

Abstract Submitted  
for the MAR11 Meeting of  
The American Physical Society

**Photoluminescence spectroscopy and lifetime measurements from self assembled semiconducting quantum dot- metal nanoparticle hybrid arrays** M. HARIDAS, J.K. BASU, Indian Institute of Science — We demonstrate how the emission properties of a hybrid array consisting of semiconducting quantum dot (QD) and metal nanoparticles (NP) can be controlled by varying the density and distance between QD and NP independently. Our hybrid system consists of chemically synthesized cadmium selenide quantum dots (CdSe QDs) and polymer capped gold nanoparticles (Au NP) embedded in a block copolymer matrix having the topology of cylinders oriented perpendicular to the substrate. We have prepared hybrid arrays with two different densities of CdSe QDs ( $\rho_{QD}$ ) each having same Au NP densities ( $\rho_{Au}$ ). The photoluminescence measurements (PL) from such hybrid system shows enhancement in emission with increase in  $\rho_{Au}$ , compared to the CdSe QD film and the enhancement factor is lower for hybrid films with high  $\rho_{QD}$ . The lifetime measurement shows double exponent PL decay with systematic reduction in exciton lifetime for hybrid arrays with respect to  $\rho_{Au}$ . The film with high  $\rho_{QD}$  shows larger reduction in lifetime. Similarly, the amplitudes of the two relaxations switch over with increase in  $\rho_{Au}$ . It is clear that the shorter time becomes the dominant relaxation mode with increasing  $\rho_{Au}$ . Observed phenomena have been explained in terms of exciton plasmon interaction.

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Date submitted: 16 Dec 2010

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