Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Synthesis and Transport Measurements of Catalyst-Free Topological Insulator Bi_2Se_3 Nanostructures JEROME T. MLACK, ATIKUR RAHMAN, GARY L. JOHNS, NINA MARKOVIC, Johns Hopkins University — The semiconductor bismuth selenide (Bi_2Se_3) was predicted to be a topological insulator (TI) with a single Dirac cone, which was observed using Angle-Resolved-Photo-Emission-Spectroscopy in 2008. TI's are materials which exhibit electrically insulating properties in the bulk, but they have metallic surface states. The surface states are topologically protected from perturbations, defects, and impurities. Nano-sized structures might be well suited for the study of surface states because the surface effects are likely to dominate over bulk properties due to the high surface-to-volume ratio. So far, nanowires and nanoribbons of TI s have been synthesized using metal catalysts, such as gold, iron, or nickel. However, it has been found that these catalysts dope the nanostructures, which has the potential to modify their properties. We show catalyst-free growth of nanowires and nanoribbons of Bi_2Se_3 using the Vapor-Liquid-Solid method. Analysis by EDAX and TEM imaging suggest high purity samples. We have fabricated devices from these nanostructures and present electron transport measurements.

Jerome T. Mlack
Johns Hopkins University

Date submitted: 17 Nov 2011 Electronic form version 1.4