Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Selective Plasmon-Exciton Coupling in Nonradiative Energy Transfer: Donor-Selective versus Acceptor-Selective PEDRO LUDWIG HERNANDEZ-MARTINEZ, Nanyang Tech Univ, TUNCAY OZEL, Bilkent University, EVREN MUTLUGUN, Nanyang Tech Univ, ONUR AKIN, SEDAT NIZAMOGLU, ILKEM OZGE OZEL, Bilkent University, QING ZHANG, QIHUA XIONG, HILMI VOLKAN DEMIR[1], Nanyang Tech Univ — We report selectively plasmon-mediated nonradiative energy transfer between quantum dot (QD) emitters interacting with each other via Förster-type resonance energy transfer (FRET) under controlled plasmon coupling either to only the donor QDs or to only the acceptor QDs. The comparative results of theoretical modelling of the donor- and acceptor selective plasmon-exciton coupling of nonradiative energy transfer is presented. Here, we demonstrate the ability to enable/disable the coupled plasmon-exciton formation distinctly at the donor site or at the acceptor site of our choice. In the case of donor-selective plasmon-exciton coupling, we observed a substantial shortening in the donor QD lifetime from 1.33 to 0.29 ns as a result of plasmon-coupling to the donors and the FRET-assisted exciton transfer from the donors to the acceptors. This enhances the acceptor emission by a factor of 1.93. In the complementary case, we observed a 2.70-fold emission enhancement in the acceptor QDs as a result of the combined effects of the acceptor plasmon coupling and the FRET-assisted exciton feeding. Our theoretical results are in good agreement with the systematic experimental characterization.

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Date submitted: 15 Nov 2013 Electronic form version 1.4