Abstract Submitted
for the SES12 Meeting of
The American Physical Society

An Investigation of Surface-Plasmon Mediated Emission from Functionalized Zinc Oxide Nanowires DANIEL MAYO, Vanderbilt University, RICHARD MU, Fisk University, RICHARD HAGLUND, Vanderbilt University —
The exciton-plasmon coupling mechanisms responsible for enhancing photoluminescence in a three-dimensional, metal-coated ZnO nanowire architecture are examined using an insulating MgO interlayer. Vertically-oriented ZnO nanowires are grown by a modified vapor-solid method inside a vertical furnace. The sides of the nanowires are then coated with MgO and functionalized with Ag nanoparticles via electron-beam evaporation using a glancing-angle deposition apparatus. By varying the thickness of the MgO spacer layer, it is possible to elucidate the exciton-plasmon coupling mechanisms that mediate ZnO photoluminescence. For the visible emission, strong quenching occurs independent of the MgO thickness. In contrast, the band-edge emission displayed an enhancement factor of 20 as the nominal thickness of the MgO spacer was increased from 10 to 60 nm.

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Date submitted: 18 Sep 2012 Electronic form version 1.4