Effect of an Azobenzene Content on Photoinduced Bending of Crosslinked Liquid-Crystalline Polymer Films

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Crosslinked liquid-crystalline (LC) polymer films containing azobenzene moieties show reversible bending by photoirradiation [1]. In our previous work, we revealed that photoinduced bending was strongly affected by crosslinking density, the order of mesogens, and alignment direction of the mesogens in the crosslinked LC polymer films [2]. In this work, crosslinked LC polymer films with a different content of an azobenzene moiety were prepared, and their photoresponsive behavior was investigated.

Chemical structures of compounds used in this study are shown in Figure 1. The crosslinked LC polymer films were prepared by *in-situ* photopolymerization. Abbreviations and feed ratio of the samples are shown in Table 1. As shown in Figure 2, upon irradiation with UV light, P5 and P3 bent toward an actinic light source along the rubbing direction. The bent films also reverted to the initial state upon irradiation with visible light. As the feed ratio of the azobenzene moieties in the crosslinked LC polymer films increases, the degree of bending was enhanced. On the other hand, P1 with a low azobenzene content exhibited no bending by continuous irradiation with UV light.

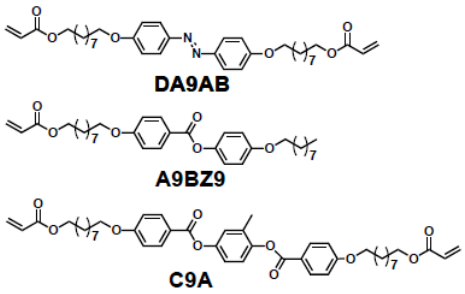

Figure 1. Chemical structures of compounds used in this study.

Table 1. Nomenclature and feed ratio of compounds

Sample	DA9AB (mol%)	A9BZ9 (mol%)	C9A (mol%)
P5	5	95	0
P3	3	95	2
P1	1	95	4

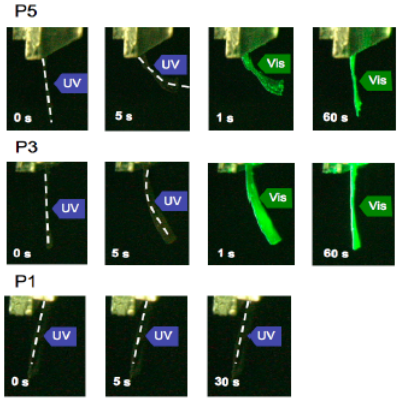

Figure 2. Photographs of the crosslinked liquid-crystalline polymer films exhibiting photoinduced bending and unbending.

References

1. T. Ikeda, J. Mamiya, Y. Yu, *Angew. Chem. Int. Ed.,* **2007**, *46*, 506-528.
2. Y. Yu, T. Maeda, J. Mamiya, T. Ikeda, *Angew. Chem. Int. Ed.*, **2007**, *46*, 881-883.