Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Growth and Characterization of Large Scale $(Sb_{1-x}Bi_x)_2Te_3$ Thin Films on Mica[1] YAN NI, ZHEN ZHANG, DAVID JILES, Department of Electrical and Computer Engineering, Iowa State University — Topological insulators (TIs) attract attentions for both fundamental science and potential applications because of their bulk band inversion arising from the strong spin orbital coupling. However, it is necessary to tune the Fermi level and Dirac cone in 3D TI $(Sb_{1-x}Bi_x)_2Te_3$ to make an ideal system for TI applications. In this work, we report high quality $(Sb_{1-x}Bi_x)_2Te_3$ thin films grown on mica substrate by molecular beam epitaxy. The surface roughness of the thin film can reach as low as 0.7 nm in a large area by van der Waals epitaxy. $(Sb_{1-x}Bi_x)_2Te_3$ thin film with x = 0.04 shows a local maxima in the room temperature sheet resistance, which indicates a minimization of the carrier density due to band structure engineering. Moreover, for higher Bi concentration, due to an increase of the surface roughness and corresponding reduction of electron mobility, the sheet resistance increases. Our results on the feasibility of depositing $(Sb_{1-x}Bi_x)_2Te_3$ in wide Bi range on mica substrate will helpful for the application of TI at room temperature and flexible electronics.

[1]Authors would like to thank the financial support from the U.S. National Science Foundation under the Award No. 1201883.

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Date submitted: 14 Nov 2014 Electronic form version 1.4