Supercontinuum-Excited Z-scan Spectroscopy of CdSe/ZnS Semiconductor Coreshells

JAETAE SEO, QIGUANG YANG, Department of Physics, Hampton University, Hampton, Virginia 23668, U.S.A., WILLIAM YU, Worcester Polytechnic Institute, Worcester, Massachusetts 01609, U.S.A., WANJOONG KIM, Electronics and Telecommunications Research Institute, Daejeon 305-700, South Korea, SUNGSOO JUNG, Korea Research Institute of Standards and Science, Daejeon 305-340, South Korea — Ultrafast and large nonlinear optical properties of semiconductor nanocrystals are of great interest because of their photonic applications. An ultrafast and white-light continuum Z-scan analysis provides, rapidly and simultaneously, the electronic contribution spectra of nonlinear absorption and dispersive nonlinear refraction of CdSe/ZnS colloidal coreshells, and laser intensity and excitation wavelength. CdSe/ZnS coreshells exhibited different polarities of nonlinear optical properties with resonant and nonresonant excitations which imply existence of electronic two-step absorption and two-photon absorption processes. This work at Hampton University was supported by the National Science Foundation (HRD-0734635, HRD-0630372, and ESI-0426328/002) and the U.S. Army Research Office (W911NF-07-1-0608).