# Dynamics of NonEquilibrium States in Supercooled Liquid Crystals

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Phase transformations in mesomorphous substances influence the dynamics of intramolecular vibrations and are manifested as changes of frequency and shape of thecorresponding vibrational bands. An important advantage of spectroscopy is the possibility to obtain quantitative phase composition, to trace the influence of polymorphous transformations between non-equilibrium states on individual fragments of the investigated molecules, and on their comformations. Results of an investigation of temperature variations of the Raman spectra of supercooled liquid crystals in a frequency range corresponding to intramolecular vibrations are presented in the present report. The dependence on the thermal pre-history of the sample may be obtained for a few coexisting nonequilibrium fractions (supercooled nematic, glass and solid phases.) A proportional correlation of these fractions is determined from cooling rate, anneal time, and other factors. From the dependence of their correlation, it is possible to determine one or another phase diagram. The dynamics and kinetics of phase transformations, such as supercooled nematic - glass, glass - metastable crystal and metastable - stable crystal, have been investigated. According to the temperature variations of the widths and Raman band shifts, information about the phase composition and phase equilibria of complicated states was obtained, as well as the temperature and character of polymorphous transitions, the dynamics of the molecular conformational angle for non-equilibrium states, and the times of structural relaxation.