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Photocurrent Spectroscopy of ZB and WZ InP Nanowire Ohmic devices K. PEMASIRI, S. PERERA, H.E. JACKSON, L.M. SMITH, University of Cincinnati, OH, J.M. YARRISON-RISE, Miami University, Oxford, OH, S. PAIMAN, Q. GAO, H.H. TAN, C. JAGADISH, Australian National University, Canberra, Australia — We use photocurrent spectroscopy to study InP nanowire Ohmic devices having either Zincblende (ZB) or wurtzite (WZ) crystal structures at 10K. Photolithography is used to fabricate Ohmic Ti/Al contact pads separated by 5 μm. Using a tunable Ti-Sapphire laser, photocurrent is measured as a function of bias voltage and excitation energy. At low temperatures (10 K), the ZB device shows strong evidence for excitonic resonance peaks at 1.425eV and 1.539eV relevant to the degenerate heavy and light holes band and the split-off band. The WZ device shows three excitonic peaks at 1.504eV, 1.530eV, and 1.655eV corresponding to the A, B and C valence band energies, respectively. These energies coincide with recent photoluminescence excitation measurements. In some WZ InP nanowire devices, the A, B and C peaks have been observed at 20-30meV higher energies compared to above, suggesting a possible quantum confinement in the nanowires. The polarization dependence of photocurrent spectra measured from 275nm ZB nanowire and 20nm WZ nanowire shows very good agreement with theoretical absorption of light by nanowires as a function of diameter and photon energy. We acknowledge the NSF through DMR-1105362, 1105121 and ECCS-1100489, and the ARC.

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