

## 이온빔 에너지에 따른 액정배향막의 전기광학적 특성연구

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### Properties of liquid crystal alignment layers exposed to ion-beam irradiation energies

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**Abstract :** In general, polyimides (PIs) are used in liquid crystal displays (LCDs) as alignment layer of liquid crystals (LCs). Up to date, the rubbing alignment technique has been widely used to align liquid crystals on the PI surface, which is suitable for mass-production of LCDs because of its simple process and high productivity. However, this method has some disadvantages. Rubbed PI surfaces include the debris left by the cloth and the generation of electrostatic charges during rubbing process. Therefore, rubbing-free techniques for LC alignment are strongly required in LCD technology. In this experiment, PI was uniformly coated on indium-tin-oxide electrode substrates to form LC alignment layers using a spin-coating method and the PI layers were subsequently imidized at 433 K for 1 h. The thickness of the PI layer was set at 50 nm. The LC alignment layer surfaces were exposed to an Ar<sup>+</sup> ion-beam under various ion-beam energies. The antiparallel cells and twisted-nematic (TN) cells for the measurement of pretilt angle and electro-optical characteristics were fabricated with the cell gap of 60 and 5  $\mu\text{m}$ , respectively. The LC cells were filled with nematic LC (NLC, MJ001929, Merck) and were assembled. The NLC alignment capability on ion-beam-treated PI was observed using photomicroscope and the pretilt angle of the NLC was measured by the crystal-rotation method at room temperature. Voltage-transmittance (*V-T*) and response time characteristics of the ion-beam irradiated TN cell were measured by a LCD evaluation system.

**Key Words :** LC alignment layer, Polyimide, Ion-beam, Rubbing-free method, Electro-optical characteristics