Abstract Submitted for the SES08 Meeting of The American Physical Society

Nonlinear optical properties of semiconductor nanocrystals: theory and experiments<sup>1</sup> QIGUANG YANG, JAETAE SEO, SEONGMIN MA, Department of Physics, Hampton University, Hampton, VA 23668, WILLIAM YU, Department of Chemistry and Biochemistry, Worcester Polytechnic Institute, Worcester, MA 01609, SUNGSOO JUNG, Korea Research Institute of Standards and Science, Daejeon, 305-600, South Korea, BAGHER TABIBI, JESSICA FREEMAN, DOYLE TEMPLE, Department of Physics, Hampton University, Hampton, VA 23668 — The third-order nonlinearities of various semiconductor nanocrystals have been investigated both theoretically and experimentally. The theoretical calculations have been done by using density matrix method and the experimental measurements have been fulfilled using time-resolved four-wave mixing, Z-scan, and I-scan methods under different experimental conditions. The experimental data have been compared to the theoretical calculations and the physical origins of the third-order nonlinearities of the semiconductor nanocrystals have been discussed. The possible nonlinearphotonic device applications of these materials have been suggested.

<sup>1</sup>This work at Hampton University was supported by the National Science Foundation (HRD-0734635, HRD-0630372, ESI-0426328/002, and EEC-0532472) and the Army Research Office (W911NF-07-1-0608).

> Qiguang Yang Department of Physics, Hampton University, Hampton, VA 23668

Date submitted: 15 Aug 2008

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