Diploma thesis abstract

Photo-orientation of azo-die molecules in solid-state nanostructured films by two-photon excitation.

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Orientation of molecules in thin nanostructured films made from pure azo-die induced by nonlinear excitation has been registered for the first time. The significant absorption dichroism appears in blue spectral range if a 210-nm film is illuminated during 1 minute with 60-fs pulses of ~ 2 GW/cm^2 pick intensity (linear polarization, 800-nm wavelength, 50-mW averange power, 80-MHz repetition rate). Thus, transmission of the film in the irradiated region increased 2.5 times in the case of parallel polarizations of pump and probe radiation and decreased 2.5 times in the case of orthogonal polarizations of pump and probe radiation. The kinetics of this process measured for various values of pump power were measured. It has been experimentally shown, that orientation process is initiated by two-photon absorption.

Optical anisotropy of scattering in nanostructured solid-state azo-dye films induced by nonlinear absorption has been registered for the first time. One-photon excitation also produces polarization anisotropy of scattering: the power of the laser beam passed through the film without scattering showed over 100 times difference for two orthogonal polarizations.

High photochemical stability of azo-die AD-1 and efficient nonlinear orientation show that this material is promising for photonics.