Single particle microscopy on photochromic fluorescent dyads

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The development of photoresponsive fluorescent materials shows a considerable interest for optical switches applications [1][2], and particularly as a tool for super-resolution imaging. In this frame, we studied a dyad molecule composed of fluorescent and photochromic units. The fluorophore, a benzothiadiazole dye (**BTD**) is associated to a photochromic moiety which is a diarylethene (**DAE**). An intramolecular energy transfer process is expected to operate between the **BTD** and the **DAE** when the **DAE** is in closed form.

Indeed, fluorescence is quenched when the **DAE** is illuminated in the UV. In the present report, nanoparticles are prepared using the reprecipitation method. In such systems, additional intermolecular energy transfer processes induce a non-linear quenching of the fluorescence because of the ring-closure reaction of few **DAE** units turn off the fluorescence of many **BTD** units (Fig. 1a) [3]. Consequently, photoswitching of a small amount of **DAE** is enough to turn off the fluorescence of the whole particle. Conversely, turning on the fluorescence of a single nanoparticle require switching almost all **DAE** in open form.

In our study, this threshold in the fluorescence recovery is used to highlight of a super-resolution effect using a confocal fluorescence microscopy setup (Fig. 1b).

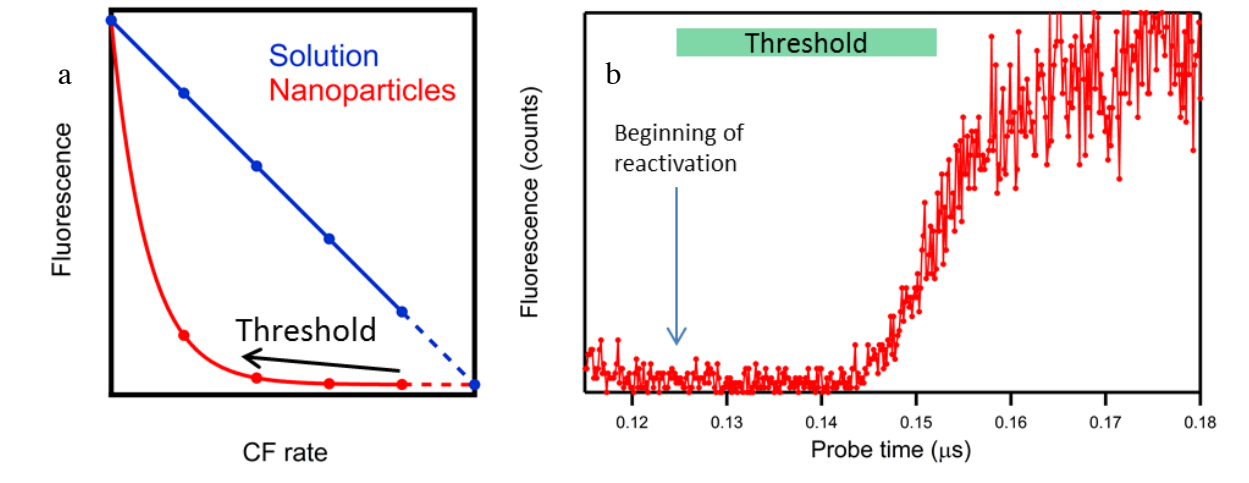

Figure 1 : a) Non linear effect to turn off of the fluorescence in nanoparticles and appearance of a threshold for the reactivation. b)Appearance of a threshold during the fluorescence activation under visible light.

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References:

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