

Abstract Submitted
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Ultrafast Pump-Probe Measurement of Media Dependent Exciton Lifetimes in Lead Sulfide Quantum Dots.¹ JOHN MAURER, MARK SIEMENS, BRIAN GREEN, University of Denver — We present exciton lifetime measurements of Lead Sulfide (PbS) quantum dots (QDs) in solution versus a dried film. In our experiments, we use ultrafast laser pulses from a Ti:Sapphire oscillator in a pump-probe experiment. The laser pulses resonantly generate excitons (pump) and probe the remaining exciton population (probe) to measure the exciton lifetime. The pronounced differences in environmental conditions between a solution and solid film could have drastic effects on the mean lifetime of excitons confined to QDs, due to the differing electrostatic and mechanical properties of the media. In particular, contributions of the surface morphology on exciton dephasing and depopulation, including direct exciton-surface interactions and surface-mediated phonon states that can scatter excitons. By investigating samples of PbS QDs in solution versus dried film, the effects of media dependent exciton lifetimes can be probed and exciton lifetimes tuned to a desirable time scale, allowing for utilization of the excited state energy.

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