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Identification of topological surface states in $(Bi_{1-x}Sb_x)_2Te_3$ alloy films J.C. WALRATH, V.A. STOICA, A.S. CHANG, YEN-HSIANG LIN, WEI LIU, L. ENDICOTT, R. CLARKE, C. UHER, R.S. GOLDMAN, Univ of Michigan - Ann Arbor — Topological insulators (TIs) have emerged as an exciting class of quantum materials, with an insulating bulk and spin-momentum-locked topologically-protected surface states, making them desirable for spintronics and other applications. Recently, tunable surface to bulk conduction has been demonstrated in ternary TI alloys $(Bi_{1-x}Sb_x)_2Te_3$, providing an ideal candidate for TI spintronic devices. Although room-temperature topological surface transport is desirable for device applications, direct detection topological surface states at room temperature has yet to be demonstrated in $(Bi_{1-x}Sb_x)_2Te_3$ systems. Here, we use scanning tunneling microscopy and spectroscopy (STM/STS) to characterize the band structure of $(Bi_{1-x}Sb_x)_2Te_3$ alloy films and directly detect the presence of topological surface states at room temperature. We will discuss the thickness and composition dependence of the band structure, including the Fermi level energy, Dirac point, and carrier type, comparing STM/STS and macroscopic transport data.

Jenna Walrath
Univ of Michigan - Ann Arbor

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