

MS33-O2 Photomechanical actuation in organic crystals: expansion, bending, coiling, twisting and peelingRabih O. Al-Kaysi¹

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In some organic crystals light can be absorbed to trigger a topologically controlled photochemical reaction. In general the photochemical reaction inside the crystal generates forces that can shatter a large single crystal and turn it to photoproduct powder. The shape, size and chemistry of the material making up the crystal have a drastic effect on the way these internal forces affect the crystal during a photochemical reaction. For molecular crystal nanowires made from *tert*-butyl anthracene-9-carboxylate photoreaction leads to an anisotropic expansion by up to 15% along the long axis of the wire. When single crystalline microribbons of fluorinated-9-anthracene carboxylic acid are irradiated with UV light, the ribbons twist then untwist after the light is switched off. Crystalline microblocks made from *cis*-dimethyl-2(3-(anthracen-9-yl)allylidene)malonate tend to peel off photoreacted layers after a brief exposure to visible light (405 nm).

Keywords: Photomechanics, Light, Molecular Crystals.

MS33-O3 Solid-state photodimerization of *o*-ethoxy-cinnamic acidDemetrius C. Levendis¹, Manuel A. Fernandes²

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The complexity of this textbook example, where photodimerisation depends on the relative arrangement of molecules in each of the four polymorphs (α , β , γ and δ), has not yet been fully recognized. In this paper, we will discuss the intermolecular interactions that shape the polymorphs, crystal hopping, phase transformations and solid-state photodimerisation of *ortho*-ethoxy-cinnamic acid (*oetca*), all of which depend on the experimental conditions, crystallization method, and the history of the crystal.

On heating crystals of the α -form of *oetca* to 60 °C they hop, depending on the face that is in contact with the hot surface. Thereafter the crystals no longer hop, but undergo a reversible phase transformation from the α ($V = 499.5 \text{ \AA}^3$) to the δ (or α') form ($V = 1492.4 \text{ \AA}^3$). This is accompanied by a twisting of the molecules that may, at least in part, be the cause of the crystal hopping. The α and δ polymorphs undergo solid-state photodimerisation in different ways depending on whether it is carried out at room temperature or above 60 °C.

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