Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

High-Resolution Structural and Electronic Properties of Epitaxial Topological Crystalline Insulator Films[1] OMUR DAGDEVIREN, CHAO ZHOU, KE ZOU, GEORG SIMON, STEPHEN ALBRIGHT, SUBHASISH MANDAL, MAYRA MORALES-ACOSTA, XIAODONG ZHU, SOHRAB ISMAIL-BEIGI, FREDERICK WALKER, CHARLES AHN, UDO SCHWARZ, ERIC ALTMAN, Yale University — Revealing the local electronic properties of surfaces and their link to structural properties is an important problem for topological crystalline insulators (TCI) in which metallic surface states are protected by crystal symmetry. The microstructure and electronic properties of TCI SnTe film surfaces grown by molecular beam epitaxy were characterized using scanning probe microscopy. These results reveal the influence of various defects on the electronic properties: tilt boundaries leading to dislocation arrays that serve as periodic nucleation sites for pit growth; screw dislocations, and point defects. These features have varying length scale and display variations in the electronic structure of the surface, which are mapped with scanning tunneling microscopy images as standing waves superimposed on atomic scale images of the surface topography that consequently shape the wave patterns. Since the growth process results in symmetry breaking defects that patterns the topological states, we propose that the scanning probe tip can pattern the surface and electronic structure and enable the fabrication of topological devices on the SnTe surface.

[1]Financial support from the National Science Foundation through the Yale Materials Research Science and Engineering Center (Grant No. MRSEC DMR-1119826) and FAME.

Omur Dagdeviren
Yale Univ

Date submitted: 11 Nov 2016 Electronic form version 1.4