

Fluorescence photoswitching of diarylethene dyads: from energy transfer to unconventional behavior and photokinetics

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Photochromic/fluorescent dyad leads to photoswitchable emissive systems through energy transfer processes.¹ The profile of the response between the fluorescence signal and the conversion yield of the photochromic moiety depends on the environment. When the dyads are gathered in nanoparticles states, giant amplification effect leading to a nonlinear profile can be observed.² Design and synthesis of new diarylethene/perylene diimide architectures will be presented.² Steady-state spectroscopy in solution and nanoparticles revealed uncommon properties depending on the ratio of diarylethene in the compound. Time-resolved spectroscopy was carried out to investigate and characterize the energy transfer processes. Moreover, they also impact the photokinetics that can be finely tuned depending on the irradiation wavelength, leading in some cases to an unconventional “pseudo zero order” effect. To explain such an interesting behavior, a mathematical modeling was achieved, allowing the determination of the photochromic quantum yields.

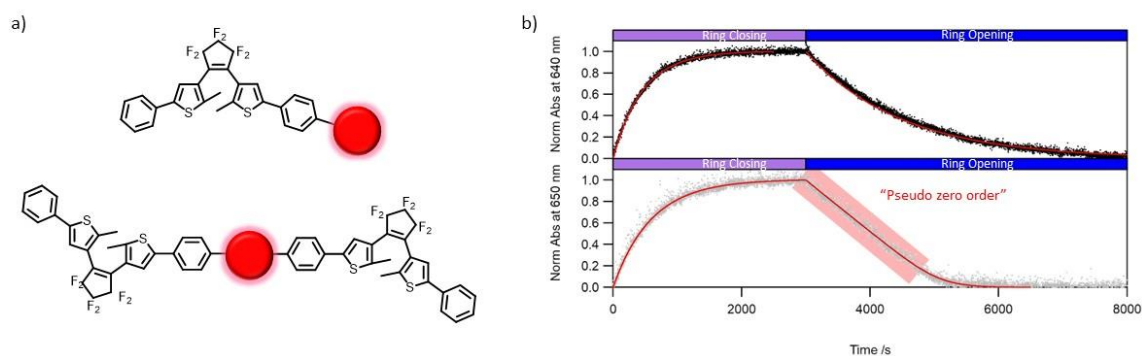


Figure 1. a) Schemes of diarylethene derivatives linked to fluorophores (red circles), b) photokinetics of the dyads in solution (black dots, classical profiles are obtained) and photokinetics of a colloidal suspension of nanoparticles (grey dots, unconventional “pseudo zero order” kinetic profile is revealed under specific irradiation wavelengths).

[1] T. Fukaminato, S. Ishida, R. Métivier, *NPG Asia Mater.* **2018**, 10, 859-881

[2] I. Ikariko, S. Deguchi, N. Fabre, S. Ishida, S. Kim, S. Kurihara, R. Métivier, T. Fukaminato, *Dyes and Pigments* **2020**, 180, 108490