

Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Thermoelectric properties of Sn_{1-x}Eu_xTe YIBIN GAO, JOSEPH HEREMANS, the Ohio State University — SnTe has potential in thermoelectric application for intermediate temperature [1]. However, the figure of merit ZT of SnTe is limited because that it always has a high hole concentration owing to Sn vacancies. As a result, the Seebeck coefficient of SnTe is low and it is very difficult to get SnTe to the optimized doping level required to get a good figure of merit. SnTe also has heavy valence band close to the light valence band edge. We know from theoretical calculations that degenerate bands are preferable than bands separated by an energy difference for thermoelectric application. EuTe has a much higher band gap than SnTe. Recent results [2] show that in Sn_{1-x}Eu_xTe films prepared by hot-wall epitaxy, the direct L-point bandgap first closes with x, and then opens. In this presentation, we report on the synthesis of bulk Sn_{1-x}Eu_xTe samples, and report on their Seebeck coefficient, Hall coefficient, resistivity and thermal conductivity. A simplified model is proposed to explain the experimental data. The results confirm the results of the previous study, and point towards the possibility of finding a high-ZT formulation in these compounds. The work is supported by ZTPlus.

[1] V. P. Vedenev et al., Semiconductors, 32, 241 (1998)

[2] Akihiro Ishida et al., J. Appl. Phys. 107, 123708 (2010)

Yibin Gao
the Ohio State University

Date submitted: 22 Dec 2010

Electronic form version 1.4