UGrad Research Poster Abstract: Gorski

Semiconducting nanoparticles have a broad range of applications, including bioimaging, energy harvesting, and charge transfer due to their size-tunability and accessible surface environment. Functionalizing the surface of these nanoparticles via quantifiable in situ ligand exchange can impact charge transfer capabilities which can be further explored in novel quantum chemistry research. Spectroscopic techniques such as ^1H NMR and photoluminescence (PL) spectroscopy provide valuable information about the surface environment of semiconducting nanoparticles. Oleate-capped CdSe quantum dots (QDs) and nanoplatelets (NPLs) readily undergo in situ ligand exchange reactions that can be probed with these techniques. PL spectroscopy was used to demonstrate surface interaction between an electron-donating ferrocene derivative and CdSe nanoparticles via photoluminescent quenching. ^1H NMR was used to resolve and quantify bound and free ligands on the surface of QDs and NPLs and demonstrated the controllable isolation of mixed-shell QDs. These results demonstrate the importance of surface ligand composition on the optical properties and charge transfer capabilities of semiconducting QDs and NPLs.