

Abstract Submitted
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Observation of Saturable and Reverse Saturable Absorption in Silver Nanodots¹ ULLAS GURUDAS, DANIEL BUBB, Rutgers-Camden, THOMAS LIPPERT, SEBASTIAN HEROITH, PSI — Saturable absorption (SA) and reverse saturable absorption (RSA) were observed in Ag nanodots prepared by pulsed laser deposition. The Real [$\text{Re } \chi^{(3)}$] and Imaginary [$\text{Im } \chi^{(3)}$] part of the third order nonlinearity of these films are measured as and respectively, using Z-scan technique. The decrease of absorption under strong optical illumination results in a negative $\text{Im } \chi^{(3)}$ at the photon energy used. At higher input irradiance RSA becomes dominant. The transformation from SA to RSA suggests that another nonlinear process takes place and become dominant. To evaluate the recovery time of these nonlinear processes and get an idea about the underlying mechanism, we conducted a degenerate pump-probe experiment with 25 psec, 532 nm laser pulses. The increased $\chi^{(3)}$ and fast response time of the Ag nanoparticles can be used for optical pulse compressor, optical switching, laser pulse narrowing and protecting optical sensors from intense laser pulses.

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