

Effect of Gold Nanoparticles on Thermal, Mechanical and Optical Properties of Polysiloxane polymer

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Abstract: We investigated the nonlinearity of liquid crystal cell doped with gold nanoparticules by considering their selective absorption. Such nonlinearities are promising for optical processing applications and optical limiters. Systems displaying thermal nonlinearities are particularly attractive as the maximum nonlinearity m occur in the absence of an applied field and and additionally this nonlinearity can be controlled by the reorientation of the liquid crystal. This study focuses on the electro –optic properties of polymer with a dfferent ratios of gold nanoparticles addition to the polysiloxane polymer, it is fond that there is a strong coupling between the mesogenic side chain groups and the polymer chain that the elasticity of the polymer chain plays a strong role even in the static electro-optic properties. The switching time (on) and (off) have been measured through the period between planer and homotropic alignment which happens under the electrical field effect. Additionally, it is found that adding gold nanoparticules moieties will decrease the phase transition temperatures and thus decreasing of switching times. The variation of the threshold voltage is measured at constant steps below nematic –isotropic transition temperature (T_{NI}) series of polymer. It is found with increasing proportion gold added to the polymer related to reduce the threshold voltage of electro-optic response and this is related to the intrinsic elastic constant of the liquid crystal polymers. The performance of the electro-optical cells has improved after add the barium titanate would reduce the contribution of the dibole moment of the cyano-groub baralle to the molecular long axis of the mesogenic unit and thus reduce density of the mesognic unit attached to polymer chaine and lead to a increase of dielectric anisotropic (ϵ) and thus enhanced backbone mobility for the system.

Keywords : Gold Nanoparticles, Polysiloxane, electro-Optical Properties.

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