## Nanocomposites and nanomaterials

# Nano-sized polymer-dispersed liquid crystal materials

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Polymer-dispersed liquid crystals (in short PDLC) materials consist of droplets of a low molecular weight nematic liquid crystal which are randomly distributed through a transparent polymer matrix [1]. In these materials a strong light scattering occurs in the visible wavelengths. The intensity of scattered light is changed by the response of liquid crystal droplets to the applied electric field. Thus these systems are widely used in various electro-optical displays [2].

However, small droplets with diameters of the order of 100 nm or less do not cause significant light scattering for visible light range [3]. These nano-sized PDLC systems are termed as (n-PDLC). Due to the size of these droplets, n-PDLCs exhibit a non-light scattering, so they have relatively good transparency. This property allows the fabrication polarization-independent devices [4]. These systems are useful for a number of optical applications such as optical communication systems.

Electro-optic properties of n-PDLC films mainly depend on the chemical nature of the polymer and liquid crystal as well as on the method of preparation. In this study n-PDLC films are fabricated. The optical transmission of the n-PDLC films versus the applied electrical field is also reported. These films are fabricated by using polymerization induced phase separation (PIPS) of a reactive monomer-liquid crystal blend exposed to ultraviolet radiation. The process of droplet formation in a PIPS process is quite complex. The droplet size, shape and density depend on several factors such as total LC content, photo-polymerization rate and solubility of the liquid crystal.

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