CONTROLLING QUANTUM DOT EMISSION BY PLASMONIC NANOARRAYS

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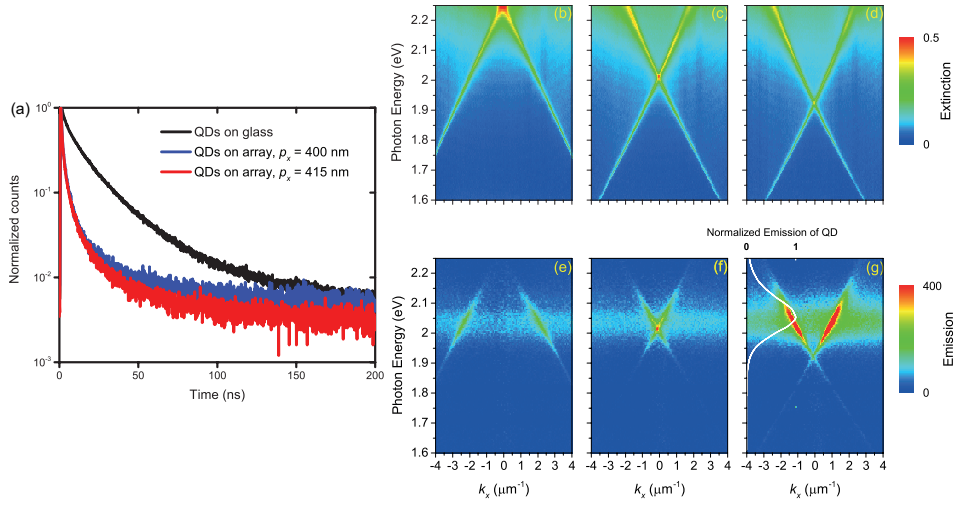
Metallic nanoparticle arrays support localized surface plasmon resonance (LSPR) and propagating surface lattice resonance (SLR). The collective SLR is an ideal platform for tailoring the emission profiles of nanoscale emitters [1]. Furthermore, the coupling between excitons and the collective modes of nanoarrays also offers an approach to exploring quantum and coherence phenomena if the strong coupling regime is achieved [2, 3].

In this work, we study the control of quantum dot (QD) emission coupled to the optical modes of silver nanoparticle arrays, both experimentally and numerically [4]. With a hybrid lithography-functionalization method, the QDs are deposited in the vicinity of the nanoparticles. Directionality and enhancement of the emission are observed in photoluminescence spectra and fluorescence lifetime measurements, respectively, as shown in the figure below. Similar features are also demonstrated in the numerical simulations. The tunable emission of this type of hybrid structures could lead to potential applications in light sources.



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