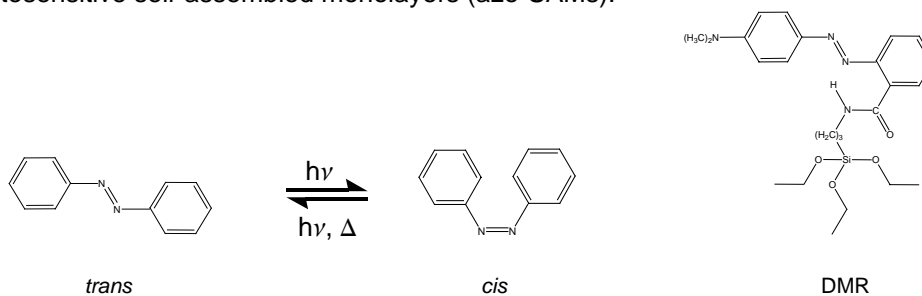


# Local photo-reorientation of a liquid crystal using a laser focused on an azo dye-based monolayer

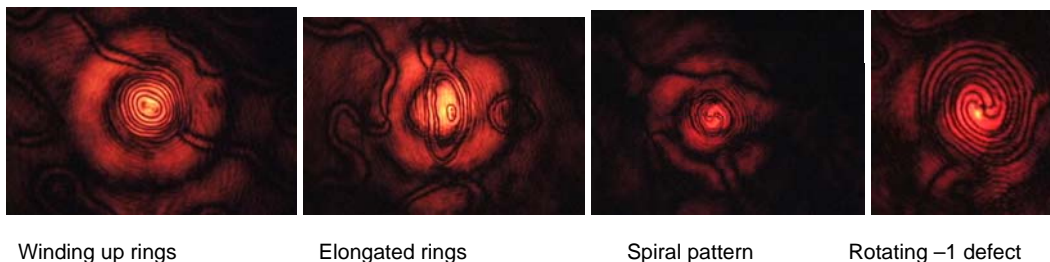
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When irradiated with light of appropriate wavelength, azobenzenes undergo photoisomerization, a reversible transformation between the *trans* and the *cis* conformations. When the actinic light is linearly polarized, the isomerization process is characterized by angular-dependent excitation and results in the photoselection of a preferred azobenzene dye orientation, perpendicular to the polarization of the light <sup>[1]</sup>. When prepared as thin films, in particular, such azobenzenes can be used to align liquid crystals (LCs). In this experiment, the methyl red derivative DMR <sup>[2]</sup> is used to form photosensitive self-assembled monolayers (azo-SAMs).



To study the local photo-reorientation of the LCs, a hybrid cell is made with a nematic material (E31) sandwiched between the azo-SAM and a homeotropic surface. The linearly polarized exciting laser is focused onto a small spot on the azo-SAM. A variety of interesting phenomena are observed when the plane of polarization of the incident light is rotated, including winding up rings of director reorientation and spiral patterns.



## References

- [1] Z. Sekkat and W. Knoll, *Photoreactive Organic Thin Films*. Academic Press (2002).  
[2] Y. W. Yi, T. E. Furtak, M. J. Farrow, and D. M. Walba, *Journal of Vacuum Science and Technology A* **21**, 1770 (2003).

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