

Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Effect of electrostatic image charge effect on the photoluminescence in Gallium droplet coated AlGaAs-GaAs Single Quantum Wells
KAROL GRZYCZYNSKI, University of North Texas, JIE LIN, TONY LLOPIS, ZHIMING WANG, G. SALAMO, ARKADII KROKHIN, ARUP NEOGI, UNIVERSITY OF ARKANSAS COLLABORATION, KWANGWOON UNIVERSITY, KOREA COLLABORATION — Gallium (Ga) droplets deposited on the cap layers of AlGaAs-GaAs single quantum wells (QWs) lead to a large blue shift in the observed photoluminescence of quantum wells compared to identical single wells without Ga droplets. Furthermore the intensity of the blue shifted emission peaks is enhanced with respect to the reference QWs. As the emission energies for all depths of QWs used (1.5nm to 10nm) exceed the plasmon resonance energy of the deposited Ga droplets, surface Plasmon polariton interactions cannot account for an increase in exciton recombination energy of about 20meV it is concluded that the blue shift and enhancement from the Ga droplets is not plasmonic in nature. The observed phenomena are described and modeled by applying an additional electrostatic potential to the confined excitons within the QW. An electrostatic attraction between the confined exciton and inhomogeneous nanoscale metal surfaces exert forces on the carriers both parallel and perpendicular to the surface of the well.

Jie Lin
University of North Texas

Date submitted: 10 Dec 2010

Electronic form version 1.4