

Nanooptics and nanophotonics

The effect of gold nanoparticles incorporation on nonlinear optical response of metal alkanooates with CW laser excitation

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The metal alkonates are novel class of liquid crystals with unique chemical and physical properties. Recently it was shown that incorporation of CdSe nanoparticles leads to the enhancement of nonlinear optical (NLO) response of cadmium octanoate (CdC₈) matrix [1].

In this work we study the absorptive and refractive NLO response of the CdC₈ and the cobalt octanoate (CoC₈) matrices with incorporated gold nanoparticles (Au NPs) by the self-action technique [2] under CW laser excitation at 532 nm. It was shown that metal alkanooat matrices demonstrate the efficient photoinduced variations of refractive index ($\text{Re}(\chi) \sim -3.4 \cdot 10^{-2}$ esu for the CdC₈ and $\text{Re}(\chi) \sim 2.3 \cdot 10^{-2}$ esu for the CoC₈). The incorporation of AuNPs leads to the refractive NLO response sign inversion/enhancement in CdC₈/CoC₈ matrices. The effect is determined by the surface plasmon excitation in Au NPs. The results indicate the possibility of metal alkanooat matrices NLO response control due to the Au NPs incorporation.

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2. Uklein A.V., Vasko A.A., Ouskova E.V, Brodyn M.S., Gayvoronsky V.Ya. Nonlinear Optical Properties of New Photosensitive Smart Materials Based on Nematic Liquid Crystal with H-Bonded Dye-Polymer Complex. *Opt. Commun.* -2013. – **296**. - P. 79-83.