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Engineering thin films of magnetically doped topological insulators for quantum anomalous Hall effect XIAO FENG, YANG FENG, State Key Laboratory of Low-Dimensional Quantum Physics, Department of Physics, Tsinghua University, Beijing, China, YUNBO OU, KANG LI, Beijing National Laboratory for Condensed Matter Physics, Institute of Physics, The Chinese Academy of Sciences, Beijing, China, JINSONG ZHANG, MINGHUA GUO, ZUOCHENG ZHANG, XINTONG LI, LIGUO ZHANG, CHANG LIU, ZHENQI HAO, YAYU WANG, SHUAIHUA JI, XI CHEN, LILI WANG, KE HE, XUCUN MA, QIKUN XUE, State Key Laboratory of Low-Dimensional Quantum Physics, Department of Physics, Tsinghua University, Beijing, China — Quantum anomalous Hall effect (QAHE) is a kind of quantum Hall effect that can occur in zero external magnetic field. Recently, QAHE has been experimentally observed in thin films of Cr-doped $(Bi,Sb)_2Te_3$ topological insulator grown on $SrTiO_3$ (111) substrate by molecular beam epitaxy. The QAHE in Cr-doped $(Bi,Sb)_2Te_3$ films is found to be easily destroyed by slight variations in sample chemical composition, film thickness, substrate condition and capping layer. We have systematically investigated the influence of these parameters on the magnetism and anomalous Hall effect of Cr-doped $(Bi,Sb)_2Te_3$ films. The crucial factors preventing QAHE are discussed based on the results. This work is helpful for a detailed understanding of QAHE and for routine preparation of QAHE samples for further studies.

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