STRUCTURE AND PROPERTIES OF DITHIENYLETHENE BASED-PHOTOACTIVABLE THIN FILMS

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Photo-deformable polymeric materials have been recently experienced an important development because of their potential applications in various fields such as light-driven actuators[1]. Azobenzenes are the most used photoresponsive molecules in photomobile polymer materials with a large change in shape upon trans/cis photoisomerisation but the thermal instability of their cis isomers is the major drawback of these materials[2]. Dithienylethenes[3] known for their thermal stability and their fatigue resistance appears to be promising candidates to replace azobenzenes. With a photo-induced carbon-carbon electrocylization, the bistable photochromes of dithienylethene switche from a colorless Open Form (OF) to a colored Closed Form (CF). In the present work, we investigate a newly system based on a mixture between an ureidopyrimidinone functionalized dithienylethene[4,5] (denoted by A) and an ureidopyrimidinone functionalized poly(ethylene-co-butylene) thermoplastic elastomer[6] (denoted by B). In chloroform, the A – B system leads to a supramolecular assembly where the subunits are connected to each other via quadrupole hydrogen bonding as detailed in figure 1a. After evaporation of the solvent, it has been found that the macroscopic shape of the resulting thin films can be modified by light: the initially bent thin film is instantaneously flattened upon visible irradiation as shown on figure 1b. Our strategy is to establish a correlation between the photochemical, structural and mechanical properties responsible for the drastic macroscopic deformations. During this presentation, we will focus on the material science aspect of the subject.

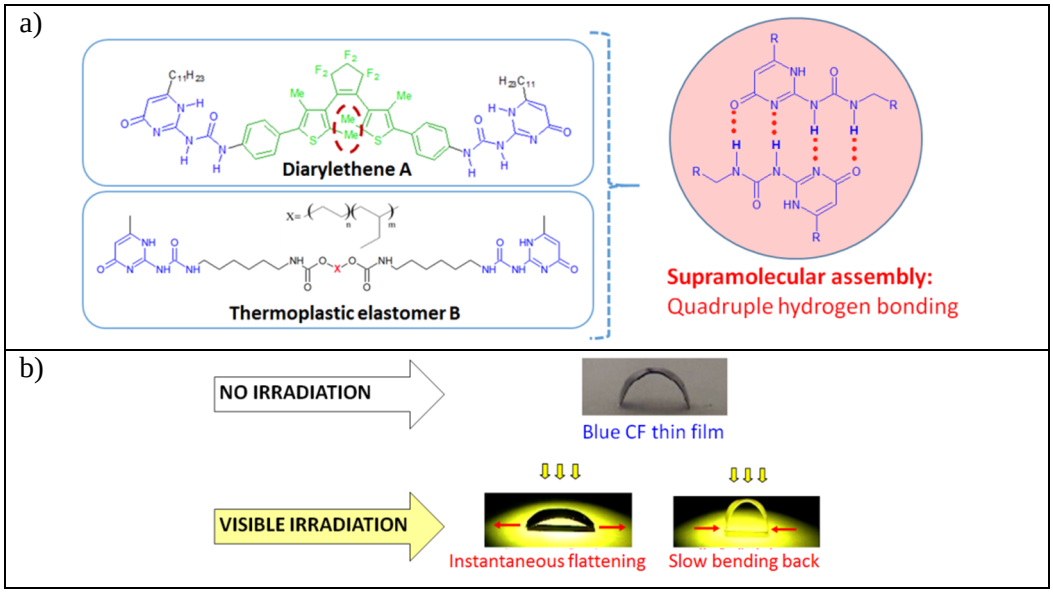

Figure 1 – **a)** Diarylethene A and elastomeric units B able to link via quadrupole sites hydrogen bondings as A-A, B-B or A-B; **b**) Thin film (dimensions 1.5cm×0.3cm×80µm) elaborated from A - B showing a flattening behavior under visible irradiation.

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