Photophysical properties of negative photochromic compounds in solution

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Positive photochromic molecules are known and studied for decades[1] , [2]. However, in the last few years, new families of photochromic molecules were discovered, for which the stable form A is colored and, thanks to irradiation with visible light, can be transformed into the colorless isomer B: this class of molecules is called "negative" photochromic compounds [3]. In this work, the properties of negative photochromic derivatives, belonging to the Donor-Acceptor Stenhouse Adducts (DASA) family, will be presented in solution (Figure 1, left) [4]. Steady-state spectroscopy was carried out in solution to provide the main spectral characteristics, whereas the continuous acquisition of absorption spectra in the presence or absence of illumination allows highlighting three major phenomena for the DASA compounds when dissolved in solution (Figure 1, right): a "dark equilibrium" which has been also followed by NMR, a "photostationary state" under irradiation, and a "thermal back reaction" in absence of light. Photophysical properties such as the conversion ratio, the quantum yield, and the kinetic rates can be extracted from photokinetics and the correlation between UV-vis absorption spectroscopy and NMR.

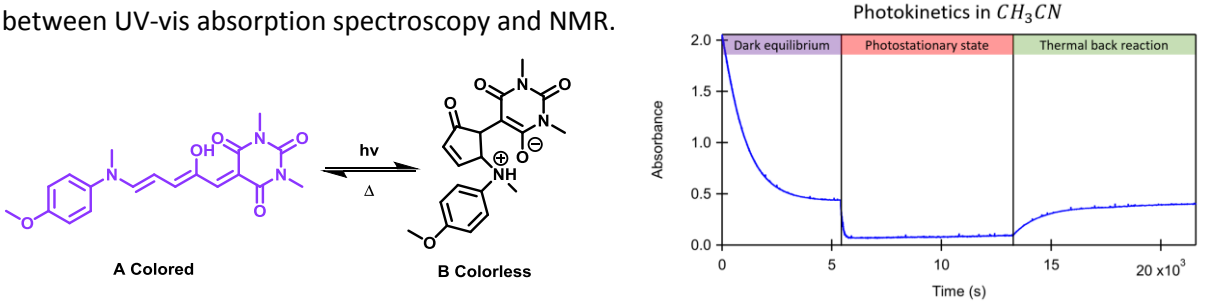

Figure 1 : (Left) Photochromic reaction of the DASA compound investigated in this work [4]. (Right) Photokinetic experiment showing the three distinct phenomena of a DASA in solution in the absence or presence of light (absorbance is measured at 580 nm, in the absorption band of the colored form, irradiation is carried out at 575 nm).

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