The eternal youth of azobenzene: New photoactive hard and soft materials

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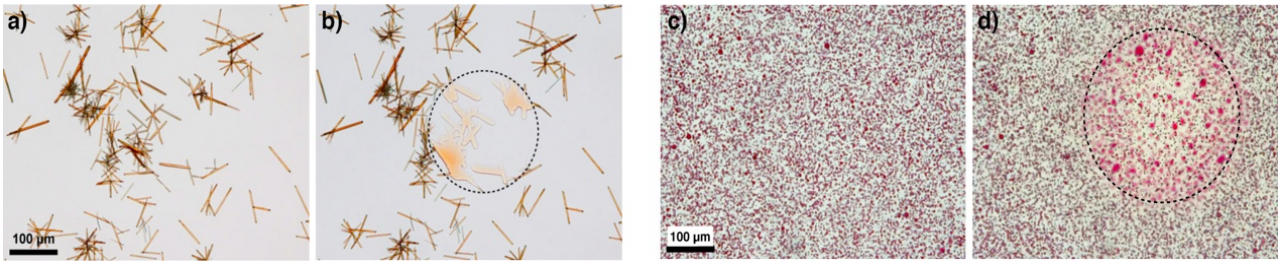

Fig. 1. (a-b) Crystals of an azobenzene based star-shaped tetramer before (a) and after (b) irradiation with UV light. (c-d) Microemulsion of an azobenzene based surfactant embedding Nile-Red before (c) and after (d) irradiation with UV-light.

Abstract: Photochromic units undergo profound changes in their chemical and/or electronic structure upon light excitation, and are highly interesting for the construction of photocontrollable molecular devices, machines and materials. Among photochromic processes, the *trans-cis* photoisomerization of azobenzene – owing to its high efficiency, excellent reversibility, and significant physico-chemical differences between the two forms – is a highly useful reaction. Azobenzene photoisomerization has been known for almost 80 years and has been exploited to implement light-induced functionalities with a large variety of compounds, biomolecules, nanosystems and materials. Here we present recent investigations undertaken in our laboratories aimed at implementing azobenzene isomerization for photo-inducing and -controlling properties in hard and soft materials at the nano- and macroscale. The reversible photoisomerization of shape-persistent azobenzene tetramers in the bulk crystalline solid state and at the single molecule level will be described [1,2]. Moreover, we will present research on the spontaneous emulsification of an azobenzene based surfactant and its photo-reversible uptake and release of small molecules in aqueous solution as an example of how this outstanding photochrome can be utilized to develop soft materials with valuable light-induced functionalities [3].

[1] Baroncini M.; d'Agostino S; Bergamini G.; Ceroni P.; Comotti A.; Sozzani P.; Bassanetti I.; Grepioni F.; Hernandez T. M.; Silvi S.; Venturi M.; Credi A. *Nat. Chem.* **2015**, *7*, 634. [2] Nacci C.; Baroncini M.; Credi A.; Grill L. *Angew. Chem. Int. Ed.* **2018**, *57*, 15034. [3] Villa C.; Bergamini G.; Ceroni P.; Baroncini, M. *Chem. Comm.,* **2019**, *55*, 11860.