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Optical Properties of Plasmon-coupled $CuInS_2$ and $CuInS_2$/ZnS Quantum Dots 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-coupled $CuInS_2$ (CIS) and $CuInS_2$/ZnS (CIS/ZnS) quantum dots (QDs) exhibit broad emission spectra and large PL enhancement that provides a great opportunity for the development of hybrid white light-emitting-diodes (LEDs). Plasmon-coupled excitons at the surface-/interface-, shallow-, and deep-trapped states of CIS and CIS/ZnS revealed spontaneous emission enhancement. The enhancements of plasmon-coupled CIS QDs were 2.4-folds compared to CIS while plasmon-coupled CIS/ZnS QDs exhibited 27.3-folds compared to CIS/ZnS. Large PL enhancement signifies the reduction of non-radiative due to the strong local field of Au NPs and the competing plasmon-coupling decay rate. Plasmon-coupled CIS/ZnS exhibited larger PL enhancement compared to plasmon-coupled CIS due to the increased spontaneous emission enhancement resulting from the reduction of non-radiative decay. Plasmon-coupled CIS and CIS/ZnS are excellent candidates for hybrid white LEDs due to the increased radiative decay by the localized surface plasmon resonance, the broad PL from CIS and CIS/ZnS, and good spectral coupling of blue diode excitation. Acknowledgement: This work at HU is supported by NSF HRD-1137747, ARO W911NF-15-1-0535, and NASA NNX15AQ03A.

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