

Control of Alignment and Optical Properties of LC Retarder with Photo-Polymerization Conditions

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Liquid crystalline polymers (LCPs) have been applied to various retardation or compensation films in LCDs [1]. The LCP film, which requires a specific alignment of the constituent LC molecules and the desired retardation, is typically made from photo-polymerization of a reactive LC monomer precursor [2-3]. Its alignment and optical properties are thus expected to depend on the photo-polymerization conditions.

In this work, we have investigated how the process factors related to the photo-polymerization, such as the intensity, dosage and environment of UV irradiation and the types and concentration of initiators, affect the alignment and optical properties of LCP films (Table 1 and Figure 1), and thus suggested the effective ways to control them, which are applicable to compensation of LCD dispersion property and (retardation) patterning of LCP films.

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- (2) D. J. Broer, H. Finkelmann, K. Kondo, *Makromol. Chem.* **1988**, 189, 185.
- (3) C. Doornkamp, S. J. Roosendaal, B. M. I. van der Zande, L. W. J. Stofmeel, J. J. van Glasbeek, J. T. M. Osenga, *SID'04 Digest* **2004**, 670.

Table 1. The conversion of polymerization, LC order parameter, and birefringence of LCP films photo-polymerized at various UV irradiation conditions

Intensity, time	Conversion of polymerization (%)	Order parameter	Birefringence
0.5 mW/cm ² , 16 s	60	0.56	0.140
1 mW/cm ² , 8 s	60	0.55	0.138
2 mW/cm ² , 4 s	62	0.54	0.134
4 mW/cm ² , 2 s	62	0.54	0.133
8 mW/cm ² , 1 s	65	0.53	0.128

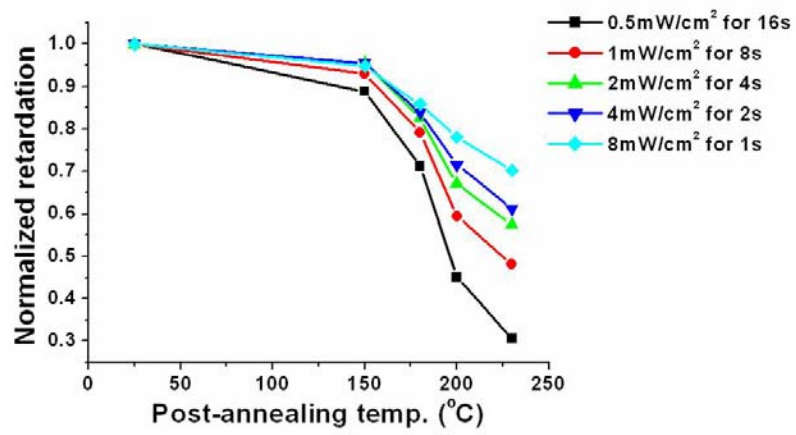


Figure 1. Change in retardation of LCP films photo-polymerized at various UV irradiation conditions with post thermal treatments