

Relaxation Processes in Isotropic Phase of Cholesteryl Myristate

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A relaxation time is usually used as the fundamental information parameter when the dynamics of phase transitions is investigated. This paper reports the study of acoustic parameters in the isotropic phase of Cholesteryl Myristate (CM) within a wide frequency range (from 2 MHz to 7 HHz) and temperature range from 100 °C to 84 °C. In the frequency range from 2 MHz to 22 MHz the pulse method based on diffraction of light on ultrasound waves was used. In the frequency range from 1.1 HHz to 7 HHz, we worked with the method of Mandelshtam-Brillouin light scattering spectroscopy.

It is observed at least three relaxation processes occur in the isotropic phase of CM within the frequency range from 2 MHz to 7 HHz. The first relaxation process (characterized by weak dependence on temperature) in the frequency range from 1 HHz to 7 HHz and the third relaxation process (characterized by strong dependence on approach to the point of phase transition) in the frequency range from 2 MHz to 22 MHz are analogous to those observed for the isotropic phase of nematogen MBBA (p-methoxybenzylidene-p-n-butylaniline). By analogy with nematogens we connect the existence of these processes with the molecular rotation along major axis and the order parameter fluctuations.

The second relaxation process observed in the range of hypersound frequencies is characteristic only for the isotropic phase of CM and it is not observed for nematogens. The existence of this relaxation process we connect with the kinetics of structure fluctuations of either smectic or cholesteric type.