Novel Photoalignment of Liquid Crystals using Dimerization of Cinnamoly and Chalcone Moieties

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Liquid crystal displays (LCDs) are needed to induce LC orientation such as a rubbing method, which has been widely used to align LC molecules on polyimide (PI) surfaces; the resulting grooves and polymer chain reorientations create anisotropic interaction energy between the surface and LC molecules. However, the rubbing method has some drawbacks, such as the generation of electrostatic charges and the creation of contaminating particles [1]. Thus, rubbing-less techniques for LC alignment are strongly needed in LCD technology [2]. The photoalignment methods received a lot of attention because they can be used to establish multiple domains easily to improve the viewing angle. These techniques create to align LC molecules via light-induced orientational ordering of the alignment surface. These LC orientations can be induced by phototoisomerization [2-4], photodecomposition [5,6], and photodimerization [7-10]. The primary issue related to the photoisomerization can be to induce reversible LC alignment through changing wavelength or polarization direction of exposed light. Also, the photodecomposition can create degradation of polymer such as image sticking by deep UV exposure. On the other hand, the LC alignment stability can be achieved through the photodimerization, which a preferential absorptive direction can be generated by selective photocrosslinkable reaction. It is known that photodimerization material such as cinmmate group [7-9] or chalcone group [10] respectively is used. The photoreaction chalconyl groups take place by irradiation with relatively longer wavelength UV light than that of the cinnamoyl group.

Here, we report the novel photosensitive material with cinmmate and chalcone groups offering the possibility of enhanced physical and dynamic properties of the LC cells. A novel photopolymer material based on N-(phenyl)-maleiimide with cinnamate and chalcone functional group for crosslinking is used for improvement of display performances.

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