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Exciton Emission from Bare and Alq₃/Gold Coated GaN Nanorods FATEMESADAT MOHAMMADI, University of Cincinnati, GERD KUHNERT, DETLEF HOMMEL, University of Bremen, Germany, HEIDRUN SCHMITZER, Xavier University, Cincinnati, HANS-PETER WAGNER, University of Cincinnati — We study the excitonic and impurity related emission in bare and aluminum quinoline (Alq₃)/gold coated wurtzite GaN nanorods by temperature-dependent time-integrated (TI) and time-resolved (TR) photoluminescence (PL). The GaN nanorods were grown by molecular beam epitaxy. Alq₃ as well as Alq₃/gold covered nanorods were synthesized by organic molecular beam deposition. In the near-band edge region a donor-bound-exciton (D⁰X) emission is observed at 3.473 eV. Another emission band at 3.275 eV reveals LO-phonon replica and is attributed to a donor-acceptor-pair (DAP) luminescence. TR PL traces at 20 K show a nearly biexponential decay for the D⁰X with lifetimes of approximately 180 and 800 ps for both bare and Alq₃ coated nanorods. In GaN nanorods which were coated with an Alq₃ film and subsequently with a 10 nm thick gold layer we observe a PL quenching of D⁰X and DAP band and the lifetimes of the D⁰X transition shorten. The quenching behaviour is partially attributed to the energy-transfer from free excitons and donor-bound-excitons to plasmon oscillations in the gold layer.

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