Electro-optical property of twisted nematic liquid crystal cells with ion-beam irradiated polymer

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Abstract: To date, rubbing has been widely used to align LC molecules uniformly.\(^1\) Although rubbing can be simple, it has fundamental problems such as the generation of defects by dust and static electricity, and difficulty in achieving a uniform LC alignment on a large substrate. Therefore, noncontact alignment has been investigated. Ion beam induced alignment method, which provides controllability, nonstop process, and high resolution display.\(^2,3\) We investigated the high pretilt angle effects on electro-optical properties of ion beam (IB)-irradiated liquid crystal cells on a blended polymer surface. High pretilt angle of liquid crystals IB-irradiated on a blended polymer surface including such as 5% and 10% of homeotropic polymer contents can be achieved. The threshold voltages of IB-irradiated twisted nematic (TN) cells on a blended polymer surface decrease with increasing the pretilt angle. Also, the rising time of IB-irradiated TN cells decreases with increasing the pretilt angle. However the decay time of IB-irradiated TN cells increases with increasing the pretilt angle. Consequently, the electro-optical properties of IB-irradiated TN cells depend strongly on the pretilt angle in a blended polymer surface.

Key Words: Liquid crystal alignment, Ion-beam irradiation, Blended polyimide, Pretilt angle, Electro-optical characteristics

Figure 1. Voltage-transmittance curve of the TN-LCD with IB-irradiated polymer surface as a function of the concentration of homeotropic PI.

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