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Investigation of Electronic Structure in Wurtzite InP Nanowires
SARANGA PERERA, K. PEMASIRI, M. FICKENSCHER, A. WADE, L.M. SMITH, H.E. JACKSON, University of Cincinnati, J.M. YARRISON-RICE, University of Miami, Oxford OH, S. PAIMAN, Q. GAO, H. TAN, C. JAGADISH, Australian National University — We use photoluminescence excitation (PLE), time-resolved photoluminescence (PL), and CW photoluminescence to investigate the electronic structure of wurtzite InP nanowires (NWs) as a function of diameter (30, 50, 100 nm) at 10 K. The NWs were prepared by Au catalyst-assisted MOCVD growth with a 420 $^\circ$C growth temperature and a V/III ratio of 700. A tunable Titanium-Sapphire laser was used to excite the nanowire sample. PL from the NWs show a dominant defect line near 840nm (1.475eV) that obstructs the view of the free exciton line which should be around 824nm (1.504eV). PLE was performed by measuring the intensity of the defect emission as a function of the excitation laser. The laser was polarized parallel and perpendicular to the nanowire and the PL was collected with circular polarization. PLE spectra show three peaks for the A, B and C hole bands (*APL* **97**, 023106-2010). Polarization measurements may probe optical selection rules. Support for this work was provided by the NSF (0701703, 0806700 and 0806572) and the Australian Research Council.

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