Title: Synthesis and characterization of photoisomerizable azo-based organic compounds as a component of liquid crystal macromolecular systems.

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Smart materials are having a great deal of attention due to their endless applications in a wide range of technological areas as artificial actuation. Specifically, photoactive materials are very attractive since light, the energy source needed for their triggering, is environmentally friendly, free and cheap. Azobenzene derivatives are the chromophores of common choice for the design of light-sensitive materials due to their reversible isomerisation. Indeed, the introduction of these particular organic chromophores into liquid-crystalline polymers enables the modulation of their macroscopic properties like, for instance, their dimensions and shape.

The first part of this project has involved the design and synthesis of two novel azobenzene derivatives. The structural identity of the azo compounds prepared has been confirmed by means of IR and ^{1}H NMR spectroscopies. Their mesomorphic and photochromic behaviour has been investigated by means of polarized optical microscopy and time-resolved UV-Vis spectroscopy.

The second part of the TFG implied the integration of these chromophores into liquid single crystal elastomers (LSCEs), *i.e.* weakly cross-linked polymer networks exhibiting a macroscopic orientation of the directors. As a whole, our LSCEs consist of a photoactive azobenzene-based monomer, a cross-linker and a mesogen. The introduction of an additional alkoxyphenyl comonomer has been considered in order to modulate the mesophase-to-isotropic phase transition temperature of the final material. Such feature is expected to pave the way to achieve photoactuating materials which can be operated under ambient conditions.

All LSCEs have been prepared via the spin casting technique in three steps developed by Finkelmann and collaborators and further characterised by means of several techniques such as polarised optical microscopy, swelling experiments, differential scanning calorimetry and x-ray diffraction.

Keywords: Azobenzene derivatives, *cis*-to-*trans* isomerisation, liquid-crystalline elastomers, organic synthesis, photoactuating materials, smart materials.