

LC layers under planar-conical anchoring with various tilt angles specified by polymethacrylate compositions

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Liquid crystals (LC) are a promising material for optical devices owing to their unique structure. Varying LC director orientation, one can control the electro-optical properties of optical cells. Initial director distribution in LC cells is assigned by the anchoring conditions at the cell surfaces. At present, The LC systems under conical surface anchoring with the director tilt angle in the range from 0° to 90° and azimuthal degeneration of the director orientation are still insufficiently studied.

In this paper, we have investigated the orientational structures in nematic layers formed under planar-conical boundary conditions with the various director tilt angles. The planar anchoring was specified by the rubbed polyvinyl alcohol (PVA) film at one of the LC cell substrates. The conical boundary conditions were assigned at another substrate by the matched mixtures of polymer poly(isobutyl methacrylate) (PiBMA) [1] and polymer poly(methyl methacrylate) (PMMA). We have studied the dependence of the director tilt angle from the ratio of PiBMA : PMMA in the orienting film and shown that the tilt angle increases from 0° to 47.7° when PiBMA : PMMA ratio changes in the range 30:70 to 100:0 [2]. The orientational structures formed under various director tilt angles and their modification under ac electric field have been analyzed (Fig. 1).

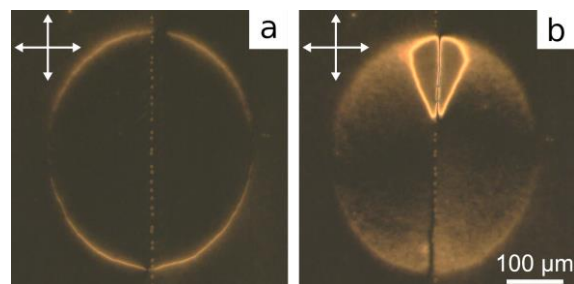


Figure 1 – POM photos of the domain in LC cell with planar-conical anchoring before (a) and after (b) the action of voltage $U = 10$ V. The director tilt angle is 36.7°.

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References:

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