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Epitaxial Growth of Bi2Se3 Topological Insulator Thin Films on Si (111) LIANG HE, FAXIAN XIU, Dept. of Elec. Eng., UCLA, YONG WANG, The University of Queensland, ALEXEI V. FEDOROV, Lawrence Berkeley National Laboratory, GUAN HUANG, XUFENG KOU, Dept. of Elec. Eng., UCLA, WARD P. BEYERMANN, Dept. of Phys., UCR, JIN ZOU, University of Queensland, KANG L. WANG, Dept. of Elec. Eng., UCLA, DEPT. OF ELEC. ENG., UCLA TEAM, MATERIAS ENGINEERING, THE UNIVERSITY OF QUEENSLAND COLLABORATION, ADVANCED LIGHT SOURCE DIVISION, LAWRENCE BERKELEY NATIONA LABORATORY COLLABORATION, DEPT. OF PHYS., UCR COLLABORATION — We report the studies of Bi2Se3 epitaxial films on Si(111) substrate using molecular beam epitaxial techniques. The structural properties of as-grown films have been investigated by AFM, STM and TEM, which exhibit good crystalline quality and terrace-like quintuple layers on the surfaces. Single-Dirac-cone-like surface states with a linear (E-K) dispersion have been observed through ARPES. Temperature- and thickness-dependent magneto-transport measurements indicate a combination of shallow impurity band hopping and surface-state electron conductions. More significantly, a very high surface contribution up to 50% can be estimated in these ultrathin films, promising a potential applications in nanoelectornics and spintronics.

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