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Optical Properties and Photoinduced Anisotropy of PEPC-co-SY3 Nanocomposite

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Abstract

In the present work, the optical properties of the PEPC-co-SY3 nanocomposite doped with gold nanoparticles are brought to light. The samples were prepared with 3 different concentrations of Au as well as a control sample of undoped azopolymer. Thin films were studied with UV/Vis and polarimetric spectroscopy. The paper's results show bandgap shifts depending on the concentration of gold nanoparticles.

At the same time, the analysis of the spectral dependence of the transmittance, the reflectance, the absorption coefficient as well as the refractive index, indicates a proportional dependence of these parameters on the nanoparticle concentration. It was found that the band gap narrows with increasing concentration of nanoparticles, it decrease from $E_g = 2.38$ eV for undoped azopolymer to 2.3 eV for azopolymer with a concentration of nanoparticles $C = 0.001$ mg/ml. The angular dependences of the azimuth and ellipticity of probe beam are also analyzed, which indicates the appearance of the polymer chirality change. Also, from the study of the spectral properties of azopolymer films and azopolymer nanocomposites, a change in the values of the spectral dependence of the refractive index was revealed, which was calculated taking into account the reflection spectrum, which has more pronounced interference peaks which leaves its mark on the refractive index spectra, and the dependence refractive index on the concentration of nanoparticles.

Keywords: azopolymers, nanocomposites, surface plasmon resonance, photoinduced birefringence, optical reversibility, anisotropic optical materials



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