Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Atmospheric Doping Affects on the Transport Properties of the Topological Insulator Bismuth Selenide (Bi_2Se_3) Grown By MBE MATTHEW BRAHLEK, YONG SEUNG KIM, NAMRATA BANSAL, ELIAV EDREY, SEONGSHIK OH, Rutgers University — During the last five years much experimental work has been done to determine if the theoretical prediction of topological insulting (TI) states truly exist. Angle resolved photo emission spectroscopy (ARPES) measurements have shown that a Dirac type linear dispersion does exist for a variety of materials, and the surface states have been observed by direct transport measurements. The next challenge is to isolate the surface electrons by removing the bulk conduction. This not trivial because bismuth selenide's Fermi energy sits in the conduction band, and most of the measured carriers are due to these bulk states. The prediction is that the surface states are robust under perturbation, but like standard semiconductors, Bi_2Se_3's bulk states are sensitive to doping. I will report on our work done on how the transport properties of MBE grown Bi_2Se_3 thin films are affected by atmospheric dopants such as oxygen and water vapor. Future prospects for studying TIs such Bi_2Se_3 and ultimately building a device depend on being able to tune the Fermi level into the gap thereby isolating the surface states, and then passivating the surface against contamination due to atmospheric oxygen and water vapor.

Matthew Brahlek
Rutgers University

Date submitted: 27 Nov 2010 Electronic form version 1.4