Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Study of long-time aging effect on low carrier MBE-grown Bi2Se3 with various capping layers MARYAM SALEHI, MATTHEW BRAHLEK, NIKESH KOIRALA, SEONGSHIK OH, Rutgers university — Although there have been a lot of advances in the growth engineering and characterization of the topological insulators (TI) since their discovery, one of the remaining challenges is to protect them against degrading due to aging over time. Stabilizing the properties of TIs under the ambient conditions is of great interest, and indeed is a crucial step towards building stable TI-integrated electronic devices. One of the immediate and effective solutions to the aging problem is to find an efficient, and compatible capping layer. In this work we focus on how properties of Bi_2Se_3 as a prototypical TI can be stabilized in air. We were able to achieve high quality Bi_2Se_3 thin films with low carriers concentration and high mobility using Molecular Beam Epitaxy (MBE). Aging study of samples with such low carriers will be more reliable compared to other MBE grown samples with higher carriers concentration. In this work, a long-term study (over 200 days) of aging effect on the transport properties of thin films with no capping layer, and ones with various in-situ (in the MBE chamber) and ex-situ deposited capping layers will be presented. Finally, by comparing the results between different capping layers, the most effective capping layer will be reported.

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Date submitted: 14 Nov 2014 Electronic form version 1.4