

Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

**Microscopic Models of Hybrid Nanocrystal Superstructures:
photonic properties** ALEXANDER O. GOVOROV, Department of Physics and
Astronomy, Ohio University, GARNETT W. BRYANT, NIST, Atomic Physics Divi-
sion, WEI ZHANG, TIMUR SKEINI, Department of Physics and Astronomy, Ohio
University, JAEBEOM LEE, NICHOLAS A. KOTOV, University of Michigan —
We investigate the optical properties of hybrid superstructures composed of metal
and semiconductor nanoparticles (NPs), and bio-linkers/polymers. Our study is in-
spired by recent experiments on bio-conjugated semiconductor-metal NP complexes
and their potential applications as sensors. Metal NPs can quench semiconductor
NP photoluminescence (PL). However, a plasmon enhancement can be achieved by
organizing many Au NPs into a spherical or cylindrical shell around a CdTe NP. We
compute electromagnetic fields induced in NP superstructures using a multipole ex-
pansion approach to describe the optical response of these complexes. Enhancement
of CdTe emission can result from plasmon mediated enhancement of the excitation
(Ag structures) or enhancement of the emission process (Au structures). The re-
sultant optical response comes from a complex interplay of this enhancement and
quenching and determines the potential applications of these superstructures.

Wei Zhang
Department of Physics and Astronomy, Ohio University

Date submitted: 22 Nov 2005

Electronic form version 1.4