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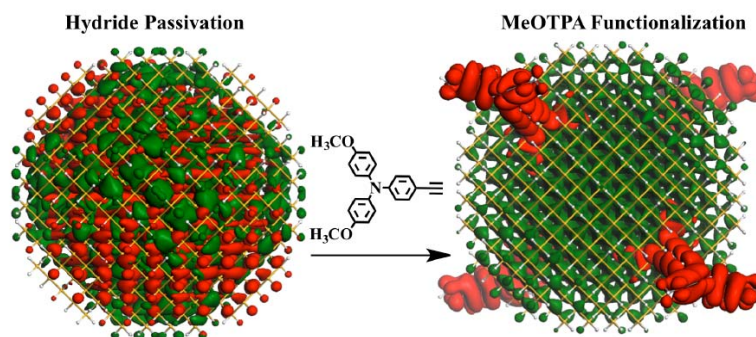
Condensed Matter Seminar

Conjugated Ligands for Tuning Bandgaps and Work-Functions of Hybrid Quantum Dots and Oxide Electrodes

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This presentation will describe the synthesis and characterization of aromatic acid and silane based surface ligands that can significantly change the bandgap of silicon quantum dots (SiQDs) and work-functions of common oxide electrodes. For example, we have recently demonstrated that custom designed and prepared electron rich or poor aromatic ligands, when attached to 2-5 nm diameter SiQD surfaces using vinylsilyl linkages, can lower the resultant materials bandgap and potentially increase the charge transport properties. Furthermore, we have prepared conjugated aromatic acids with extreme dipole moments using mild Heck chemistry that have been used as ligands for tuning the work-function of ZnO, ITO, and NiO electrodes by 2 eV, a magnitude of which has not been reported to date.



HOMO (red) and LUMO (green) isosurfaces, from TDDFT analysis of a 3.1 nm $\text{Si}_{849}\text{H}_{344}$ QD capped (left) by only hydride and (right) by hydride and four MeOTPA ligands.

Thursday, November 19th at 12 pm in Duane Physics G126



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