Study of Surface Orientation of Carbon Alignment Layers by Polarized PEEM

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Today's flat panel displays are largely based on liquid crystal (LC) molecules that can modulate light transmission of the display through changes in orientation. The alignment of LC molecules on carbon alignment layers is hence not only an interesting scientific but also an important technological problem. Noncontact method such as ion beam irradiation without suffering from electrostatic discharging and dust contamination has been suggested to replace the current rubbing alignment process [1-2]. However, the anchoring energy of LC molecules on an ion beam treated surface is not stable. Here we used photoemission electron microscopy (X-PEEM), polarization-dependent near-edge X-ray absorption fine structure (NEXAFS) and polarized attenuated total reflection infrared spectroscopy (ATR-IR) measurements to investigate the orientation order of the carbon alignment surface. The alignment surface such as polyimide (PI) and diamond-like carbon (DLC) are treated with a hydrogen ion beam for a configuration alignment of surface bonding and passivation. With simultaneously sputtering and passivation, the results reveal a preferential asymmetric in-plane alignment of DLC layer at the substrate. In-plane orientation order of rubbed PI molecules with modifying the main or side chain structure are explored as well.

Reference

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