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Z-scan studies of nonlinear optical properties of colloidal gold nanorods and nanoshells

Autorzy

Marta Gordel

Radosław Kołkowski

Joanna Olesiak-Bańska

Katarzyna Matczyszyn

Malcolm Buckle

Marek Samoć

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Streszczenie

A quantitative comparison of third-order nonlinear optical properties of colloidal gold nanoshells (NSs) and gold nanorods (NRs) in water solutions has been carried out using openand closed-aperture Z-scan measurements, performed with femtosecond laser pulses over a broad range of wavelengths. Absorption saturation was found to be a dominant effect for all the studied nanoparticles; however, two-photon absorption (2PA) properties were also detected, and were clearly resolved especially at the shortest wavelengths used. The value of the merit factor γ_2/M (2PA cross section scaled by the molecular weight) for the NRs (10 × 35 nm) at 530 nm is 7.5 (GM · mol/g), while for the NSs it is 1.9 (GM · mol/g) at the same wavelength.

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