The Comparative Investigations of Phase Transitions In Liquid Crystalline Films and Volume Samples

I. Estrela-Llopis, V. Pogorelov, and W. Bukalo
Department of Physics
Kiev Taras Shevchenké's University
Kiev, 252127, Ukraine

Comparative investigations of phase transitions in volume and film mesogenic media (MBBA, EBBA and aminoxy-benzylidene) have been performed in the work. The information about phase transitions has been obtained from analysis of Raman and electronic spectra of these substances. Two Raman spectra regions corresponding to intramolecular bending and stretching vibrations of C = N - groups and benzene rings have been investigated. Regularities connecting parameters of vibrational bands with structural peculiarities of different phases obtained at various rates of preliminary cooling of sample have been found. Using these connections the conformational angles, the energetic barriers between different conformers, and the order of nonarrangement of various phases have been calculated for volume and film mesomorphous media. The possibility of receipt of quantitative information about the influence of thermal pre-history of the samples on their structural compositions and about structural relaxation times of non-equilibrium phases in investigated objects has been determined. Models of structural transformations, the possibility of the prognostic of structural evolution, and the identification of phase transitions for wide classes of mesogenic media are discussed in the report.