Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Study of Thermal Conductivity of Si Nanowires with micro-Raman Spectroscopy[1] BINGQING LI, Department of Physics, Bryn Mawr College, KATHRYN F. MURPHY, DANIEL S. GIANOLA, Department of Materials Science and Engineering, University of Pennsylvania, X.M. CHENG, Department of Physics, Bryn Mawr College — Nanowires have played an increasingly important role in thermoelectric technology due to their high figure of merit ZT resulting from the reduced thermal conductivity, K, and good electrical conductivity. In this work, we report the measurement of K of individual silicon nanowires (SiNWs) by mapping Raman temperature profiles along the testing nanowires using a microelectromechanical system (MEMS) device and a micro-Raman system with a 530 nm laser beam. Thermal conductivity was measured as a function of uniaxial tensile stress applied to the SiNWs, which was varied from 0 to 1.2 GPa. The measured K results for the unstrained nanowires agree well with the predictions based on diffuse phonon boundary scattering. The dependence of SiNWs' thermal conductivity on engineering stress can provide significant information for nanowires fabrication.

[1]The work at University of Pennsylvania is supported by the Department of Energy, Basic Energy Sciences, through an Early Career Award (DE-SC0008135). The work at Bryn Mawr College is supported by NSF Career Award (DMR- 1053854).

Bingqing Li
Department of Physics, Bryn Mawr College

Date submitted: 17 Nov 2012 Electronic form version 1.4