Abstract

This thesis describes the effect of the PDLC (Polymer Dispersed Liquid Crystals) materials doping by inorganic nanoparticles for industrial applications in the field of opacity controlled glazing. Emphasis is made on understanding of the parameters influencing the electro-optical response of these materials. The elaboration of thesamples was carried out using the method of photo-polymerization induced phase separation (PIPS) from the initial mixtures comprising a nematic liquid crystal (CL) E7 and a difunctional acrylic monomer tripropylene glycol di-acrylate (TPGDA) in the presence of TPO photoinitiator, exposed to UV radiation. The addition of inorganic nanoparticles with high eclectic and magnetic properties to the PDLCs is performed in order to improve the electrooptic response of these materials. A study of the matrix behavior of the in the presence of nanoparticles was established in order to interpret the observed differences on the electrooptical properties. Infrared spectroscopy analysis revealed a decrease in the conversion rate caused by nanoparticles. The study of the swelling in isotopic solvents has shown that inclusions of TiO2 nanoparticles decrease the swelling ratio of the TPGDA matrix. Optical microscopy (MOP) and differential scanning analysis (DSC) studies were performed to determine the transition temperatures of these materials based on the system composition.The results obtained show that the glass and nematic-isotropic transition temperatures increase by the addition of nanoparticles. An improvement of the electrooptic response for the doped PDLC was obtained at relatively low voltages. This confirms the good disposition of these systems in the field of industrial application.

KEYWORDS: polymer networks, doping, PDLC, electro-optics, TiO2 nanoparticles.