Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Optical Properties of PbSe Nanocrystal Quantum Dots Under Pressure[1] KIRILL K. ZHURAVLEV, JEFFREY M. PIETRYGA, ROBERT K. SANDER, RICHARD D. SCHALLER, Los Alamos National Laboratory — The optical properties of PbSe nanocrystal quantum dots (NQDs) were studied as a function of applied hydrostatic pressure over the range from ambient to 4 GPa. PbSe NQDs exhibit an energy gap that is dominated by quantum confinement energy. Despite such strong confinement, we find that the energy gaps of 3, 5, and 7 nm PbSe NQDs change monotonically with pressure with a dependence that is almost entirely determined by the deformation potential. The sizable dependence of the NQD energy gap with pressure invites applications in the areas of high speed pressure sensing and tunable IR lasers. We will also present x-ray diffraction data, including the data indicating new phase transition not observed earlier.

[1]This work was supported by the US Department of Energy under contract W-7405-ENG-36 and the Intelligence Technology Innovation Center. JMP was supported by an Intelligence Community Research Fellowship. RDS was supported by a Frederick Reines Fellowship.

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Date submitted: 15 Nov 2006 Electronic form version 1.4