Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

**Tailoring the Crystal Structure of Individual Silicon Nanowires by Polarized Laser Annealing** CHIA-CHI CHANG, Department of Physics, University of Southern California, HAITIAN CHEN, CHUN-CHUNG CHEN, CHONGWU ZHOU, STEPHEN CRONIN, Department of Electrical Engineering, University of Southern California — We study the effect of polarized laser annealing on the crystalline structure of individual amorphous and nano-crystalline silicon nanowires (Si NWs) using Raman spectroscopy. The crystalline fraction of annealed NWs increases dramatically from 0 to 0.93 with increasing incident laser power. We observe Raman line shape narrowing and frequency hardening upon laser annealing due to the increase in crystal grain size. The Raman anti-Stokes:Stokes intensity ratio is used to determine the local heating temperature caused by the intense focused laser spot, which shows a strong polarization dependence on both single crystal bulk Si and nano-crystalline Si NWs. This method provides a new approach to control the crystal structure rather than by simply adjusting the laser power. Furthermore, strain induced linewidth broadening and frequency softening was also observed in bent nano-crystalline Si NWs, and the deformation stress can be released via laser annealing.

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Date submitted: 24 Nov 2010 Electronic form version 1.4