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Topological surface states on high-index Bi_2Se_3 epifilms grown by molecular-beam epitaxy on InP(001) XIN GUO, ZHONGJIE XU, Phys. Dept.,The University of Hong Kong, MENGYU YAO, Key Laboratory of Artificial Structures and Quantum Control (Ministry of Education), Dept. of Phys., Shanghai Jiaotong University, HONGTAO HE, Phys. Dept., Hong Kong University of Science and Technology, LIN MIAO, Key Laboratory of Artificial Structures and Quantum Control (Ministry of Education), Dept. of Phys., Shanghai Jiaotong University, LU JIAO, Phys. Dept.,The University of Hong Kong, HONGCHAO LIU, JIANNONG WANG, Phys. Dept., Hong Kong University of Science and Technology, DONG QIAN, JINFENG JIA, Key Laboratory of Artificial Structures and Quantum Control (Ministry of Education), Dept. of Phys., Shanghai Jiaotong University, WINGKIN HO, MAOHAI XIE, Phys. Dept.,The University of Hong Kong
— We use MBE to successfully grow a high-index Bi_2Se_3 (221) epifilm on InP(001) substrate. To facilitate growth of Bi_2Se_3 (221) on InP(001), the substrate has to undergo a careful thermal treatment. XRD and LEED measurements affirm the film to be of Bi_2Se_3 (221).The ARPES experiments on such a Bi_2Se_3(221) sample reveal unambiguously the linear dispersed surface states. In addition, the Fermi surface is elliptical rather than the more symmetrical one on Bi_2Se_3(111). Electrical transport studies of such (221) Bi_2Se_3 samples also show an anisotropy in two perpendicular directions in the plane of the surface. The longitudinal resistivity along the "transverse" direction is $1.9 \sim 4.4$ times higher than that along the "parallel" direction, and their ratios also depend on temperature from 2K to 300K. Hall resistances show non-linear field dependence at high temperature, implying multiband conduction.

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