

No-bias-bend pi cell using the rubbed polyimide mixture

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Abstract : Most liquid crystal display modes, including the twisted nematic (TN) mode¹, the in-plane switching (IPS) mode², the fringe field switching (FFS) mode³, and the vertically aligned (VA) mode⁴ are based on either a horizontal or a vertical alignment. However, for some applications, such as no-bias-bend (NBB) pi cell or bistable bend-splay display, an intermediate pretilt angle is essential.⁵ NBB pi cells have been a focus of interest because of their fast response time; however, the reliable control of the intermediate pretilt angle of liquid crystals that is required for the fabrication of NBB pi cells is challenging. The controllable pre-tilt angle of liquid crystals was investigated using a blend of horizontal and vertical polyimide prepared by a rubbing method. Various pretilt angles in the range from 0° to 90° were achieved as a function of the vertical polyimide content. We observed uniform liquid crystal alignment on the rubbing-treated blended polyimide layer. A NBB pi cell with an intermediate pretilt angle of 47.8° was manufactured. This cell had no initial bias voltage and a low threshold voltage, which indicates that it has low power consumption. In addition, the response time of the NBB pi cell was rapid.

Key Words : No-bias-bend pi cell, intermediate pretilt angle, mixture, rubbing

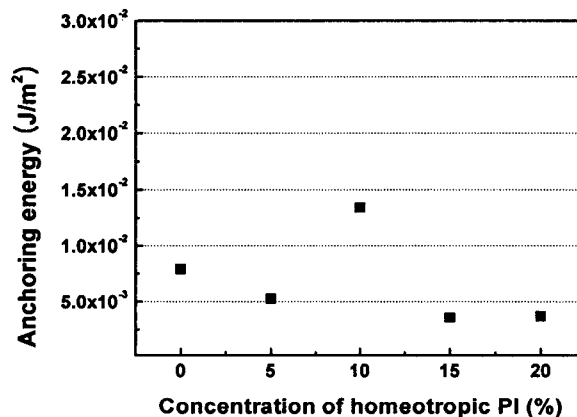


Figure 1. The polar anchoring energy of LCs on the rubbing treated blended PI as a function of concentration of the vertical PI.

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