Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Ultrafast exciton energy transfer from giant nanocrystals to layered J-aggregate films ASJA RADJA, HUE NGUYEN, Department of Physics, The University of Texas at Dallas, Richardson, TX, 75080, JENNIFER HOLLINGSWORTH, Chemistry Division and Center for Integrated Nanotechnologies, Los Alamos National Laboratory, L, ANTON MALKO, Department of Physics, The University of Texas at Dallas, Richardson, TX, 75080 — The integration of organic and inorganic materials at the nanoscale offers the possibility of developing new photonic devices that could combine the advantages of both classes of materials. Particularly interesting for such applications is a new class of core/shell CdSe/CdS nanocrystals (NQDs) with large number of shell monolayers (MLs) that are photostable, non-blinking and have an advantage of suppressed non-radiative Auger recombination leading to the existence of bright multiexcitonic (MX) states. However, due to large MLs thicknesses, the extraction of charge through such shells may pose considerable problems. In this work we studied hybrid structures composed of "giant", (#ML>10) CdSe/CdS NQDs anchored on top of thin layers of strongly absorbing J-aggregates (JA) of cyanine dye (TDBC). We performed time-resolved and steady-state photoluminescence (PL) measurements to quantify the *excitonic energy transfer* (ET) rates from the gNQDs to JA layer. By varying temperature (from RT to 80K) we observed change in ET rates in accordance with the overlap integral between NQD PL emission and JA absorption. In all cases, ET transfer rates exceeded 99%. Hence, we foresee the utilization of gNQDs in applications in hybrid systems based on energy transfer.

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Date submitted: 26 Nov 2011 Electronic form version 1.4