Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Raman measurements of strain in GaAs/GaP core-shell nanowires[1] MOHAMMAD MONTAZERI, M.A. FICKENSCHER, L.M. SMITH, H.E. JACKSON, University of Cincinnati, J.M. YARRISON-RICE, Miami University, J. H. KANG, Q. GAO, H.H. TAN, C. JAGADISH, Australian National University, Y. GUO, J. ZOU, University of Queensland, M.E. PISTOL, Lund University, C.E. PRYOR, University of Iowa — We present results of Raman scattering from as–grown highly strained GaAs/GaP core-shell nanowires with 50 nm diameter GaAs cores and 25 nm GaP shells. We show that the degree of compressive hydrostatic and shear strain of the GaAs core can be separately determined using Raman scattering. Analysis of the shift and splitting of the TO-mode Raman spectra shows that the GaAs core has a -1.2 % compressive hydrostatic strain and a -0.7 % shear strain. Our measurements are consistent with 8-band k.p calculations and predict a 260 meV increase of the GaAs core band gap and a ∼100 meV heavy hole-light hole splitting of the valence band. These results open up new opportunities to strain engineering of the band structure by varying the nanowire core/shell ratio.

[1]Supported by the NSF (0701703, 0806700, 0806572 and NIRT), the Australian Research Council, and the Swedish Research Council.

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Date submitted: 24 Nov 2009 Electronic form version 1.4