

Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Dependence of the band gap of highly confined CdSe and PbSe nanocrystals on temperature AARON ZAUBI, Cornell College, J. BYLSMA, P. DEY, J. REJMAN, S. WITANACHCHI, P. MUKHERJEE, D. KARAIKKAJ, University of South Florida, M. BEARD, NREL — We have recorded fluorescence spectra from PbSe and CdSe quantum dots in hexane/toluene respectively between 5K and 300K in order to investigate the temperature dependence of the electronic band gap of these highly confined nanostructures. The band gap for CdSe follows the known blue shift with decreasing temperature. We have measured the temperature dependence of the band gap of PbSe quantum dots for two different diameters below 4 nm and indeed observe a red shift of the band gap with decreasing temperature, which is stronger for the smaller size quantum dots. Such behavior would contradict the expected blue shift of the band gap with decreasing temperature. The origin of this peculiar behavior is not well understood and we are pursuing further theoretical and experimental studies in order to elucidate the mechanism behind it. Using the method of single-nanostructure laser spectroscopy will allow us to observe individual nanostructures while simultaneously removing ensemble averaging effects due to quantum interactions between multiple structures.

Denis Karaiskaj
University of South Florida

Date submitted: 16 Dec 2010

Electronic form version 1.4