

Abstract Submitted
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Dynamics of Excitons in Bare and Organic/Metal coated InP Nanowires¹ MASOUD KAVEH, University of Cincinnati, QIANG GAO, CHAENNUPATI JAGADISH, Australian National University, Canberra, Australia, GERD DUSCHER, University of Tennessee, Knoxville, HANS-PETER WAGNER, 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 (Alq₃) as well as Alq₃/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 3.3 ns and 14 ns. In Alq₃ covered NWs we observe a stronger emission from both exciton transitions and longer decay times for indirect excitons indicating surface state passivation at the Alq₃/NW interface. In Alq₃/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. The emission from indirect excitons is still comparable to the PL yield of bare NWs.

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