Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

P-type $Bi_{1-x}Sb_x$ above 300K HYUNGYU JIN, CHRISTOPHER JAWORSKI, Department of Mechanical Engineering, The Ohio State University, JOSEPH HEREMANS, Department of Mechanical Engineering and Department of Physics, The Ohio State University — Heavily-doped p-type bismuth was theoretically predicted to be a good thermoelectric material. Tin is a known monovalent acceptor in the semimetal bismuth, but even at moderate Sn concentrations, the material becomes compensated and even switches n-type as temperature increases. Antimony, on the other hand, is always p-type; this work aims at finding the concentration in $Bi_{1-x}Sb_x$ alloys where acceptor behavior on Sn switches. Historically, the regime where $Bi_{1-x}Sb_x$ exhibits p-type conduction has been limited to cryogenic temperatures, with Seebeck coefficients switching negative below 300K Tin-doped single crystals of composition $Bi_{1-x}Sb_x$with $0.16<x<0.5$ have been synthesized using the Bridgeman method followed by a lengthy anneal. We measure and report here thermopower, electrical resistivity, thermal conductivity and thus zT measured from 2-400K and 2K carrier density as calculated from the Shubnikov-de Haas effect.

Hyungyu Jin
Department of Mechanical Engineering, The Ohio State University

Date submitted: 17 Nov 2009 Electronic form version 1.4