Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Stannanane as a Topoligcal Insulator: a Study of Conducitivity and Mobility WILLIAM VANDENBERGHE, MASSIMO FISCHETTI, University of Texas at Dallas — Recently, it was shown that monolayer tin (lat: stannum) which we refer to as stannanane, is a 2D topological insulator with a band gap exceeding 300 meV upon functionalization. We investigate the band structure of functionalized stannanane ribbons using ab-initio calculations and determine the Fermi-velocity of the edge states. We calculate the wavefunctions of the edge states closing the band gap in stannanane ribbons and demonstrate their spin-polarization. We compute the matrix element with a deformation-potential Hamiltonian to study back-scattering between opposite-edge states. The overlap of the edge states reduces with increasing ribbon width and depends on the energy. Finally, we calculate the stannanane conductivity and mobility as a function of Fermi level for different ribbon widths using the Kubo-Greenwood formalism and show that mobilities exceeding 10^7 $cm^2/(Vs)$ can be expected in stannanane ribbons.

William Vandenberghe
University of Texas at Dallas

Date submitted: 15 Nov 2013 Electronic form version 1.4