Layer Stabilization against Field-Induced Deformation in Vertically Aligned Deformed-Helix Ferroelectric Liquid Crystals

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The vertically aligned structure of the deformed-helix ferroelectric liquid crystals (DHFLCs) has attracted interest in display and fiber-optic applications since its excellent features such as fast response time and complete dark state [1,2]. In the vertically aligned DHFLC, the in-plane switching electrodes were used for electro-optic switching. In such configuration, however, the light leakage near the electrode edge was observed due to the irrecoverable layer deformation by the strong vertical field [2,3]. We report a method stabilizing the smectic layer against field-induced deformation of the vertically aligned DHFLCs with introducing the pre-polymer into the DHFLC. After exposure of ultra-violet (UV) light, the polymeric structure enhanced the stability of the smectic layer against the vertical electric field and thus the reliable switching characteristics were obtained as shown in Fig. 1. Also, we investigated the polymer/DHFLC mixed structure to understand the underlying stabilization mechanism.

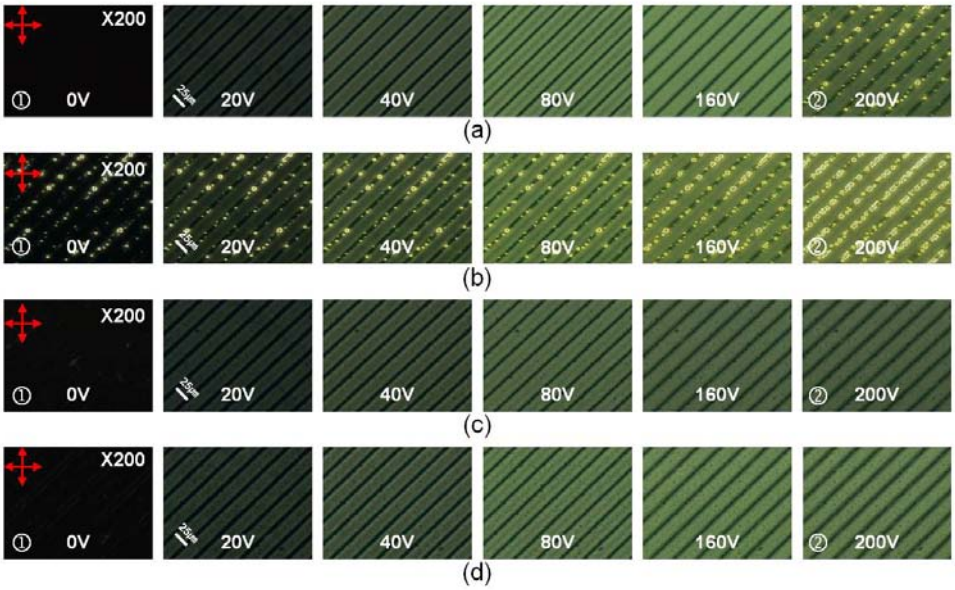

Figure 1 The microscopic textures of experimental cells: the normal DHFLC cell as a function of the applied voltage (0V ~ 200V) (a) at first operation and (b) at second operation. The proposed DHFLC cell as a function of the applied voltage (c) at first operation and (d) at second operation.

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