Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Photocurrent spectroscopy of single ZB GaAs and GaAs/AlGaAs core-shell nanowires[1] BEKELE BADADA, LEIGH SMITH, HOWARD JACKSON, Department of Physics, University of Cincinnati, Ohio 452210-0011, USA, JAN YARRISON-RICE, Department of Physics, Miami University, Oxford, Ohio 45056, USA, TIM BURGESS, CHENNUPATI JAGADISH, Department of Electronic and Materials Engineering, Australian National University, Canberra, ACT, 0200, Australia — We investigate the band structure of single ZB GaAs nanowires and GaAs/$Al_{0.5}Ga_{0.5}As$ core shell nanowires using photocurrent spectroscopy at room and low temperatures. The single nanowire devices were fabricated photolithographically to define Ti (20nm)/Al (300nm) metal contacts on either end the nanowire. Photocurrent measurements were performed using CW excitation from a tunable CW Ti-Sapphire laser (775nm-890nm) and a broadly tunable (550-960 nm) pulsed excitation from a coherent super continuum photonic crystal fiber. At room temperature we observe an Urbach tail near the absorption edge at 1.42 eV for both GaAs and GaAs/ $Al_{0.5}Ga_{0.5}As$ core-shell nanowires. In the core shell structure, we also observe the exponential tail from the $Al_{0.5}Ga_{0.5}As$ superimposed on the GaAs absorption in the core. The 2eV onset is consisant with 50%. At low temperature, 10K, similar measurements were performed and a peak is observed near the band edge $\sim$ 1.50-1.51 eV for both bare and core-shell structure for GaAs reflecting the contribution of excitons to the photocurrent.

[1]We acknowledge the NSF through DMR-1105362, 1105121 and ECCS-1100489, and the ARC.

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Date submitted: 14 Nov 2012 Electronic form version 1.4