

Energy transfer and fluorescence photoswitching in multichromophoric systems

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The design of multifunctional and photoswitchable molecules, materials and devices is a research area that has led to a growing number of recent applications. In this context, diarylethenes (DAEs) are particularly interesting because these photochromic molecules are excellent candidates for a wide variety of optical applications, such as photomechanical conversion, photo-control of biological objects, but also optical data storage and super-resolution imaging. For the latter two fields, the addition of fluorescence properties to DAE compounds is very attractive, allowing to combine the photo-switchable behavior of the photochromic reaction and the high sensitivity of fluorescence. In this seminar, we will discuss several examples of multichromophoric molecular systems, based on DAE derivatives and fluorescence, when: (i) the DAE unit itself exhibits emission properties, (ii) the DAE and the fluorescent unit are non-covalently associated, and (iii) the DAE and the fluorophore are linked by covalent bonds. Steady-state and time-resolved spectroscopic studies, from the macroscopic scale (ensemble) to individual nano-objects, will be presented and compared to simulations, to quantify the efficiency of photoswitching and decipher the photophysical processes involved at the nanoscale (*e.g.* intra- and intermolecular energy transfer), leading to amplification effects when a large number of chromophores is involved (Figure 1).

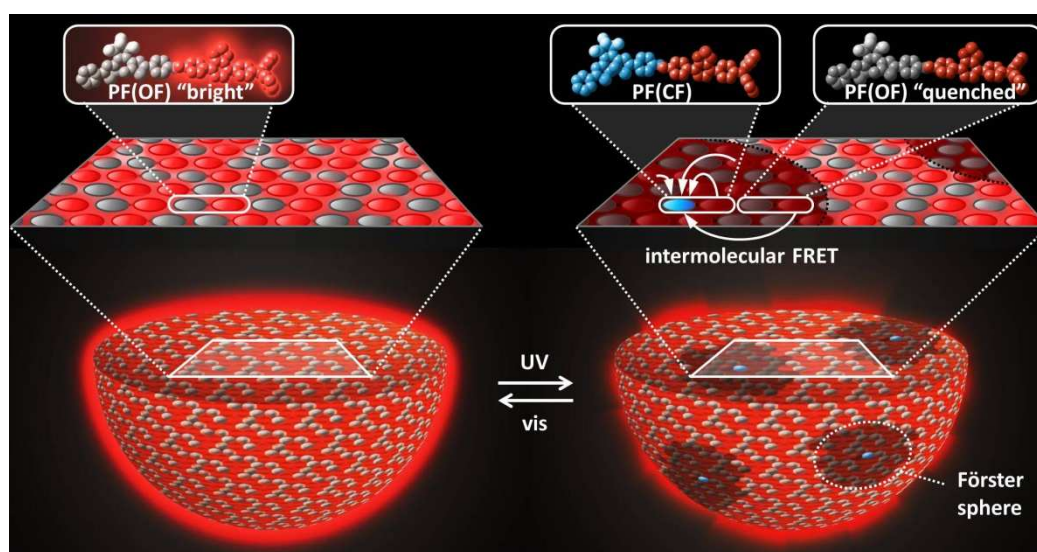


Figure 1. Illustration of fluorescence photoswitching amplification, based on multiple energy transfer processes, revealed for multichromophoric systems (here, for molecular nanoparticles).