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Cubic Nonlinearity of Ag/Au Coreshells SEONGMIN MA, JAETAE SEO, QIGUANG YANG, BAGHER TABIBI, DOYLE TEMPLE, Hampton University, WANJOONG KIM, JINHA HEO, WAN SOO YUN, SUNGSOO JUNG, Korea Research Institute of Standards and Science, HAMPTON UNIVERSITY COLLABORATION, KOREA RESEARCH INSTITUTE OF STANDARDS AND SCIENCE COLLABORATION — Cubic nonlinearity of Ag/Au spherical coreshells in toluene were investigated by polarization-resolved degenerate four-wave mixing with 6-ns laser pulse at 532 nm with 10-Hz repetition. The average diameter of Ag core was ∼6.7 nm. The overall diameter of Ag/Au was changed from 6.1 to 9.1 nm by adding more mole concentration of $HAuCl_4$, which resulted in the change of surface plasmon resonance peaks from 411 to 492 nm. The hyperpolarizability of Ag/Au coreshells with parallel and orthogonal excitations were changed from $\sim 3.4\times10^{-38}$ to $\sim 2.7\times10^{-40}$ m^5/V^2 and from $\sim 2.5\times10^{-38}$ to $\sim 1.1\times10^{-40}$ m^5/V^2, respectively, as the shell thickness of Au was increased. It implies that dephase or decay rates of materials have main contributions on cubic nonlinearity rather than excitation cross-section. This work at Hampton University was supported by Army Research Office (W911NF-07-1-0608) and National Science Foundation (HRD-0734635, HRD-0630372, ESI-0426328/002, and EEC-0532472).

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