Requests for Collaboration

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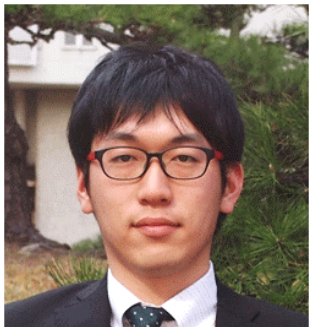


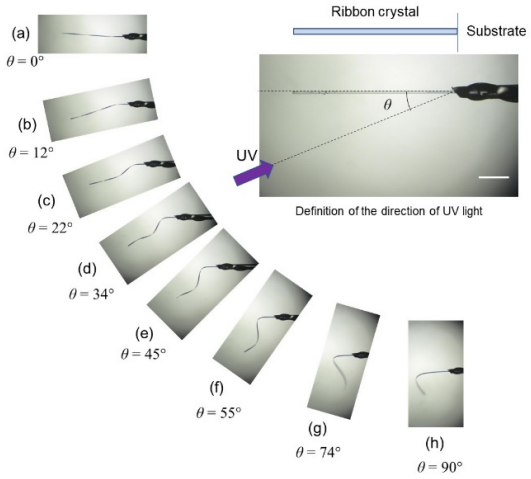
Research Interests

- Organic photochemistry
- Photochromism
- Photomechanical materials

Creative Achievements in The Application of New and Existing Science and Technology

Control of photomechanical behavior by illumination conditions

Photomechanical molecular crystals have been investigated as mesoscopic actuators. Although many researchers made efforts to discover new photomechanical motions by synthesis of new compounds and control of crystal growth, no one have focused on the irradiation conditions in detail. We have so far investigated the dependence of photomechanical bending behavior of diarylethene crystals on irradiation wavelength and power. Controlling more complex shape changes using light exposure conditions is important for the further development of these materials. Recently, we also found the effect of illumination direction on the photomechanical twisting of a diarylethene crystal. Changing the UV illumination direction with respect to the crystal resulted in different twisting modes, ranging from helicoid to cylindrical. These results indicate that the strain tensor on the crystal surface induced by photochromic reaction could be controlled by the illumination direction. The use of illumination angle to tune the mechanical response illustrates that photomechanical molecular crystals provide unique opportunities for the control of their motion.



Research theme That I Want to Request for Collaboration

- Quantitative evaluation of photomechanical behaviors
- Regular arraying of photoresponsive molecular crystals
- Acceleration of photomechanical behavior

A List of 5 Key Publications

- Control of photomechanical crystal twisting by illumination direction, D. Kitagawa, H. Tsujioka, F. Tong, X. Dong, C. J. Bardeen, S. Kobatake, ***J. Am. Chem. Soc.***, **140**(12), 4208-4212 (2018).
- Mechanical behavior of molecular crystals induced by combination of photochromic reaction and reversible single-crystal-to-single-crystal phase transition, D. Kitagawa, K. Kawasaki, R. Tanaka, S. Kobatake, ***Chem. Mater.***, **29**(17), 7524-7532 (2017).
- Photoinduced rapid and explosive fragmentation of diarylethene crystals having urethane bonding, D. Kitagawa, T. Okuyama, R. Tanaka, S. Kobatake, ***Chem. Mater.***, **28**(14), 4889-4892 (2016).
- Photoreversible current ON/OFF switching by photoinduced bending of gold-coated diarylethene crystals, D. Kitagawa, S. Kobatake, ***Chem. Commun.***, **51**(21), 4421-4424 (2015).
- Photoinduced twisting of a photochromic diarylethene crystal, D. Kitagawa, H. Nishi, S. Kobatake, ***Angew. Chem. Int. Ed.***, **52**(35), 9320-9322 (2013).