MS34-O2

Photomechanical and thermomechanical molecular crystals

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Crystals that can respond to external stimuli, such as light and heat have increasingly attracted attention in chemistry, materials science, and soft robotics fields. Most of photomechanical crystals exhibit bending and expansion/contraction motion. We have already developed several photomechanical bending processes of azobenzene, salicylideneaniline, and other crystals. Recently, we have reported walking and rolling locomotion of chiral azobenzene crystals, induced thermally by phase transition. The photomechanical and thermomechanical crystals are introduced and discussed in this conference.

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Keywords: Photomechanical Bending, Thermomechanical Locomotion, Mechanisms

MS34-O3

Watching chemistry happen – dynamic studies on light induced transformations in linkage isomerism complexes

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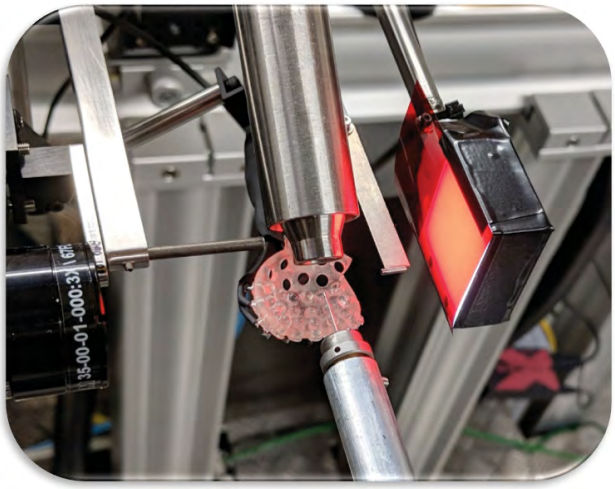
The investigation of short-lived reaction intermediates and transient species upon light activation in chemical and biological species is of upmost importance to better understand the pathways in a reaction.

Linkage isomers are complexes that contain an ambidentate ligand that can bond to the metal centre through two or more donor atoms. The ambidentate ligand can be switched from one state to another in response to irradiation, and display a change in the bulk properties e.g. reflective index or colour change. At low temperatures these metastable species can be cryo-trapped and the lifetime can last longer than a diffraction experiment, but they can revert back to the ground state as they approach room temperature. The metastable species have a tuneable lifetime depending on temperature.

For metastable species, conventional time-resolved studies using a high intensity pulsed laser proved difficult as the nanosecond pulse induced crystal heating and thus reverted the metastable species back to the ground state. Beamline i19 at Diamond, in collaboration with the Raithby Group at the University of Bath have developed a time-resolved setup with LEDs and a novel collection strategy to investigate species with lifetimes from minutes to milliseconds. The LEDs are able to spread out energy load on the crystal while giving ample intensity for conversion. Utilising the electronic gating capabilities of the Pilatus detector allowed entire time-series to be obtained simultaneously within a couple of hours. Automated processing routines gave fully refined structures minutes after the data-collection completion.



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