

Flexo-dielectro-optical spectroscopy as a method of studying nanostructured nematic liquid crystals

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The method of flexo-dielectro-optical spectroscopy was initially developed to study the spectra of the linear and quadratic electro-optic response of continuous nematic liquid crystal layers as a function of the frequency of the applied electric field in the low frequency range (0.1 – 1000 Hz) [1]. Subsequently, it was applied to the microconfined PDLC system [2].

In the present study nanostructured nematic systems of some alkyl cyanobiphenyl liquid crystals containing hydrophilic aerosil silica nanoparticles is investigated. The method is implemented by a lock-in detection of the 1st and 2nd harmonic of transmitted laser light through a liquid crystal layer subjected to a.c. electric field. The registering of spectra is done by the LabVIEW visual programming software. Spectra were recorded at various temperatures of the nematic phase.

The spectra so obtained contain information about liquid crystal disorder induced by the nanoparticles in the nanoscale vicinity of each particle.

1. Y.Marinov, N.Shonova, C.Versace, A.G.Petrov, *Mol.Cryst.Liq.Cryst.* **329** (1999) 533-538
2. A. G. Petrov, Y. Marinov, S. D'Elia, S. Marino, C. Versace, N. Scaramuzza, *J. Optoelec. Adv. Mat.* **9** (2007)420 – 423