Abstract Submitted
for the OSS14 Meeting of
The American Physical Society

Exciton Dynamics in Organic/Plasmonic polytype WZ/ZB InP Nanowires[1] MASOUD KAVEH-BAGHBADORANI, Department of Physics, University of Cincinnati, QIANG GAO, CHAENNUPATI JAGADISH, Department of Electronic Materials Engineering, Australian National University, C anberra, Australia, GERD DUSCHER, Department of Materials Science and Engineering, University of Tennessee, Knoxville, HANS-PETER WAGNER, Department of Physics, University of Cincinnati — We investigate the exciton dynamics in bare and organic/metal coated wurzite/zincblende (WZ/ZB) InP nanowires (NW) by temperature-dependent time-integrated (TI) and time-resolved (TR) photoluminescence (PL). Aluminum quinoline (Alq_3) as well as Alq_3/Mg:Ag covered NW heterostructures are fabricated by organic molecular beam deposition. PL measurements on bare InP nanowires at 15 K reveal two emission bands at 1.45, and 1.48 eV originating from indirect WZ/ZB and point-defect (PD) trapped excitons, respectively. TR PL traces show an approximately single exponential decay for PD trapped excitons with a lifetime of 2 ns and biexponential decay for indirect WZ/ZB excitons with lifetimes of 5 ns and 24 ns. In Alq_3 covered NWs we observe a stronger emission from both exciton transitions and longer decay times for indirect excitons indicating surface state passivation at the Alq_3/NW interface. In Alq_3/Mg:Ag NWs the PD trapped exciton emission is notably reduced which is attributed to a fast energy-transfer from free excitons in the WZ segments to plasmon oscillations in the metal film.

[1]The support of URC at UC and of the Australian Research Council is kindly acknowledged.

Masoud Kaveh-Baghbadorani
Department of Physics, University of Cincinnati

Date submitted: 19 Mar 2014 Electronic form version 1.4