Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Topological Insulator Nanoribbons and Nanosheets Studied by Scanning Tunneling Microscopy[1] J. C. RANDEL, D. KONG, H. PENG, J. J. CHA, S. MEISTER, K. LAI, Y. CHEN, Z.-X. SHEN, Y. CUI, H. C. MANOHARAN, Stanford University — Topological insulators (TIs) have recently emerged as a new phase of matter characterized by topologically-protected gapless surface states. These conductive surface states open the door for novel dissipationless electronic and spintronic devices based on a growing library of TI materials. Nanoscale TIs are particularly attractive because their high surface-to-volume ratio enhances the relative contribution of the surface states. We report a simple method for producing samples of Bi_2Se_3 nanostructures on a gold substrate. We present the first scanning tunneling microscopy (STM) measurements on TI nanostructures, and characterize them from their largest dimension (>10 micron) down to atomic scale. We observe single crystal structures that show preferential growth in both one and two dimensions (nanoribbons and nanosheets), with both morphologies exhibiting atomically precise edges. Our observations confirm the high-quality nature of the TI nanostructures, and their suitability for use in a new generation of dissipationless nanoscale electronics.

[1]Supported by the Department of Energy, Office of Basic Energy Sciences, Division of Materials Sciences and Engineering under contract DE-AC02-76SF00515.

Jason Randel
Stanford University

Date submitted: 19 Nov 2009

Electronic form version 1.4