Supporting information

Zn and N co-doped TiO_2 thin films: photocatalytic and bactericidal activity

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Table S1. Relationship between the Zn at.% present in the precursor solution and Zn at.% determined by EDS analysis (both relative to Ti).

Sample	Zn conc. in precursor solution (mol.%)	Zn conc. in film determined by EDS (at.%)
0.4% Zn, N : TiO_2	0.2	0.4%
1.0% Zn, N : TiO_2	0.5	1.0%
1.4% Zn, N : TiO_2	1.0	1.4%
2.9% Zn, N : TiO_2	1.5	2.9%

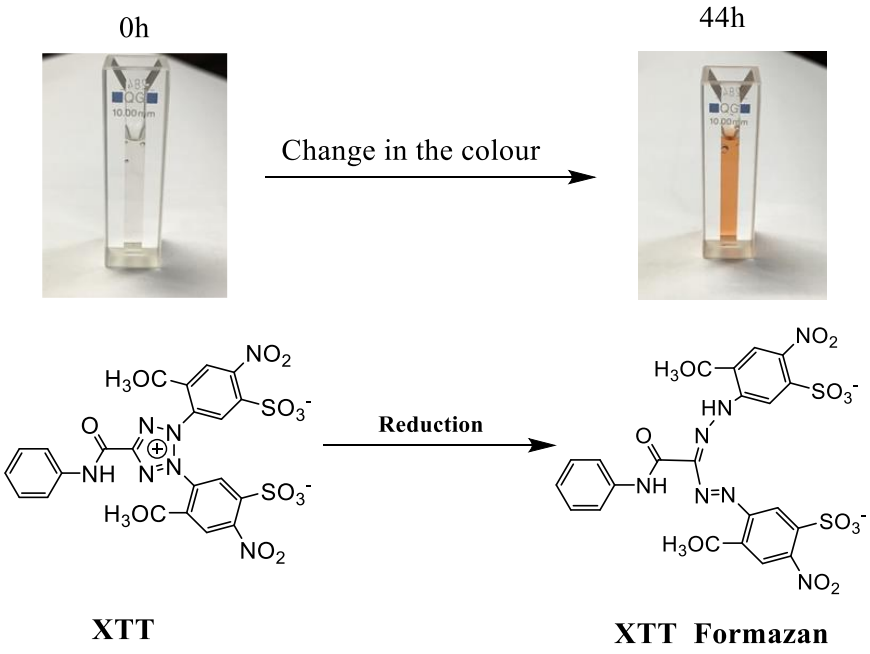
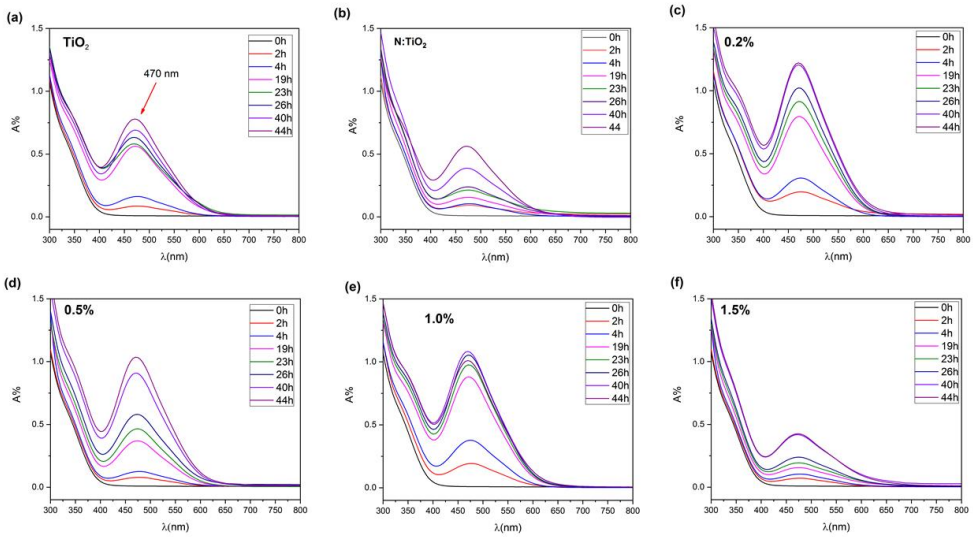


Figure S1: Structural change in the [2,3-bis(2-methoxy-4-nitro-5-sulfophenyl)-5-[(phenylamino)carbonyl]-2H-tetrazolium sodium salt] (XTT) after reduction to XTT formazan by superoxide ($O_2^{\bullet -}$), which was generated under the action of UVA light in the photocatalyst thin films.



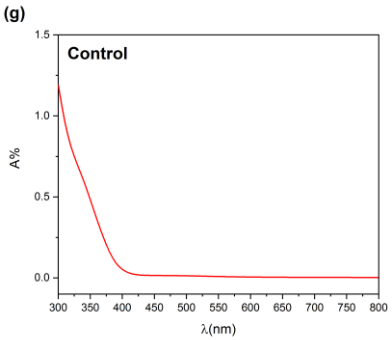


Figure S2: Reduction of XTT sodium salt solution by superoxide (O_2•–) radical formation on the photocatalyst thin films under UVA irradiation: a) undoped TiO2, b) N –doped TiO2, c) 0.4% Zn, N : TiO2, d) 1.0% Zn, N : TiO_2, e) 1.4% Zn, N : TiO_2, f) 2.9% Zn, N : TiO2 and g) a glass control after 44 h.

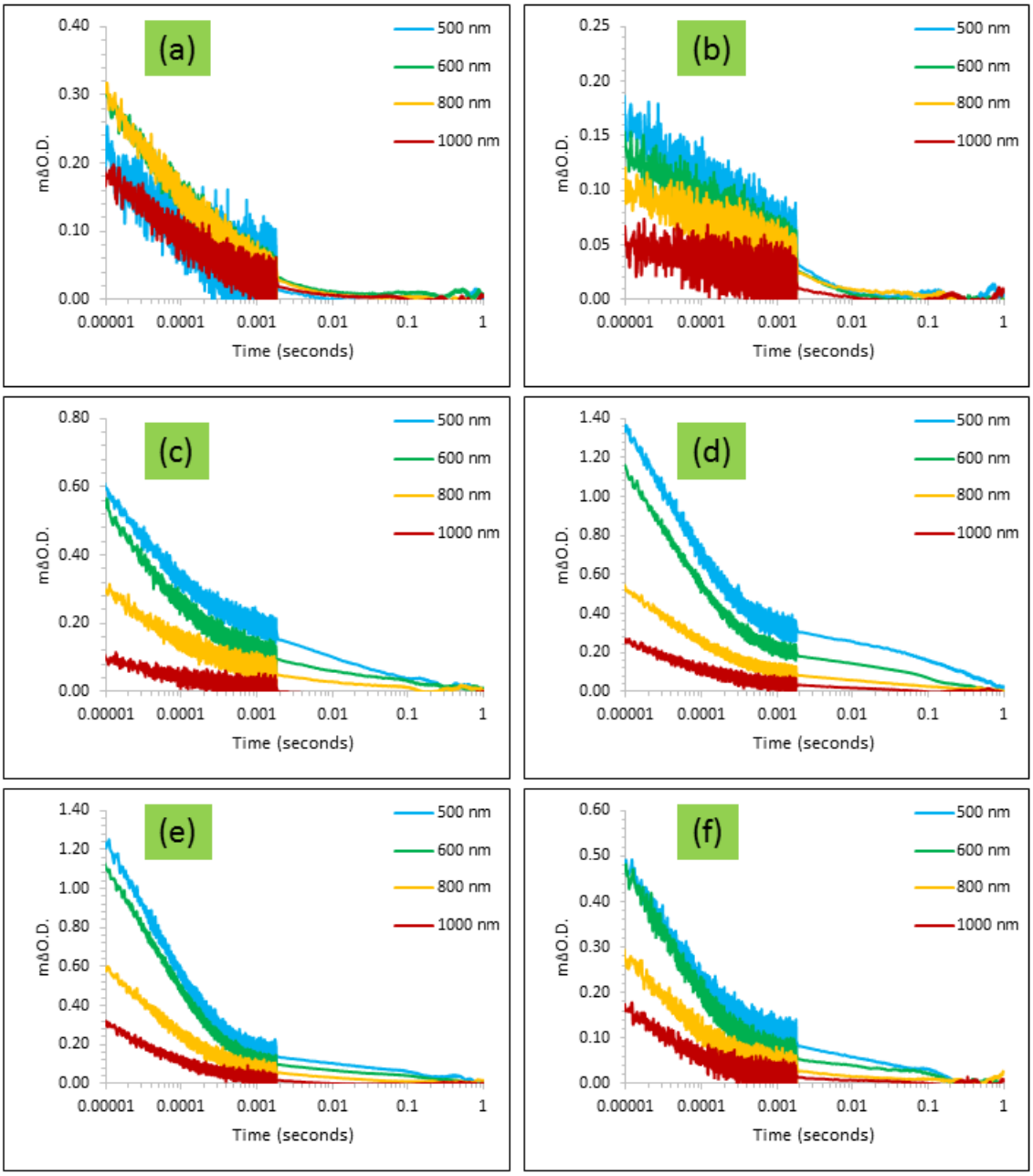


Figure S3. Transient absorption decays, measured from 10 µs after a laser pulse to 1 s (λ_{exc} = 355 nm, ~1 mJ.cm^{-2} per pulse; 0.65 Hz), at the select wavelengths of 500, 600, 800 and 1000 nm for a) TiO_2, b) N : TiO_2 c) 0.4% Zn, N : TiO_2, d) 1.0% Zn, N : TiO_2 , e) 1.4% Zn, N : TiO_2 and f) 2.9% Zn, N : TiO_2.

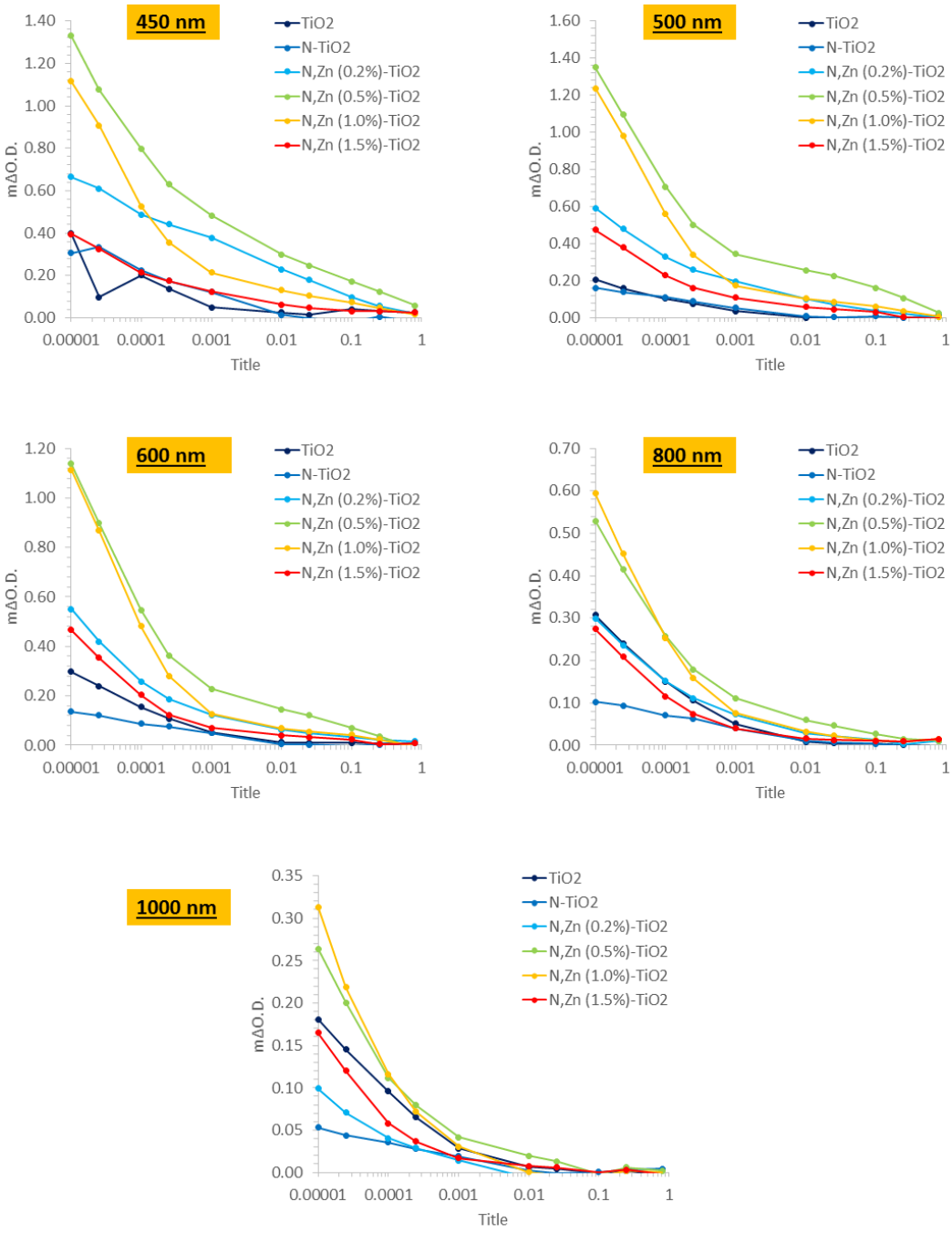


Figure S4. A comparison of transient absorption decays, measured from 10 µs after a laser pulse to 1 s (λ_{exc} = 355 nm, ~1 mJ.cm^{-2} per pulse; 0.65 Hz) of all samples at the select wavelengths of a) 450 nm, b) 500 nm, c) 600 nm, d) 800 nm and e) 1000 nm. Note - in the graphs the nominal Zn conc. are given, 0.2% = 0.4 at.%, 0.5% =1.0 at.%, 1.0% = 1.4 at.% and 1.5 % = 2.9 at.% in the films.

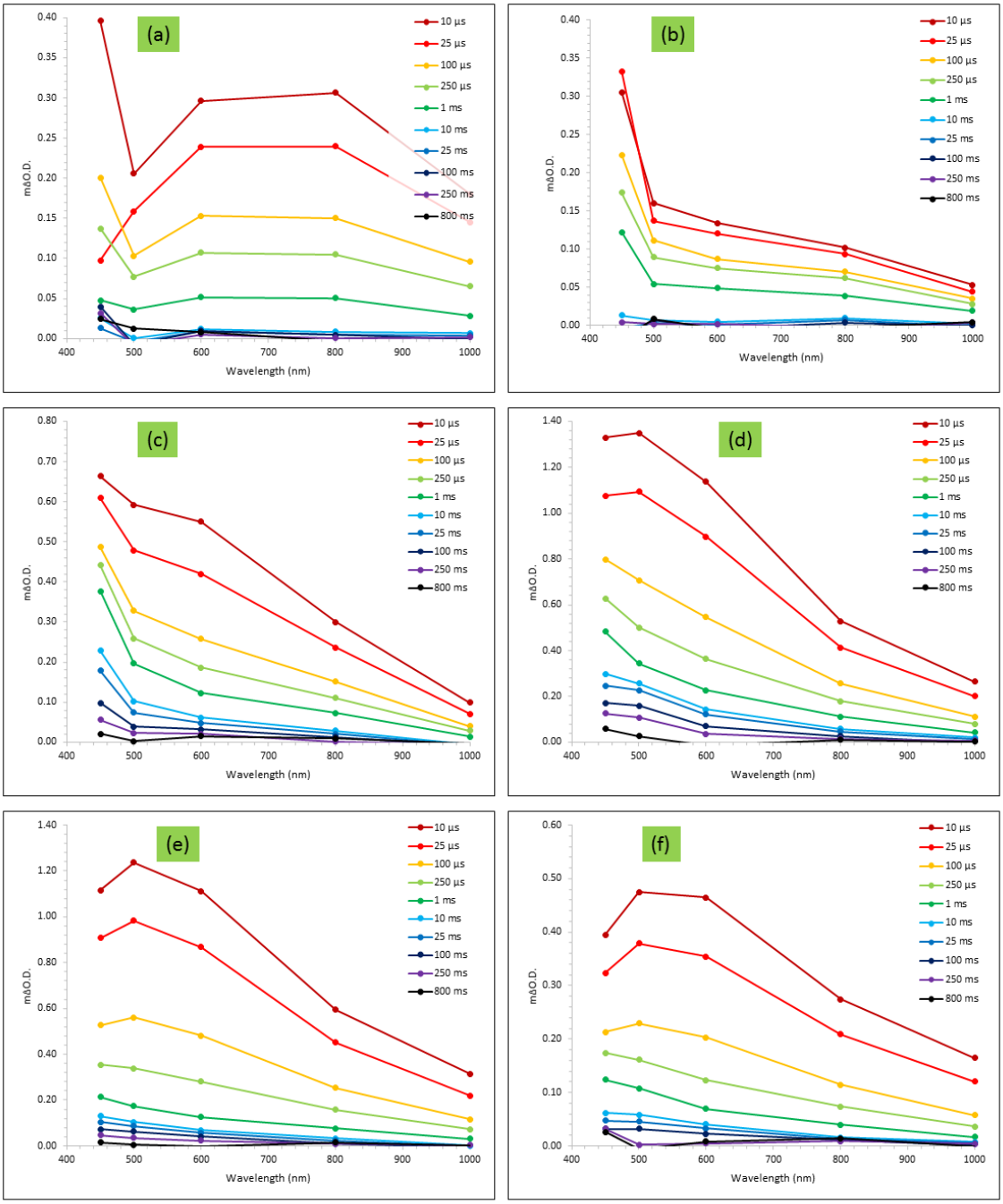


Figure S5. Transient absorption spectra, measured from 10 µs after a laser pulse to 1 s (λ_{exc} = 355 nm, ~1 mJ.cm^{-2} per pulse; 0.65 Hz), at the select times of 10 µs, 25 µs, 100 µs, 250 µs, 1 ms, 10 ms, 25 ms, 100 ms, 250 ms and 800 ms for a) TiO_2, b) N : TiO_2, c) 0.4% Zn, N : TiO_2, d) 1.0% Zn, N : TiO_2, e) 1.4% Zn, N : TiO_2 and f) 2.9% Zn, N : TiO_2.

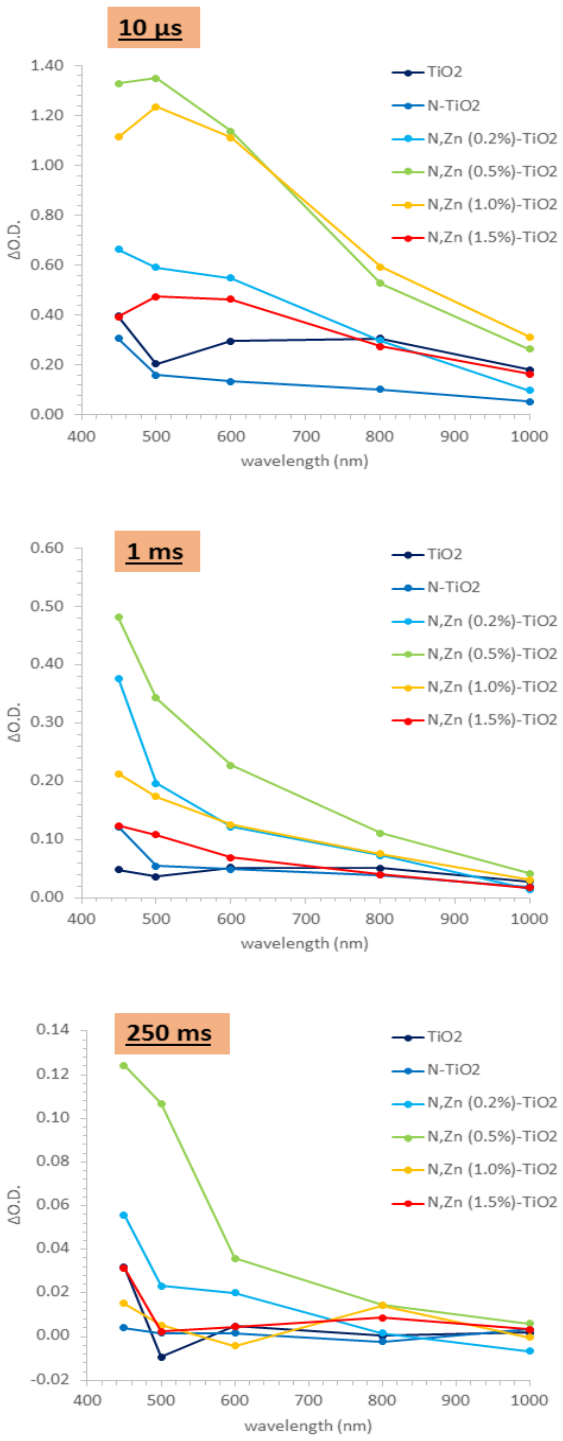


Figure S6. Comparison of the transient absorption spectra, measured from 10 µs after a laser pulse to 1 s (λ_{exc} = 355 nm, ~1 mJ.cm^{-2} per pulse; 0.65 Hz), of all samples at the select times of a) 10 µs, b) 1 ms and c) 250 ms.