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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, China; Department of physics, Florida State University, USA, XIAOYUE HE, KEHUI WU, YONGQING LI, Institute of Physics, Chinese Academy of Sciences, China — Three dimensional topological insulators have emerged as a novel type of quantum materials that may lead to ground-breaking applications such as quantum computation and spintronic devices. These applications, however, often require an insulating bulk. A lot of progress has been made in suppressing the bulk conductivity. 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 (MBE). A full range of Sb-Bi compositions have been studied in order to obtain the lowest possible bulk conductivity. For the samples with optimized Sb compositions ($x = 0.5\pm0.1$), the carrier type 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 a $(Bi_{1-x}Sb_x)_2Te_3$ 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.

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