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Gate-tunable electronic transport in topological insulator Bi_2Te_3 thin films synthesized by metal-organic chemical vapor deposition HELIN CAO, Physics department, Birck Nanotechnology Center, Purdue University, West Lafayette, IN 47907, RAMA VENKATASUBRAMANIAN, JONATHAN PIERCE, Center for Solid State Energetics, RTI International, Research Triangle Park, NC 27709, TAI-LUNG WU, JIFA TIAN, ISAAC CHILDRES, Physics department, Birck Nanotechnology Center, Purdue University, West Lafayette, IN 47907, YONG CHEN, Physics department, Birck Nanotechnology Center, School of Electrical and Computer Engineering, Purdue University, West Lafayette, IN 47907 — Topological insulator is a new state of matter with a nominally insulating gap in the bulk and non-trivial metallic states on the surface. One of the proto-type topological insulator materials, Bi_2Te_3, can be synthesized in the form of high quality, wafer scale thin films by metal-organic chemical vapor deposition (MOCVD). Here we present an experimental study of Bi_2Te_3 thin films with thickness ranging from a few nm's to 1 μm synthesized by MOCVD on semi-insulating GaAs (001) substrates. Hall bar shaped devices using atomic layer deposition (ALD) high-k Al_2O_3 or HfO_2 as gate dielectric have been fabricated. We have measured the magneto-transport (including both R_{xx}, 4-terminal longitudinal resistance, and R_{xy}, the Hall resistance) at various temperatures and gate voltages to probe the possible transport signatures of the topological surface states. We have also studied gate-tunable weak anti-localization in R_{xx}(B) for ultra-thin films.

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