Highly tunable electron transport in epitaxial topological insulator \((\text{Bi}_{1-x}\text{Sb}_x)_2\text{Te}_3\) 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 \((\text{Bi}_{1-x}\text{Sb}_x)_2\text{Te}_3\) films on \(\text{SrTiO}_3(111)\) 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 \((\text{Bi}_{1-x}\text{Sb}_x)_2\text{Te}_3\) sample. These highly tunable \((\text{Bi}_{1-x}\text{Sb}_x)_2\text{Te}_3\) thin films provide an excellent platform to explore the intrinsic transport properties of the three dimensional topological insulators.

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Date submitted: 18 Sep 2012

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