

Abstract Submitted
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Characterization of the surface environment of PbSe nanoparticles by correlating calculated and measured x-ray spectra KEITH GILMORE, AARON HAMMACK, APRIL SAWVEL, EVELYN ROSEN, D. FRANK OGLETREE, JEFFREY URBAN, DELIA MILLIRON, BRETT HELMS, BRUCE COHEN, DAVID PRENDERGAST, Lawrence Berkeley National Lab, NANO-SURFACES TEAM — Given that defining characteristics of nanoparticles are often dictated by their surfaces, it is desirable to be able to control the surface environments. We seek this control through ligand exchange chemistry and investigate PbSe as a model system. We correlate calculated and measured x-ray spectra to quantify the extent of ligand exchange, validate our structural models, and characterize the optical and electronic properties induced by the new surface environment. Chemical shifts in x-ray photoelectron spectra indicate changes in atomic bonding at the surface, whereas x-ray absorption spectra reveal ligand conformation and binding coordination at the surface. The colloidal synthesis of PbSe particles is highly reliable and the resulting particles are technologically useful size-tunable IR absorbers. Such particles have Pb rich surfaces and native oleic acid coats. We replace the oleic acid with alternate ligands of choice, which may change the Pb:Se ratio at the particle surface.

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