

## Supplementary Information

### **Kinetic effects of cationic surfactants on the photocatalytic degradation of anionic dyes in aqueous TiO<sub>2</sub> dispersions**

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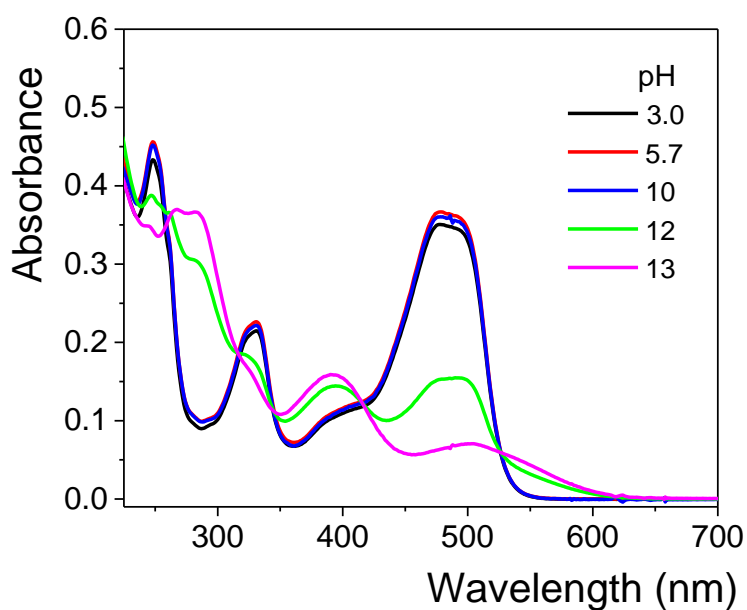
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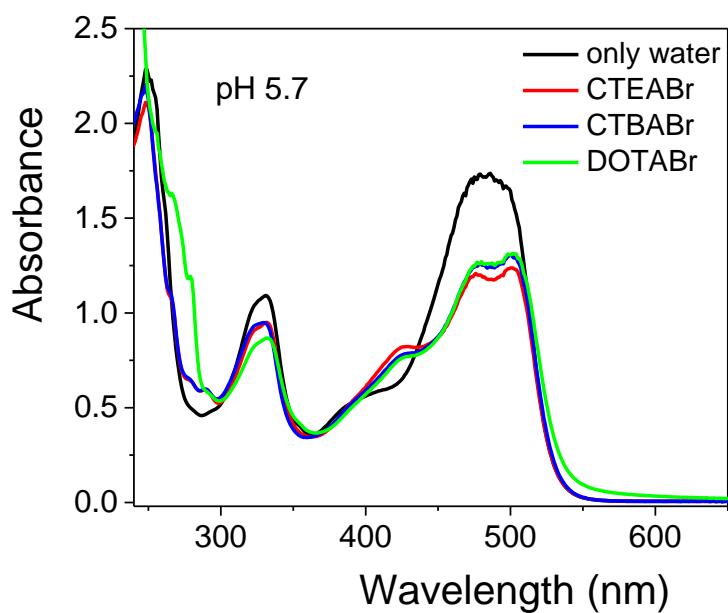
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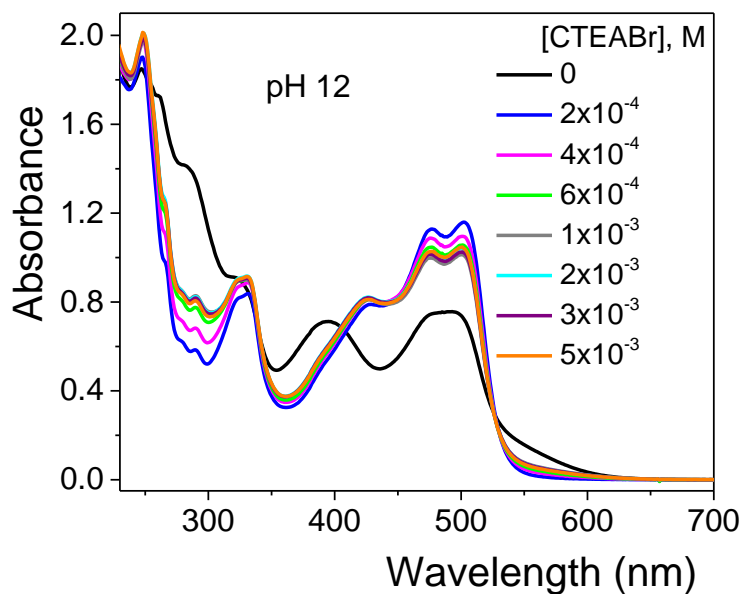
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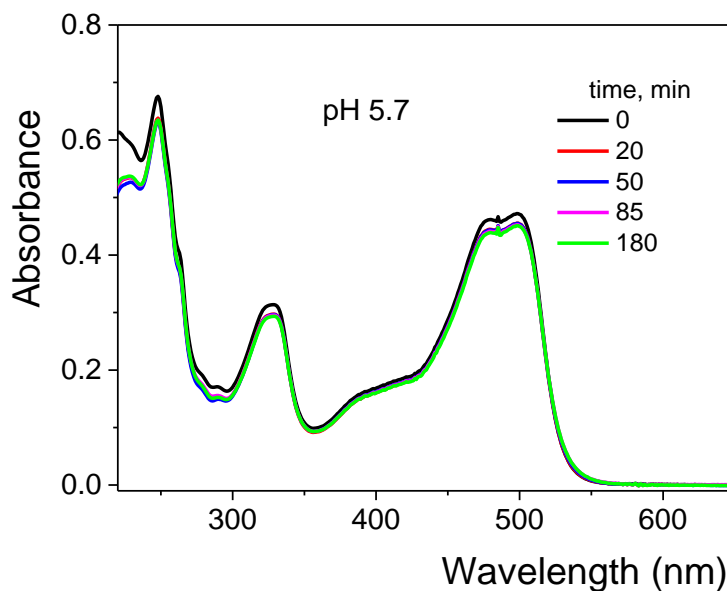
**Fig. S1.** Absorption spectra of OG ( $2.0 \times 10^{-5}$  M) recorded at different pH in aqueous solution.



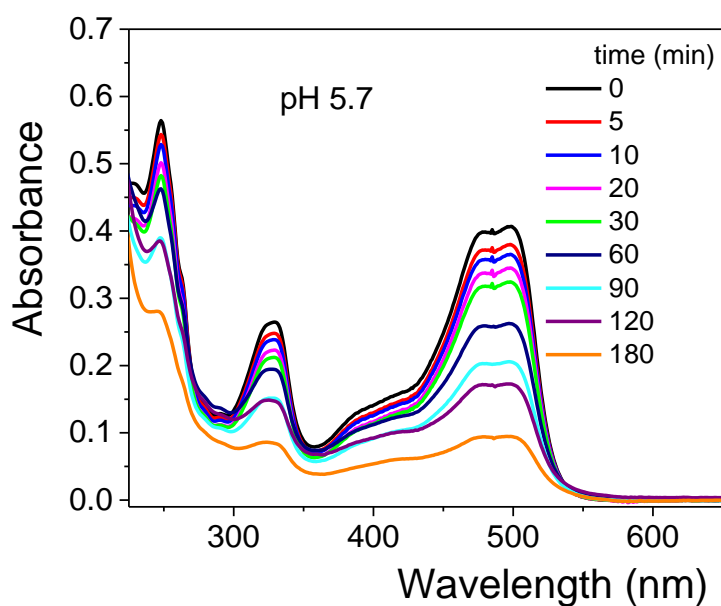
**Fig. S2.** Absorption spectra of OG ( $1.0 \times 10^{-4}$  M) recorded in aqueous solution at pH 5.7 alone (black line) and in the presence of  $1.0 \times 10^{-3}$  M CTEABr, CTBABr and *p*-DoTABr.



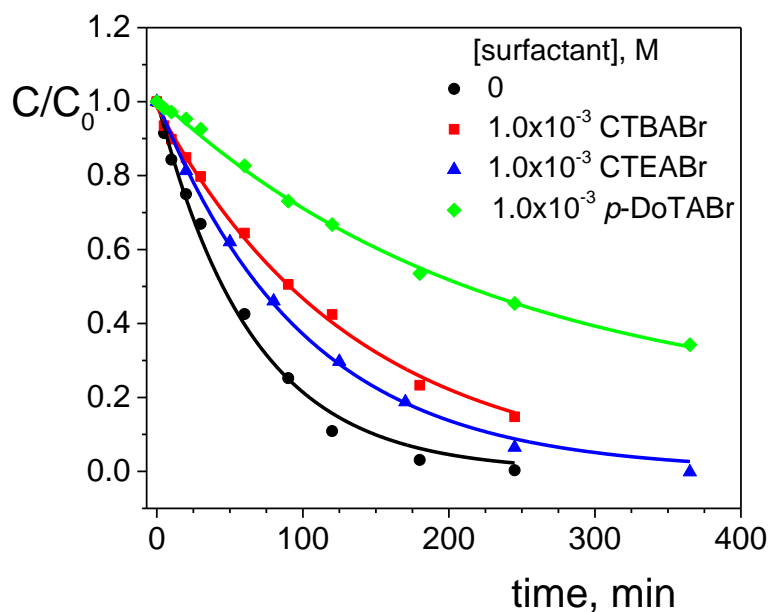
**Fig. S3.** Absorption spectra of OG ( $1.0 \times 10^{-4}$  M) recorded in aqueous solution at pH 12 alone (black line) and in the presence of various CTEABr concentrations ( $2.0 \times 10^{-4} \div 5.0 \times 10^{-3}$  M).



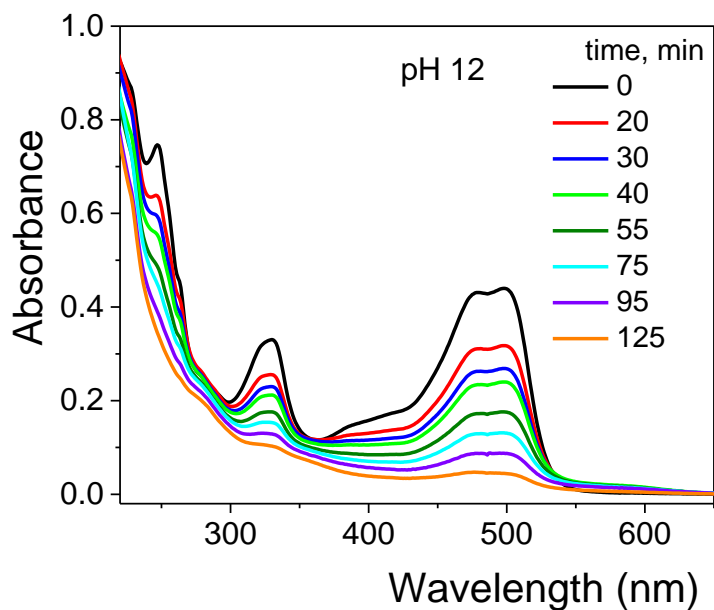
**Fig. S4.** Absorption spectra recorded during the UV irradiation of  $2.0 \times 10^{-4}$  M OG (analysis at  $2.5 \times 10^{-5}$  M after dilution with ethanol in acid solution) in aqueous solution at pH 5.7 as a function of irradiation time (12 UV lamps).



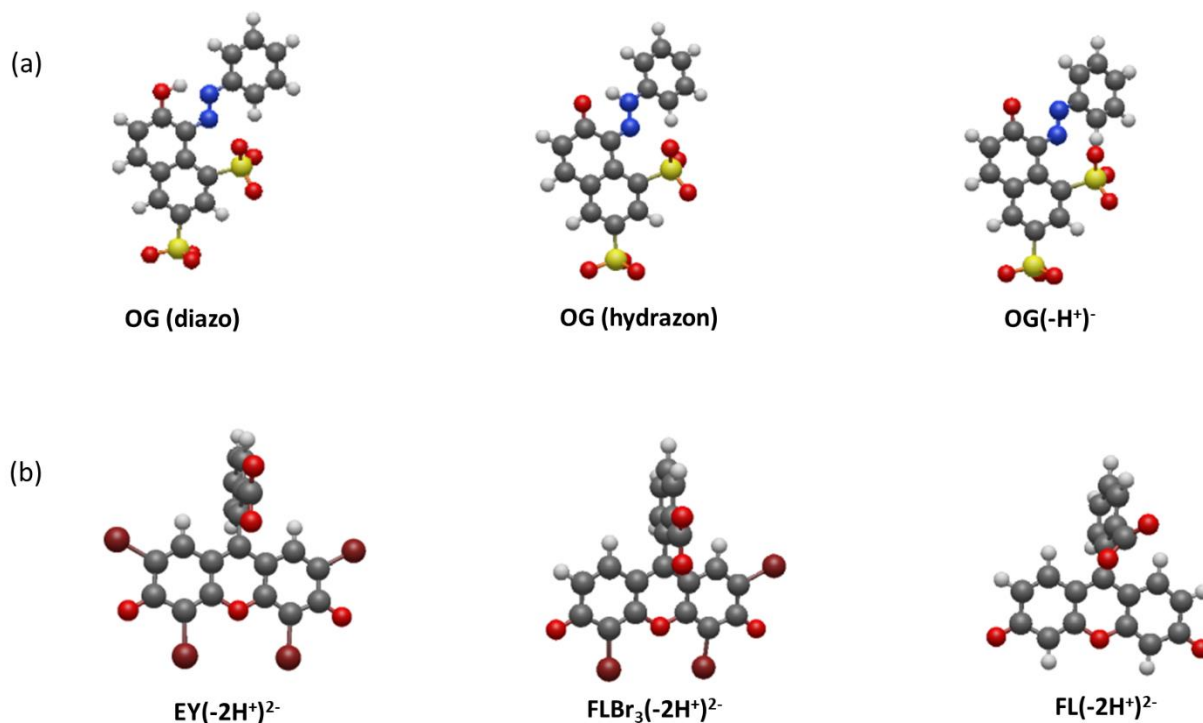
**Fig. S5.** Absorption spectra recorded during the photodegradation of  $2.0 \times 10^{-4}$  M OG (analysis at  $2.5 \times 10^{-5}$  M after dilution with ethanol in acid solution) by  $\text{TiO}_2$  (0.4 g/L) in aqueous dispersion at pH 5.7 and in the presence of CTBABr ( $1.0 \times 10^{-3}$  M) as a function of irradiation time (12 UV lamps).



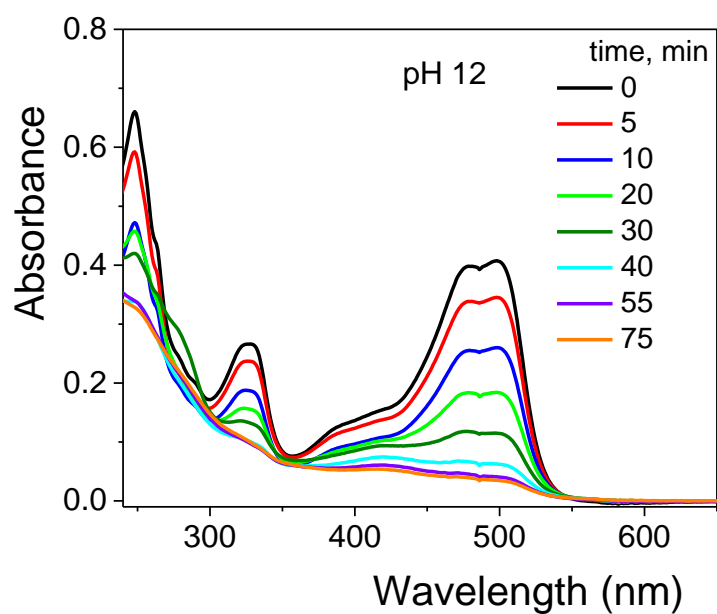
**Fig. S6.** Photodegradation kinetics of OG ( $2.0 \times 10^{-4}$  M) by  $\text{TiO}_2$  (0.4 g/L) in aqueous dispersion at pH 5.7 alone ( $\bullet$ ) and in the presence of  $1.0 \times 10^{-3}$  M CTBABr ( $\blacksquare$ ), CTEABr ( $\blacktriangle$ ) and *p*-DoTABr ( $\blacklozenge$ ) in water (12 UV lamps);  $\lambda_{\text{anal}} = 498$  nm. The solid lines represent the corresponding pseudo-first order kinetic fittings.



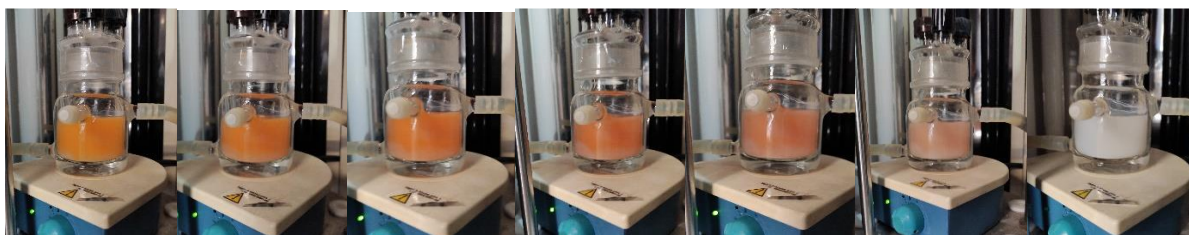
**Fig. S7.** Absorption spectra recorded during the photodegradation of  $2.0 \times 10^{-4}$  M OG (analysis at  $2.5 \times 10^{-5}$  M after dilution with ethanol in acid solution) catalyzed by  $\text{TiO}_2$  (0.4 g/L) in aqueous dispersion at pH 12 as a function of irradiation time (6 UV lamps).



**Fig. S8.** Structures optimized in water of (a) OG(diazo), OG(hydrazon) and OG(-H<sup>+</sup>)<sup>-</sup>; (b) EY(-2H<sup>+</sup>)<sup>2-</sup>, FLBr<sub>3</sub>(-2H<sup>+</sup>)<sup>2-</sup> and FL(-2H<sup>+</sup>)<sup>2-</sup>.

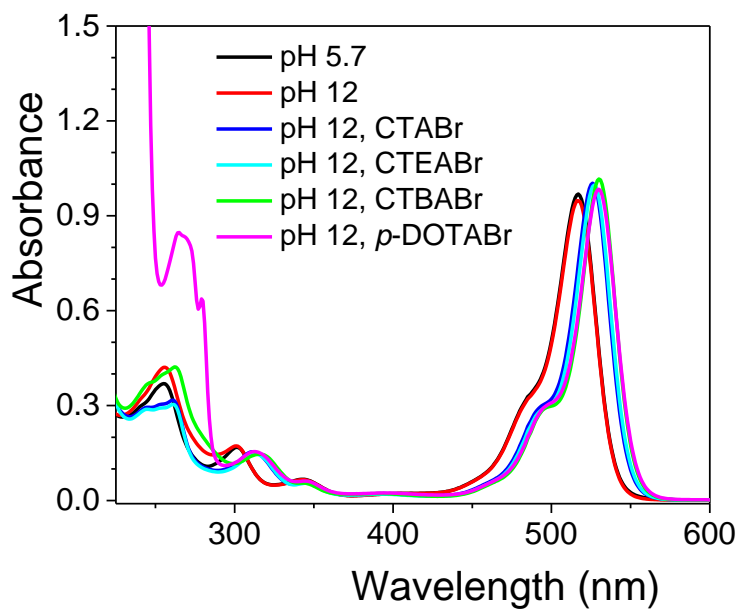


**Fig. S9.** Absorption spectra recorded during the photodegradation of  $2.0 \times 10^{-4}$  M OG (analysis at  $2.5 \times 10^{-5}$  M after dilution with ethanol in acid solution) by  $\text{TiO}_2$  (0.4 g/L) in aqueous dispersion at pH 12 and in the presence of CTEABr ( $1.0 \times 10^{-3}$  M) as a function of irradiation time (6 UV lamps).

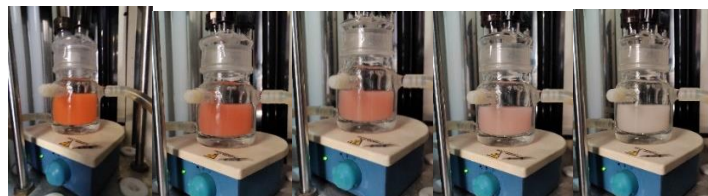


**Fig. S10.** Photodegradation of OG catalyzed by  $\text{TiO}_2$  in aqueous dispersion at pH 12 in the presence of CTEABr ( $1.0 \times 10^{-3}$  M).

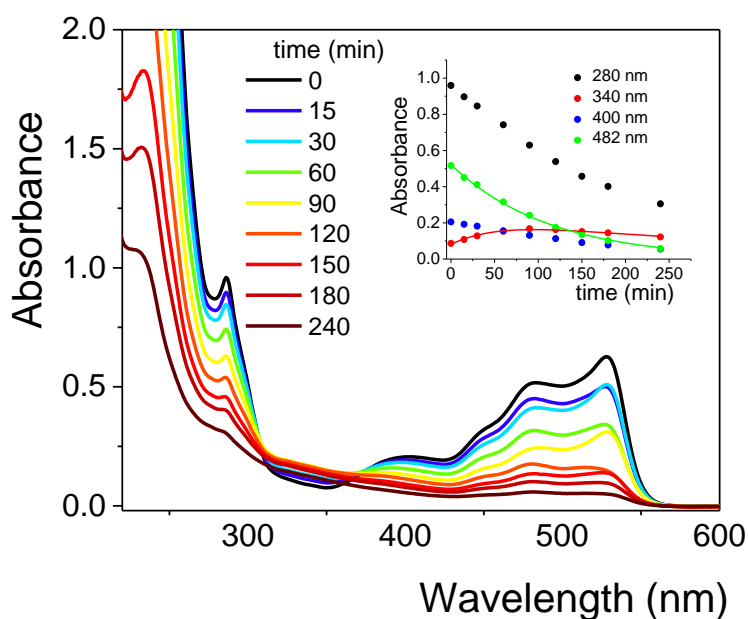




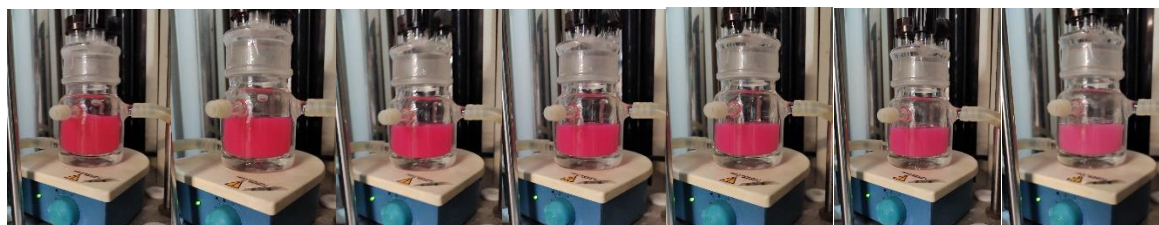
**Fig. S11.** Absorption spectra of EY ( $1.0 \times 10^{-5}$  M) recorded in aqueous solution at pH 5.7, at pH 12 alone and in the presence of  $1.0 \times 10^{-3}$  M CTABr, CTEABr, CTBABr and *p*-DoTABr.



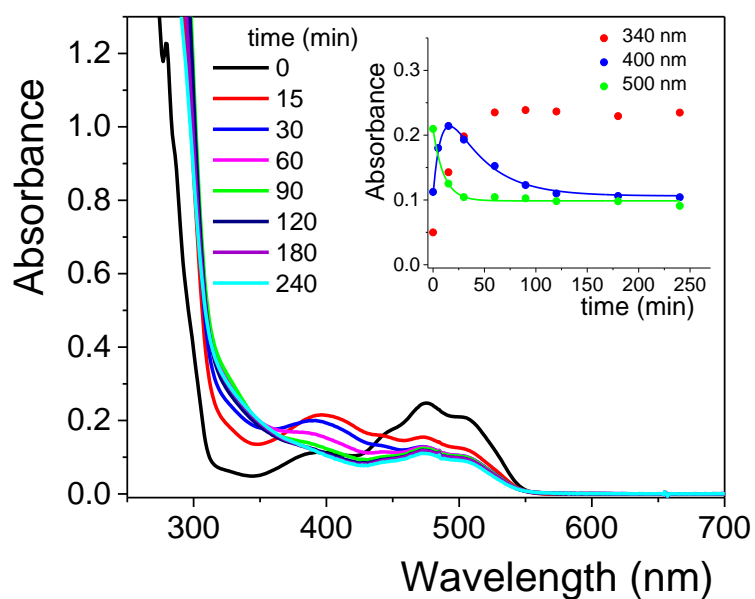
**Fig. S12.** Photodegradation of EY catalyzed by TiO<sub>2</sub> in aqueous dispersion at pH 12.



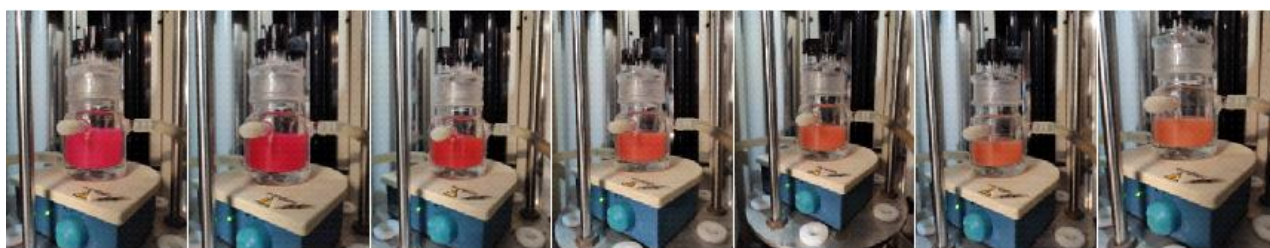
**Fig. S13.** Absorption spectra recorded during the photodegradation of  $2.0 \times 10^{-4}$  M EY (analysis at  $1.0 \times 10^{-4}$  M after dilution with ethanol in acid solution) by  $\text{TiO}_2$  (0.4 g/L) in aqueous dispersion at pH 12 in the presence of CTABr ( $1.0 \times 10^{-3}$  M) as a function of irradiation time (12 UV lamps). Inset: change in absorbance at 280, 340, 400 and 482 nm as a function of irradiation time. The solid lines represent the corresponding kinetics fittings.



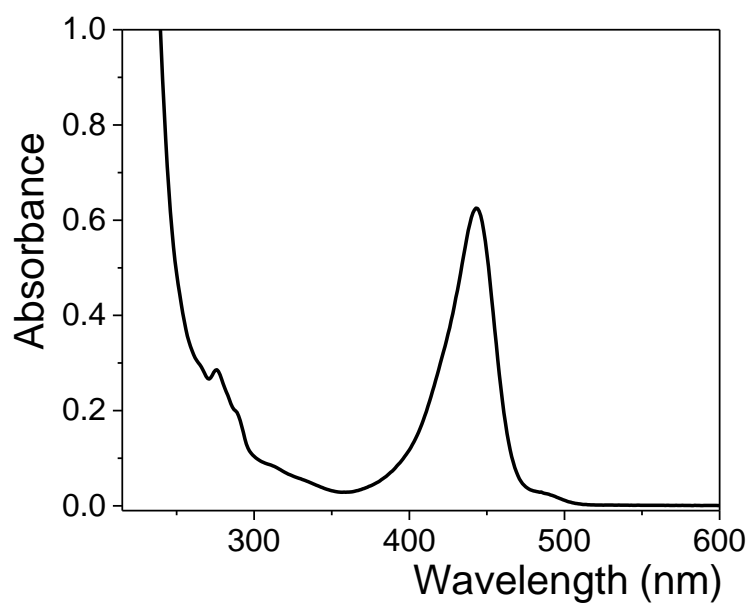
**Fig. S14.** Photodegradation of EY catalyzed by  $\text{TiO}_2$  in aqueous dispersion at pH 12 in the presence of CTABr ( $1.0 \times 10^{-3}$  M).



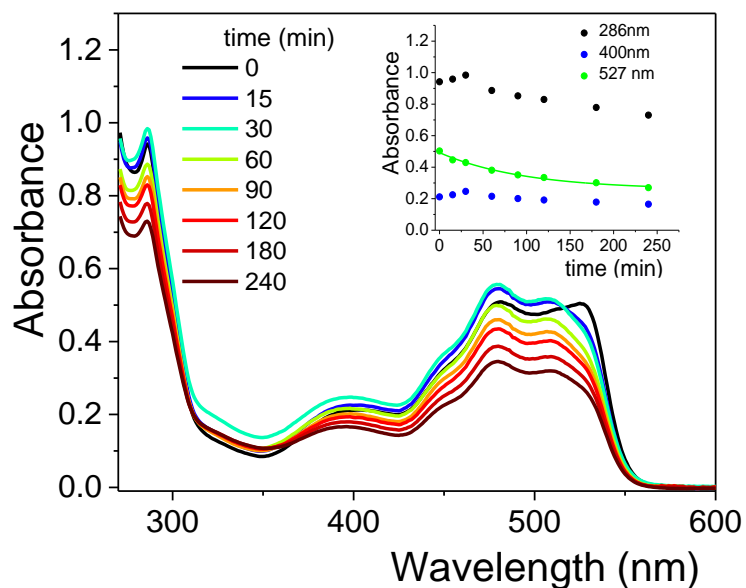
**Fig. S15.** Absorption spectra recorded during the photodegradation of  $2.0 \times 10^{-4}$  M EY (analysis at  $1.0 \times 10^{-4}$  M after dilution with  $\text{CH}_3\text{CN}$  in acid solution) by  $\text{TiO}_2$  (0.4 g/L) in aqueous dispersion at pH 12 in the presence of *p*-DoTABr ( $1.0 \times 10^{-3}$  M) as a function of irradiation time (12 UV lamps). Inset: change in absorbance at 340, 400 and 500 nm as a function of irradiation time. The solid lines represent the corresponding kinetics fittings.



**Fig. S16.** Photodegradation of EY catalyzed by  $\text{TiO}_2$  in aqueous dispersion at pH 12 in the presence of *p*-DoTABr ( $1.0 \times 10^{-3}$  M).



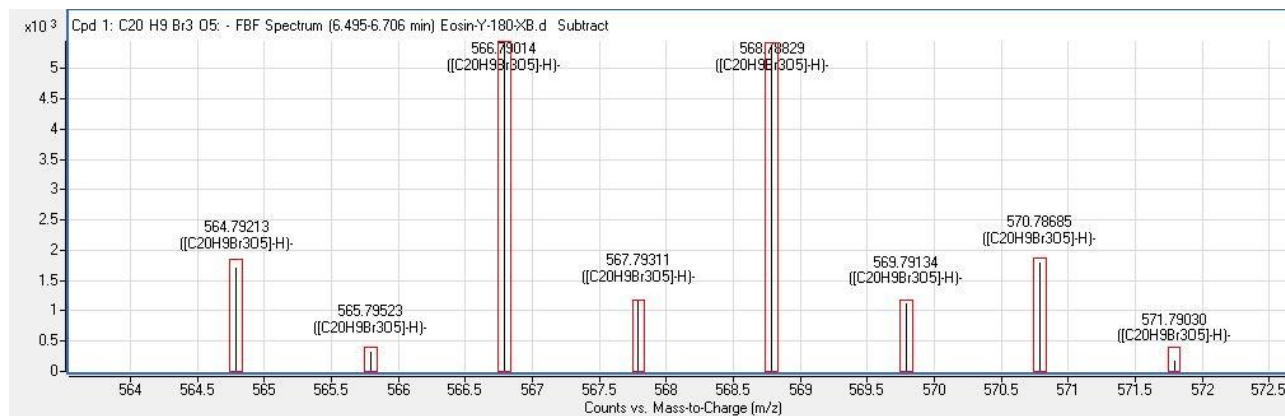
**Fig. S17.** Absorption spectra of FL ( $1.0 \times 10^{-5}$  M) recorded in 1:1 water:ethanol acid solution.



**Fig. S18.** Absorption spectra recorded during the photodegradation of  $2.0 \times 10^{-4}$  M EY (analysis at  $1.0 \times 10^{-4}$  M after dilution with ethanol in acid solution) by  $\text{TiO}_2$  (0.4 g/L) in aqueous dispersion at pH 12 and in the presence of  $\text{CH}_3\text{OH}$  (1.0 M) as a function of irradiation time (12 UV lamps). Inset: change in absorbance at 286, 400 and 527 nm as a function of irradiation time. The solid lines represent the corresponding kinetics fittings.

**Fig. S19.** HPLC-HRMS analysis

MS spectrum:



UV-Vis spectrum:

