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Crossover from 3D to 2D Quantum Transport in Bi2Se3/In2Se3 Superlattices ZHAO YANFEI, LIU HAIWEN, ICQM, Peking University, GUO XIN, Physics Department, The University of Hong Kong, JIANG YING, Department of Materials Science and Engineering, Zhejiang University, SUN YI, WANG HUICHAO, ICQM, Peking University, WANG YONG, Department of Materials Science and Engineering, Zhejiang University, LI HANDONG, University of Electronic Science and Technology of China, XIE MAOHAI, Physics Department, The University of Hong Kong, XIE XINCHENG, WANG JIAN, ICQM, Peking University — The topological insulator/normal insulator (TI/NI) superlattices (SLs) with multiple Dirac channels are predicted to offer great opportunity to design novel materials and investigate new quantum phenomena. Here, we report first transport studies on the SLs composed of TI Bi2Se3 layers sandwiched by NI In2Se3 layers artificially grown by molecular beam epitaxy (MBE). The transport properties of two kinds of SL samples show convincing evidence that the transport dimensionality changes from three-dimensional (3D) to two-dimensional (2D) when decreasing the thickness of building block Bi2Se3 layers, corresponding to the crossover from coherent TI transport to separated TI channels. Our findings provide the possibility to realizing 3D surface states in TI/NI SLs.

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