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Photocurrent Spectroscopy of single ZB, WZ InP Nanowire devices K. PEMASIRI, S. PERERA, A. WADE, H.E. JACKSON, L.M. SMITH, University of Cincinnati, Cincinnati, OH, J.M. YARRISON-RICE, Miami University, Oxford, OH, S. PAIMAN, Q. GAO, H.H. TAN, C. JAGADISH, Australian National University, Canberra, Australia — Photocurrent spectroscopy was performed on single InP nanowire devices having either zinc-blende (ZB) or wurtzite (WZ) crystal structures at 300 K and 10 K. Photolithography was used to fabricate Ohmic Ti/Al metal contact pads separated by 5 μm. Using a monochromatic white light set up or a tunable (1.30 to 1.55 eV) CW laser, the photocurrent is measured as a function of bias voltage and excitation energy. At room temperature, the lowest energy band of In WZ (1.408 eV) is found to be 70 meV above the ZB band gap (1.338 eV), consistent with previous photoluminescence measurements. At low temperatures (10 K), the ZB device shows strong evidence for a broadened excitonic resonance peak at 1.432 eV and the WZ device shows three excitonic peaks at 1.504 eV, 1.56 eV, and 1.65 eV corresponding to the A,B and C valence band energies, respectively, which coincide with recent photoluminescence excitation measurements. Support for this work was provided by the NSF (#0701703, #0806700 and #0806572) and the Australian Research Council.

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