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Investigate Pre-tilt and Anchoring Energy of Liquid Crystal Conjugated Polymer by Using Planar and Diluted Vertical Alignment Layer

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Fundamental research involved in liquid crystal(LC) phase are extremely challenging. In particular, alignment of LC is great important for the basic understanding of interfacial phenomena and for the fabrication of electro-optical devices including LC displays (LCD). To operate these devices, vertical or planar alignment of LC is necessary with high demand for the tilted alignment of LCs between planar and vertical. Recently, various method are researched, such as mixing vertical and planar PIs, microtextured formation using atomic force microscope[1], and ion beam exposure of silicon carbide film[2]. By using these methods, pre-tilt angle and anchoring energy of LC molecular precisely controlled. However, these controlled LC molecular is monomer, and such a LC polymer has not been fully investigated yet.

In this paper, we investigated conjugated polymer which have nematic phase in high temperature. To control anchoring energy, we used stack method with planar and diluted vertical alignment layer. Figure Pre-tilt angle of LC is controlled by varying the concentration of vertical alignment layer on planar layer. In same condition, we coated F8BT which is conjugated polymer in toluene, and thermal annealing to induce nematic phase. After, we measured retardation according to concentration of vertical alignment layer. The retardation was decreased as increase the thickness of the vertical alignment layer. Since the thickness of the F8BT layer was same to 60 nm, the small retardation value means that the conjugated polymer has low order parameter due to low azimuthal anchoring energy.

References

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