

The Molecular Orientation of Polyimide Alignment Layer used in TFT-LCDs

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Polyimide (PI) materials have had played an important role in the construction of flat panel liquid crystal displays (LCD's). The PI film has an important impact on initial alignment of the liquid crystal materials in LCD panels. Therefore, its physical deformation may lead to defect and malfunction in the display. For example, an LCD is known to bear image sticking problem when it is assembled following 3 days or longer stagnancy in the process after main curing of layer. In this paper, the molecular orientation of polyimide surfaces with respect to the stagnancy is investigate by means of surface sensitive Near Edge X-ray Absorption Fine Structure (NEXAFS) spectroscopy. NEXAFS measurements clearly reveal preferred in-plane and out-of-plane orientation. The preferred in-plane orientation within the film can accelerate the image sticking problem in LCD's operating in patterned vertical alignment (PVA) mode. Based on the result, vertical alignment of polyimide pendant group is found helpful for the better alignment of LC molecules in LCD's operating in PVA mode.