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Abstracts

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Precise Bending Control of Crosslinked Liquid-Crystalline Polymer by Two-Photon Processes

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Crosslinked liquid-crystalline polymers (CLCPs) containing photochromic moieties show macroscopic deformation upon irradiation with light by one-photon processes.¹ If CLCPs can be activated by two-photon excitation, on the other hand, deformation of CLCPs could be much more precisely controlled thanks to the ability of the two-photon processes to achieve three-dimensional spatial resolution.

We developed a composite system containing a stilbene derivative as a two-photon absorbing sensitizer and azotolane monomers as photochromic mesogens. We prepared interpenetrating polymer network (IPN) films² containing azotolane and the stilbene derivative. The IPN film bend away from the light source upon irradiation with femtosecond laser pulses at 600 nm focusing on near the backside of the film (Fig. 1). This result indicates that *trans-cis* isomerization reaction of azotolane occurs only in the backside region of the film by space selectivity of two-photon excitation (Fig. 2).

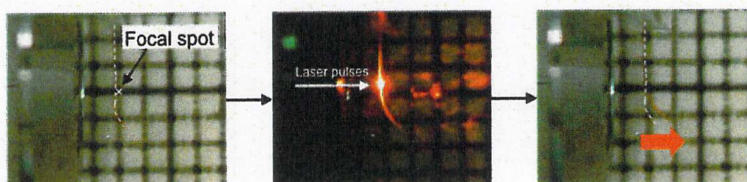


Fig. 1 Bending behavior of the IPN film upon irradiation with femtosecond laser pulses.

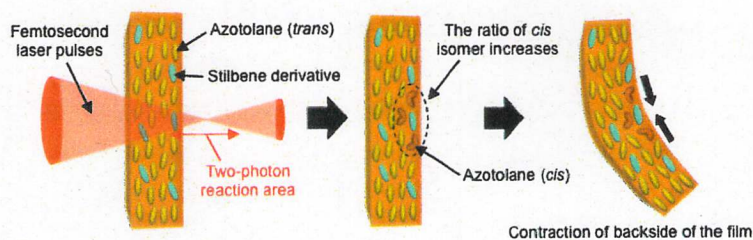


Fig. 2 Bending mechanism of the IPN films by two-photon processes.

(1) Y. Yu, M. Nakano, T. Ikeda, *Nature* **2003**, 425, 145.

(2) T. Ube, K. Takado, T. Ikeda, *J. Mater. Chem. C* **2015**, 3, 8006.



Shota Sasaki graduated from Department of Applied Chemistry at Chuo University in March 2016. He has been a graduate student in the group of Prof. Ikeda at Chuo University since April 2016. His research interests focus on crosslinked liquid-crystalline polymers and two-photon absorption.