

# Light and pH tunable luminescence in a photochromic bisdiarylethene

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## ELECTRONIC SUPPLEMENTARY INFORMATION

### Fluorescence lifetime determinations

Due to the closeness of the four acid-base equilibrations (spanning over a restricted pH/H<sub>0</sub> range) and consequent overlap of spectra, experimental determination and assignment of  $\tau$  values to the differently protonated species was very uncertain as fluorescence decay measurements revealed the contributions by couples of fluorophores in the whole pH/H<sub>0</sub> interval explored, except for pH > 4. However,  $\tau$  determinations carried out over a wide acidity range at three different analysis wavelengths (440, 500 and 570 nm) allowed to propose the tentative assignment reported in Table 3 of the article. The complete set of measurements is reported in Table SI.1. As expected from the variations of fluorescence spectral distribution and intensity, the various contributions have different weights depending on both the pH and the excitation and analysis wavelengths.

**TABLE SI.1:** Fluorescence lifetimes as a function of the pH and emission wavelength;  $w_1$  and  $w_2$  represent the weight of each component. Cyan background corresponds to wavelength and pH/H<sub>0</sub> regions where the data were more reliable.

pH/H <sub>0</sub>	$\lambda_{em}=440\text{ nm}$		$\lambda_{em}=500\text{ nm}$		$\lambda_{em}=570\text{ nm}$	
	$\tau_1/\text{ns} (w_1)$	$\tau_2/\text{ns} (w_2)$	$\tau_1/\text{ns} (w_1)$	$\tau_2/\text{ns} (w_2)$	$\tau_1/\text{ns} (w_1)$	$\tau_2/\text{ns} (w_2)$
-2	0.15 (0.93)	1.2 (0.07)	0.43(0.97)	3.38(0.03)	0.4(0.94)	4.8(0.06)
-1.3	0.35 (0.97)	4.9 (0.03)	0.46(0.97)	3.0(0.03)	0.33(0.97)	1.7(0.03)
-0.95	0.085(0.94)	0.97(0.06)	0.48(0.97)	2.8(0.03)	0.37(0.94)	5.3(0.06)
-0.3	0.33(0.59)	0.98(0.41)	0.37(0.58)	0.91(0.42)	0.4 (1)	/
0.4	0.18(0.98)	2.3(0.02)	0.39(0.98)	2.4(0.02)	0.2(0.91)	0.85(0.09)
0.7	0.16(0.92)	1.0(0.08)	0.15(0.76)	0.7 (0.24)	tri-exponential	
1	0.29(0.90)	1.4 (0.1)	0.28(0.96)	1.4(0.04)	0.12(0.89)	0.65(0.11)
1.5	0.13(0.71)	0.73 (0.28)	0.34(0.91)	1.2(0.09)	0.074(0.84)	0.61(0.16)
1.9	0.12(0.78)	0.76 (0.22)	0.09(0.83)	0.71(0.17)	0.076(0.89)	0.74(0.11)
2.6	0.15(0.72)	0.96 (0.28)	0.11(0.80)	0.95(0.20)	0.45(0.58)	1.03(0.42)
3.5	0.25(0.48)	0.93 (0.52)	0.22(0.58)	0.94(0.42)	0.63(0.17)	0.91(0.83)
4.2	0.94(1)	/	0.26(0.46)	0.94(0.54)	0.68(0.34)	1.0(0.66)
5.1	0.90(1)	/	0.37(0.02)	0.87(0.98)	0.36(0.37)	1.0(0.63)
7.5	0.80(1)	/	0.74 (1)	/	0.79 (1)	/