Influence of Terphenyl Compound in LC Mixture on PS-VA LCD

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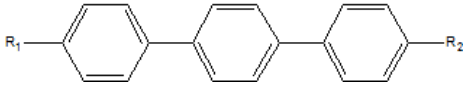
Polymerization process under UV exposure for pre-tilt angle adjustment or anchoring force enhancement has been used a lot in LCD industry recently, such as polymer-stabilized VA, IPS, blue phase LCD and PDLC. So study and control of polymerization of reactive mesogen in the LC mixture is quite important for those technologies. In this paper, influence of terphenyl compound (see **formula (1)**), which can provide large birefringence as nematic LC component, on RM reaction and other properties of PS-VA LCD will be studied.



(1)

Table 1. Terphenyl compound content of different LCs

LC name	LC-A	LC-B	LC-C
Terphenyl compound content / wt%	0	4%	8%

Three LC mixtures with different terphenyl compound contents (see **Table 1**) were selected to do the study. **Fig.1** shows the UV absorbance spectrum of these three LC mixtures dissolved in n-hexane as solvent (100ppm). Results show that more terphenyl in LC mixture cause stronger UV absorbance. LC-C with 8% terphenyl has the strongest absorbance between 240nm to 340nm, whose peak position has the longest wavelength. And LC-A without terphenyl has the lowest UV absorbance.

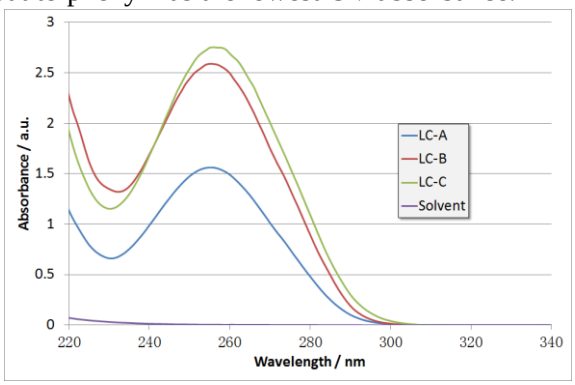


Fig.1 UV absorbance spectrum of LCs

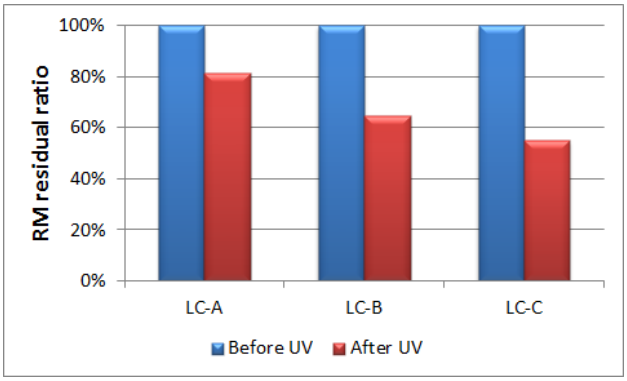


Fig.2 RM residual ratio in different mixtures

Fig.2 shows RM residual ratio in different LC mixtures before and after the same UV process. It shows that more terphenyl in LC mixture cause fast RM decay rate, which means fast polymerization rate. And some other results, such as polymer bump formation and pre-tilt angle formation, also show that terphenyl compound in LC mixture can accelerate reaction rate of RM under UV light.

In this study, influence of terphenyl compound in LC mixture on PS-VA LCD was studied. Results show that terphenyl compound in LC mixture can enhance UV absorbance and accelerate RM reaction rate.It seems that terphenyl compound can transfer the energy form UV light to RM for polymerization with higher efficiency. This provides us a good way to control polymerization rate of RM under UV exposurein many LC systems with polymer formation process.

References

1. Jae Jin Lyu, et al., J. Phys. D: Appl. Phys. 44 (2011)
2. Chih-Tsung KANG, et al., IDW 11, 45, (2011)