

## **Effect of BaTiO<sub>3</sub> Nanoparticles Amount Addition on Electro-Optical Properties of Side Chain Liquid Crystal Polymer**

**Khalid Al.Ammar Hawra'a Abd-Al Ameer Salih**

**Physics Department – college of Education for pure science–Babylon University/ Iraq**

**Abstract :** In this paper of this studies the synthesis and characterization of liquid crystalline side chain polymers with mesogenic groups laterally attached to the polymer main chain are described by variation of the terminal group ,moiety ,a change in the glass transition temperature, the nonlinearity of liquid crystal cell doped different molecular weights with Barium Titanate nanoparticles BaTiO<sub>3</sub> by considering their selective absorption This study focuses on the electro – optic properties of polymers with a different molecular weights based on the polysiloxane backbone. Additionally, it is found that adding barium titanate nanoparticles moieties will decrease the phase transition temperatures and thus decreasing of switching times , and which is due to in the viscosity of the polymer which is product from 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 . It is found that the high molecular weights of polymers have great threshold voltage of the electro– optic response and this is related to the intrinsic elastic constant of the liquid crystal polymers .when decreases molecular weight The increases order parameter cause by the degree of cross-link that get in the molecules of the material are few . The effect of the low molecular weight of the polymer reduces the threshold voltage and that it is possible to have relationship an increase flexible spacer of polymer. The application of a stress field to the elastomer while in the nematic phase result in a stress –induced alignment of the mesogenic units in the direction of the extension .The performance of the electro – optical cells has improved after add the barium titanate would reduce the contribution of the dipole moment of the cyano – group parallel to the molecular long axis of the mesogenic unit and thus reduce density of the mesogenic unit attached to polymer chain and lead to a Increases of dielectric anisotropic (  $\Delta\epsilon$  ) and thus enhanced backbone mobility for the system.

**Key word :** Barium Titanate nanoparticales, Polysiloxane, electro-optic properties.