Sym. D : Display Materials

LC TECHNOLOGIES

B-TUE-10

OPTICAL PROPERTY OF CHOLESTERIC LIQUID CRYSTAL AND ITS APPLICATION TO LCD, S. T. KIM, I. KIM, W.T.OH, H.N.Hwang, Y.K. KIM(Optoelectronic Mat. Tech.Group, LG Cable & Machinery, Kyungki-do 431-080, Korea)

The cholesteric liquid crystal(CLC) molecules are nematic molecules with twisting power so that they form a helical structure. For the CLC, depending on which chiral components are associated in the structure they can be right or left handed. One importance associated with this handedness is that the circular-polarization of reflected light from CLC is determined by the helical handedness of CLC. If CLC is in the form of right-handed helix, the reflected light should be right-handed circularly polarized. The unpolarized incident light will become circularly polarized in one way depending on handedness of CLC helix as well as the reflected color corresponds to the pitch of CLC helix. The application of CLC materials can be profuse since the CLC can easily be formulated to have various colors. CLC materials can be applied as a light separation device and a brightness enhancing device of LCD.

In the present study, application of CLC materials to LCD shall be considered. Broadband circular polarizer and color filter can be made by using CLC materials. By applying the CLC circular polarizer and color filter, it would be possible to enhance the brightness by recycling the reflected light by CLC. The reflected light range could be controlled by formualtion of CLC, polymerization temperature and UV intensity.

B-TUE-11

BLEND OF POLYIMIDE AND POLY(VINYL CINNAMATE) AS THERMALLY STABLE PHOTO-INDUCED LIQUID CRYSTAL ALIGNMENT LAYER, HEE-TAK KIM, and JUNG-KI PARK (Dept. of Chem. Eng. KAIST, Daejon, 305-701, Korea)

The liquid crystal alignment, which is the essential technology for LCD, is currently achieved by rubbing of polyimide layer. In last several years, alignment control of LC molecule on photo polymer substrate has been realized and the methods are considered to become a most promising candidate as a post-rubbing technique because it is free of static charge generation and be also effective for four-domain LCD which can provide wide viewing angle. However, the materials used for photo-induced LC alignment show poorer thermal stability compared to the polyimide used in rubbing method, which has made them difficult to be used in the production processes involving high temperature treatment. In this work, the blend of thermally stable polyimide and poly(vinyl cinnamate) was studied with an aim to reduce the thermal relaxation of the structural anisotropy developed in poly(vinyl cinnamate) during the exposure of the polarized UV, providing thermal stability of liquid crystal alignment.

B-TUE-12

THE OPTICAL CONTROL OF THE BIREFRINGENCE OF A NEMATIC LIQUID CRYSTAL USING A NEW PHOTO-POLYMER, J.-H. Lee, D.-H. You, C.-J. Yu, S.-D. Lee (School of Electrical Engineering, Seoul National Univ., Seoul 151-742, Korea), and D. H. CHOI (Dept. of Textile Engineering, Kyung Hee Univ., Yongin-Kun, Kyungki-Do 449-701, Korea)

The control of the birefringence of a nematic liquid crystal (LC) was achieved by changing the polarization direction of light. Using a new photo-polymer (PP) with a photo-isomerizing group, a planar nematic LC cell was made with one rubbed polyimide layer and the other PP layer for LC alignment. The optically induced alignment characteristics of PP as well as LC molecules were measured as a function of the polarization direction and the illumination time of a pump beam. It was found that the change in the electro-optic transmittance is predominantly governed by the polarization direction of the beam. Moreover, the rotation of the polarization direction of the beam dictates the twist of the LC molecules through the cell.

B-TUE-13

LIQUID-CRYSTAL ALIGNMENT ON RUBBED POLYIMIDE FILMS WITH VARIOUS SIDE CHAINS, S.I. KIM, M. REE* (Dept. of Chemistry, Pohang Univ. of Sci. & Tech., Pohang 790-784 Korea), and J.C. JUNG (Dept. of Materials Sci. & Eng., Pohang Univ. of Sci. & Tech., Pohang 790-784 Korea)

Rubbed polyimide films are used in liquid crystal displays to align liquid crystals in contact with polyimides. However, the alignment of liquid crystals on the rubbed polymer surface has not been understood fully although the rubbing process is widely employed in the LCD industry. In this study, polyimides were synthesized with 4,4-oxydiphthalic anhydride and *m*-phenylene diamines with long side chains. These side chains include alkyl chain as flexible segment and phenyl or biphenyl group as rigid segment. Using rubbed polyimides as alignment layers, the pretilt angles of liquid crystals were determined. The measured pretilt angle was strongly denpendent upon the chemical nature (length and conformation) of flexible segment as well as the rigid segment. Furthermore, the pretilt angle was further dependent upon the rubbing density. In addition, structures and other properties of the polymers were characterized by X-ray diffraction, prism-coupling, differential scanning calorimetry, and thermogravimetry. The results will be discussed in detail with considering of the roles of side groups. [*This study was supported by the Electronic Display Industrial Research Association (G7 Project in 1997) of the Ministry of Trade & Industry and by the New Materials Research Fund in 1997 and the Basic Science Research Institute Program (BSRI-97-3438) from the Ministry of Education*].