEM) and scanning (SEM) electron microscopies will be presented.

[1]Supported by NSF-DMR-1312483, and DOD-W911NF-13-1-0159

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Date submitted: 14 Nov 2014 Electronic form version 1.4