Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Highly tunable electron transport in epitaxial topological insulator ($Bi_{1-x}Sb_x)_2Te_3$ thin films TONG GUAN, Institute of Physics, Chinese Academy of Sciences; Florida State University, XIAOYUE HE, KEHUI WU, YONGQING LI, Institute of Physics, Chinese Academy of Sciences — Three dimensional topological insulators (TI) have potential applications in quantum computation and spintronics. These applications often require an insulating bulk and high tunability in chemical potential. Remarkable progresses have been made in synthesizing new TI material with more insulating bulk by alloying the binary compounds Bi_2Se_3, Sb_2Se_3, Bi_2Te_3 and Sb_2Te_3 in the past couple of years. Here we report the growth of single crystalline $(Bi_{1-x}Sb_x)_2Te_3$ films on $SrTiO_3(111)$ substrates by molecular beam epitaxy. A full range of Sb-Bi compositions have been studied. Optimal Sb composition for minimum bulk conduction was found to be x = 0.5 ± 0.1. For the samples $(Bi_{0.5}Sb_{0.5})_2Te_3$, the carrier density can be tuned from n-type to p-type with the help of a back-gate. Linear magnetoresistance has been observed at gate voltages close to the maximum in the longitudinal resistance of $(Bi_{0.5}Sb_{0.5})_2Te_3$ sample. These highly tunable $(Bi_{1-x}Sb_x)_2Te_3$ thin films provide an excellent platform to explore the intrinsic transport properties of the three dimensional topological insulators.

Tongshuai Xu
Florida State University

Date submitted: 10 Dec 2012 Electronic form version 1.4