

A Kinetic Study of Radical Polymerization of Acrylic Monomers in the Presence of the Liquid Crystal and the Electro-Optical Properties of These Mixtures

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Abstract : Intensive research continues in the field of liquid crystals (LCs) for their potential use in modern display applications. Nematic LCs has been most commonly used due to the large birefringence and their sensitivity to even weak perturbation forces induced by electric, magnetic and optical fields. Polymer dispersed liquid crystals (PDLCs), composed of micron-sized nematic LC droplets dispersed in a polymer matrix is an important class of materials for applications in different domains of technology involving large area display devices, optical switches, phase modulators, variable attenuators, polarisers, flexible displays and smart windows. In this study the composites are prepared from mixtures of monofunctional acrylic monomers, (Butylacrylate (ABu), 2-Ethylhexylacrylate (2-EHA), 2-Hydroxyethyl methacrylate (HEMA) and hydroxybutylmethacrylate (HBMA)) and two liquid crystals: (4-cyano-4'-n-pentyl-biphenyl) (5CB) and E7 which is an eutectic mixtures of four cyanoparaphenylenes. These mixtures are prepared adding the Darocur 1173 as photoinitiator, the 1,6-hexanediol diacrylate (HDDA) as cross-linker agent, and finally they are exposed to UV irradiation. The kinetic polymerization of monomer/LC mixture were investigated with the Fourier Transform Infra Red spectroscopy (FTIR). The electro-optical properties of the PDLC films were determined by measuring the voltage dependence on the transmitted light.

Keywords : acrylic monomers, films PDLC, liquid crystal, polymerisation

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