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Temperature dependence of photoluminescence from single InP nanowires D. SHEREEN, A. MISHRA, THANG B. HOANG, L.V. TITOVA, H.E. JACKSON, L.M. SMITH, University of Cincinnati, J.M. YARRISON-RICE, Miami University, H.J. JOYCE, Y. KIM, Q. GAO, H.H. TAN, C. JAGADISH, Australian National University — Temperature-dependent micro-photoluminescence (PL) measurements have been carried out to study electronic states of InP nanowires prepared by catalyst-assisted vapor-liquid-solid growth. Low temperature PL spectra of the nanowires show a broad (full width at half maximum of 27 $\pm$ 3 meV) near bandgap peak centered at 1.414 $\pm$ 0.008 eV, in some cases accompanied by a weak defect-related lower energy shoulder at $\sim$ 1.378 $\pm$0.008 eV. Unlike the emission from GaAs/AlGaAs nanowires, which quenches at temperature 120 K due to the presence of large number of non-radiative centers, the PL from the single InP nanowires persists up to room temperature. With increasing temperature, the emission broadens and redshifts. The emission intensity is nearly constant at low temperatures, and begins to quench at 50K. We compare this data with data obtained from epitaxial InP layers grown under similar conditions. Strong linear polarization of the nanowire emission in the direction of nanowire axis is observed in the entire temperature region (8 K – 270 K). Financial support for this work was provided by the University of Cincinnati and the Australian Research Council.

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