

Orientalional structures of cholesteric droplets with conical boundary conditions

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Polymer dispersed cholesteric liquid crystal (CLC) is a composite polymer film with liquid crystal droplets dispersed in it. This material is characterized by controlled optical properties, which depend on liquid crystal orientational structures in the droplets. In turn, the orientational structures are specified by the anchoring conditions of CLC molecules at the polymer surface and the ratio of the droplet diameter d and intrinsic CLC pitch p_0 . At present, the CLC droplets with tangential or normal boundary conditions are well studied [1-3]. Orientational structures in CLC droplets with conical anchoring are almost unexplored. Recently the polymer dispersed nematic liquid crystal with conical boundary conditions was investigated [4]. It has been shown that several different orientational structures can be formed in these droplets [5]. One of the most common structures is an axial-bipolar configuration with a circular surface disclination and two radial boojums.

In the present work, the orientational structures of CLC droplets with conical boundary conditions have been studied. Twisted axial-bipolar structure with a circular disclination and two boojums are formed in CLC droplets when the confinement ratios d/p_0 less 1.8. In this case, the CLC director is twisted in the direction perpendicular to the bipolar axis similar a twisted bipolar structure. Besides the symmetrical bend of the circular disclination directly proportional to the ratio d/p_0 is observed (Fig. 1a,b). The layer-like structures with the pitch approximately equal to intrinsic CLC pitch p_0 are formed in CLC droplets when the confinement ratios d/p_0 exceeds 1.8 (Fig. 1c).

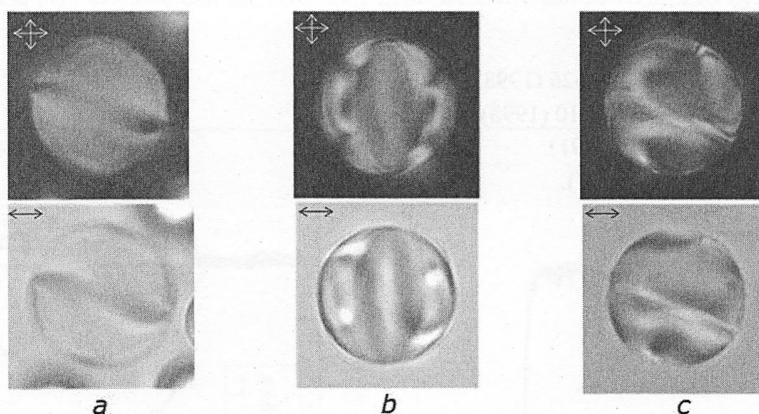


Fig. 1. Photographs of the cholesteric droplets in crossed polarizers (top row) and with switched-off analyzer (bottom row). Twisted axial-bipolar structure with a circular disclination and two radial boojums with confinement ratios $d/p_0 = 0.1$ (a) and $d/p_0 = 1.8$ (b), the layer-like structure with $d/p_0 = 2.0$ (c).

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