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Synthesis and surface-state transport of ultrathin topological crystalline insulator SnTe films KE ZOU, Dept. of Appl. Phys. and CRISP, Yale Univ., STEPHEN ALBRIGHT, Dept. of Phys. and CRISP, Yale Univ., OMUR DAGDEVIREN, Dept. of Mech. Eng. Mat. Sci. and CRISP, Yale Univ., M.D. MORALES-ACOSTA, Dept. of Appl. Phys. and CRISP, Yale Univ., GEORG SIMON, Dept. of Mech. Eng. Mat. Sci., Chem. Envir. Eng., and CRISP, Yale Univ., CHAO ZHOU, Dept. of Mech. Eng. Mat. Sci. and CRISP, Yale Univ., SUBHASISH MANDAL, SOHRAB ISMAIL-BEIGI, Dept. of Appl. Phys. and CRISP, Yale Univ., UDO SCHWARZ, Dept. of Mech. Eng. Mat. Sci., Chem. Envir. Eng., and CRISP, Yale Univ., ERIC ALTMAN, Dept. of Chem. Envir. Eng. and CRISP, Yale Univ., FREDERICK WALKER, CHARLES AHN, Dept. of Appl. Phys. and CRISP, Yale Univ. — SnTe is a topological crystalline insulator that exhibits crystal symmetry protected surface states that may impact the development of novel electronic devices. With a practical implementation of these materials in view, we introduce a new way to synthesize ultrathin films of SnTe ($\sim$ 10 unit cell thick) for transport measurements on $SrTiO_3$ (001) substrates using molecular beam epitaxy. Commonly observed bulk conduction by Sn vacancies is greatly suppressed in these ultrathin films. We observe that the surface states near the SnTe/vacuum interface are depleted due to band bending. Importantly, we find that the surface-state carriers are buried and protected from depletion at the SnTe/$SrTiO_3$ interface and dominate the measured conductance at thicknesses smaller than 40 unit cells, and that these carriers have a high density and mobility.

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