Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

**Pressure-induced insulator to metal transitions in potential 3D topological insulators $Ag_2Se$ and $Ag_2Te$** ZHAO ZHAO, SHIBING WANG, Stanford University, ARTEM OGANOV, State University of New York at Stony Brook, PENGCHENG CHEN, Tsinghua University, HAIJUN ZHANG, Stanford University, ZHENXIAN LIU, National Synchrotron Light Source, Brookhaven National Laboratory, WENDY MAO, Stanford University — Silver chalcogenides $Ag_2Se$ and $Ag_2Te$ are non-magnetic compounds exhibiting interesting physics like linear magnetoresistance and dimensionality tunable band gap. To explore their behaviors under high pressure, we performed synchrotron X-ray diffraction and infrared experiments combined with evolutionary algorithm structure predictions and *ab-initio* band structure calculations. For $Ag_2Se$, the unusual increase of phase I's band gap and topologically nontrivial features of its band structure support $\beta-Ag_2Se$ as a potential 3D topological insulator. The bulk insulating phase I first transforms to a bulk metallic phase II with 2.4 percent volume drop, marked by the appearance of the distinctive Se(Ag1)-Ag2-Se(Ag1) triple layers stacking pattern. At higher pressure, a transition from the phase II to a completely metallic phase III was observed. And for $Ag_2Te$, our study shows that the bulk insulating phase I first transforms into a semi-metallic phase II with the perseverance of its topologically non-trivial nature, and then to a bulk metallic phase III. Our study highlights pressure's role in tuning the electronic structures of $Ag_2Se$ and $Ag_2Te$.

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Date submitted: 01 Nov 2013 Electronic form version 1.4