Abstract Submitted
for the OSS13 Meeting of
The American Physical Society

Exciton Dynamics in Hexagonal InP Nanowires[1] MASOUD KAVEH-BAGHBADORANI, Department of Physics, University of Cincinnati, Cincinnati, OH 45221, U.S.A., WOLFGANG LANGBEIN, School of Physics and Astronomy, Cardiff University, Cardiff C F24 3AA, U.K., QIANG GAO, CHAENNUPATI JAGADISH, Department of Electronic Materials Engineering, Australian National University, Canberra, AC T 0200, Australia., HANS-PETER WAGNER, Department of Physics, University of Cincinnati, Cincinnati, OH 45221, U.S.A. — We study the exciton dynamics in InP nanowire (NW) ensembles by intensity/temperature-dependent photoluminescence (PL) measurements, time-correlated-single-photon-counting (TCSPC) and heterodyne detected four-wave-mixing experiments (HFWM). The InP NW were grown on fused silica substrate by 50 nm gold catalyst metal-organic-vapor-phase-epitaxy at T= 450° C resulting in nearly WZ type NWs. The PL measurements at 15 K show three emission band at 820 nm, 837 nm and 860 nm. The bands are attributed to free, trapped and indirect WZ-ZB related exciton transitions, respectively. With increasing T the free-exciton band gains importance relative to the dominating trapped exciton band while the low energy band vanishes. TCSPC results show an increasing PL decay rate of all emission bands with increasing T, most pronounced for the low energy band. The result agrees with the exciton population dynamics obtained from three-beam HFWM measurements. Photon echo experiments at 80 K reveal an ultrafast exciton dephasing time of less than 100 fs which is attributed to scattering with a high carrier background in these NWs.

[1]The support of the Australian Research C ouncil is kindly acknowledged.

Masoud Kaveh-Baghbadorani
Department of Physics,
University of Cincinnati, Cincinnati, OH 45221, U.S.A.

Date submitted: 25 Feb 2013 Electronic form version 1.4