Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Shape-dependent exciton spin polarization studied by time-resolved magneto-optical spectroscopy KENNETH KNAPPENBERGER, DANIEL BLUMLING, Florida State University — Shape-dependent exciton spin polarization of semiconducting nanoparticles will be presented. Time- and polarization-resolved magneto-photoluminescence spectroscopy is carried out at low temperature in magnetic fields up to 17.5 Tesla to investigate the extent of spin polarization in CdSe quantum dots and nanorods. One-dimensional CdSe nanorods exhibit a large degree of circular polarization when even small magnetic fields are applied. The large spin polarization achieved in 1-D nanostructures is not observed in 0-D quantum dots. The experimentally measured polarization is attributed to strong mixing of "dark" and "bright" exciton fine-structure states in 1-D nanostructures, which leads to the formation of spin-polarized excitons. The polarized emission is also confirmed by wavelength-resolved intensity-integrated and time-correlated single-photon counting measurements. The findings may have significant impacts on devices based on the nanocrystals platform, including; solar-to-electric energy conversion, spintronics and chemical lasers.

Kenneth Knappenberger
Florida State University

Date submitted: 12 Nov 2009 Electronic form version 1.4