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Photocurrent spectroscopy studies of single ZB GaAs, GaAs/AlGaAs core-shell and quantum well tube nanowires[1] BEKELE BADADA, LEIGH SMITH, HOWARD JACKSON, Department of Physics, University of Cincinnati, Ohio 45221-0011, USA, JAN YARRISON-RICE, Department of Physics, Miami University, Oxford, Ohio 45056, USA, TIM BURGESS, QIANG GAO, CHENNUPATI JAGADISH, Department of Electronic and Materials Engineering, Research School of Physics and Engineering, Australian National University, Canberra, Australian — We employ photocurrent spectroscopy technique to investigate the energy band structure of single bare GaAs, GaAs/AlGaAs core-shell nanowire and quantum well tube. These nanowires were gown by MOCVD techniques. A single nanowire device is fabricated using photolithography followed by deposition of Ti (20nm)/Al (300-500nm) as contacts on the ends of the nanowires. Photocurrent measurements were performed using 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 a fixed bias across the nanowire. The photocurrent spectra obtained from single bare GaAs nanowires show the band gap energy of 1.42eV and 1.51eV at room (293K) and low (10K) temperatures respectively. At 10K a peak was observed near the band edge suggesting excitonic resonance. In GaAs/AlGaAs core-shell nanowire, we observe both core and shell absorptions which allow us to estimate the concentration of Al in such structures. The photocurrent spectra of quantum well tube show evidences of confined energy states in the quantum well in addition to the absorption of the GaAs core and the AlGaAs shells.

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