Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Electronic Transport Properties and Band Structure of 2-D Material $NaSn_2As_2$[1] BIN HE, Department of Mechanical Engineering, the Ohio State University, Columbus, Ohio USA 43210, MAXX ARGUILLA, NICHOLAS CULTRARA, JOSHUA GOLDBERGER, Department of Chemistry and Biochemistry, the Ohio State University, Columbus, OH 43210, JOSEPH HEREMANS, Department of Mechanical Engineering, the Ohio State University, Columbus, Ohio USA 43210 — 2-D-like materials potentially have superior thermoelectric properties compared to traditional 3-D materials when the conduction mechanisms are different in the plane and along the c-axis. A classic example is that of n-type tetradymites, where the difference between electron and phonon anisotropies is exploited. Here we explore a material in which the polarity of the Hall and Seebeck signals are different. We present electrical and thermoelectric transport properties of $NaSn_2As_2$, a quasi-2-D system, with Na atom embedded between nearly-2D Sn-As layers. It shows typical metallic behavior with its resistance increasing linearly with temperature. Its Hall measurement shows a p-type behavior, with anomalous slope change with applied magnetic field, which varies over temperature. At the same time, its Seebeck coefficient is measured to be negative, increasing with temperature. DFT band structure calculations, confirmed ARPES measurements[1],show that this material is a 2-carrier system, which explains the discrepancy between Hall and Seebeck data. We conclude that the conduction mechanisms should be different in-plane and along the c-axis. 1. M. Arguilla, et al. ACS Nano 2016, 10, 95009508

[1]This work is supported by NSF EFRI 1433467

Bin He
The Ohio State University, Columbus, Ohio USA 43210

Date submitted: 20 Nov 2016 Electronic form version 1.4