Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Surface conduction in encapsulated topological gated structures[1]
YURY DESHKO, INNA KORZHOVSKA, LUKAS ZHAO, The City College of New York, GHIDEWON AREFE, Columbia University, MARCIN KONCZYKOWSKI, Ecole Polytechnique, France, LIA KRUSIN-ELBAUM, The City College of New York — In three-dimensional (3D) topological insulators (TIs), the surface Dirac fermions intermix with the conducting bulk, thereby complicating access to the low-energy surface charge transport or magnetic response. The subsurface 2D states of bulk origin are vulnerable to bandbending due to surface adatoms, a band modification thought to be responsible for the 'ageing' effect. To minimize this effect, we have developed an inert environment mechanical exfoliation technique to fabricate transistor-like gated structures in which prototypical binary TIs as well as ultra-low bulk carrier density ternaries (such as Bi_2Te_2Se) were encapsulated by thin h-BN layers, with electrical contacts made using exfoliated graphene. The effects of electrostatic tuning by the gate bias voltage on surface conductivity as a function of thickness of the TI layers and the variation with disorder will be presented.

[1]Supported by NSF-DMR-1312483, and DOD-W911NF-13-1-0159

Yury Deshko
The City College of New York

Date submitted: 14 Nov 2014 Electronic form version 1.4