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Electronic transport in MBE-grown Bi_2Se_3 topological insulator thin film field effect devices TAI-LUNG WU, JIFA TIAN, HELIN CAO, YI XUAN, Department of Physics and Birck Nanotechnology Center, Purdue University, West Lafayette, IN 47907, XINYU LIU, JACK FURDYNA, Department of Physics,University of Notre Dame, Notre Dame, IN 46556, YONG P. CHEN, Department of Physics and Birck Nanotechnology Center, Purdue University, West Lafayette, IN 47907, QMD TEAM — Topological insulators (TI), such as Bi_2Se_3 and Bi_2Te_3, have attracted a lot of attention due to their exotic electronic properties. Bi_2Se_3 TI films grown by molecular beam epitaxy (MBE) are promising for studying the nature of topologically protected surface states due to their large size, high quality, the capability to tune the thickness and interface with various semiconductor substrates. In this study, thin films of Bi_2Se_3 have been grown on $GaAs$ (001) semi-insulating substrates in a III-V/II-VI dual chamber MBE system. To study the electronic properties, micrometer scale Hall-bar devices with high-k dielectric (Al_2O_3) top gates have been fabricated. Systematical measurements of temperature dependent and electrical field modulated magnetro-transport are performed to exam the conduction contributed by the surface states.

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