Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Studies on Seebeck Coefficient of Individual Bismuth Telluride Nanotube[1] DUKSOO KIM, Department of Electrical Engineering, The Penn State Univ., RENZHONG DU, Department of Physics, The Penn State Univ., YUEWEI YIN, SINING DONG, XIAOGUANG LI, Hefei National Laboratory for Physical Sciences at Microscale, University of Science and Technology of China, QI LI, Department of Physics, The Penn State Univ., SRINIVAS TADIGADAPA, Department of Electrical Engineering, The Penn State Univ. — We have studied on Seebeck coefficient (S) of freestanding individual Bismuth Telluride nanotubes using microfabricated thermoelectric workbench at the temperatures from 300 K to 25 K. The thermoelectric workbench is composed of three main elements: heater, thermocouple, and platinum pad. A polysilicon-gold thermocouple accurately measures the temperature, arising from the heat generated at the tips of the test sites from the polysilicon heater located 2 μm apart from the thermocouple. Platinum pads placed on top of the heater and thermocouple structures and electrically isolated from these constitute S measurement circuit. IPA solution containing Bi_2Te_3 nanotubes was drop-cast on the workbench and the Ebeam Induced Deposition of platinum was used to improve the electrical and thermal contacts between nanotube and platinum pads. The inner and outer diameter of nanotube is 50 nm and 70 nm, respectively. The sign of obtained S was positive which is indicating the nanotube is p-type. And the magnitude was increased compared to the bulk and nanowire types. The measured S (364 μV/K) of nanotube at T = 300 K is 1.65 times larger than that (220 μV/K) of bulk and 1.4 times larger than the previously reported value (260 μV/K) of nanowire.

[1]This work is supported by NSF MRSEC (Grant No. DMR-0820404)

DukSoo Kim
Dept of Electrical Engineering, The Pennsylvania State University,
University Park, PA, USA

Date submitted: 28 Nov 2012 Electronic form version 1.4