Nonlinear absorption and nonlinear refraction: maximizing the merit factors.

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Streszczenie

Both nonlinear absorption and nonlinear refraction are effects that are potentially useful for a plethora of applications in photonics, nanophotonics and biophotonics. Despite substantial attention given to these phenomena by researchers studying the merits of disparate systems such as organic materials, hybrid materials, metal-containing molecules and nanostructures, it is virtually impossible to compare the results obtained on different materials when varying parameters of the light beams and different techniques are employed. We have attempted to address the problem by studying the properties of various systems in a systematic way, within a wide range of wavelengths, and including the regions of onephoton, two-photon and three-photon absorption. The objects of our studies have been typical nonlinear chromophores, such as π-conjugated molecules, oligomers and polymers, organometallics and coordination complexes containing transition metals, organometallic dendrimers, small metal-containing clusters, and nanoparticles of various kinds, including semiconductor quantum dots, plasmonic particles and rare-earth doped nanocrystals. We discuss herein procedures to quantify the nonlinear response of all of these systems, by defining and comparing the merit factors relevant for various applications.

Słowa kluczowe

Nonlinear absorbers, nonlinear refractive index, nonlinear microscopy, 3D information storage, all-optical switching 1.

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