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Plasmon-coupled CdSe Quantum Dots for White LEDs QUINTON RICE, Hampton University, SANGRAM RAUT, RAHUL CHIB, ZYGMUNT GRYCZYNSKI, University of North Texas Health Science Center, IGNACY GRYCZYNSKI, Texas Christian University, WAN-JOONG KIM, Electronics and Telecommunications Research Institute, SUNG-SOO JUNG, Korea Research Institute of Standards and Science, BAGHER TABIBI, FELIX SEO, Hampton University — Plasmon-exciton coupling of Au nanoparticles CdSe quantum dots (QDs) are of great interest due to the many benefits and applications in optoelectronics including wide optical tunability, high color purity, and large PL enhancement in the vicinity of plasmonic nanoparticles. Exciton recombination in CdSe QDs originates from the Coulomb interaction while quantum confinement of carriers is responsible for discrete energy states and a blue-shift from the bulk bandgap (718 nm) when the size of the QDs near the bulk exciton Bohr radius (5.8 nm). The QDs strong confinement reveals a secondary emission site which is attributed to increased surface defects due to atomic vacancies and/or incomplete crystallization during synthesis. Photoluminescence (PL) enhancement and decreased exciton lifetime was observed for the bandedge transition with 2-3 fold enhancement and the surface-trapped state transition with 1.5-2 fold enhancement which is accredited to the modified internal quantum efficiency The strong presence of the broad surface-trapped state emission combined with PL enhancement through plasmon-coupling leads to the realization of hybrid white LEDs. Acknowledgement: This work at HU is supported by NSF HRD-1137747, ARO W911NF-15-1-0535, and NASA NNX15AQ03A.

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