


Supplementary Information

Solvothermal Synthesis of Cerium-Doped Titania Nanostructured Materials Modified by Acetylacetone for Solar Driven Photocatalysis

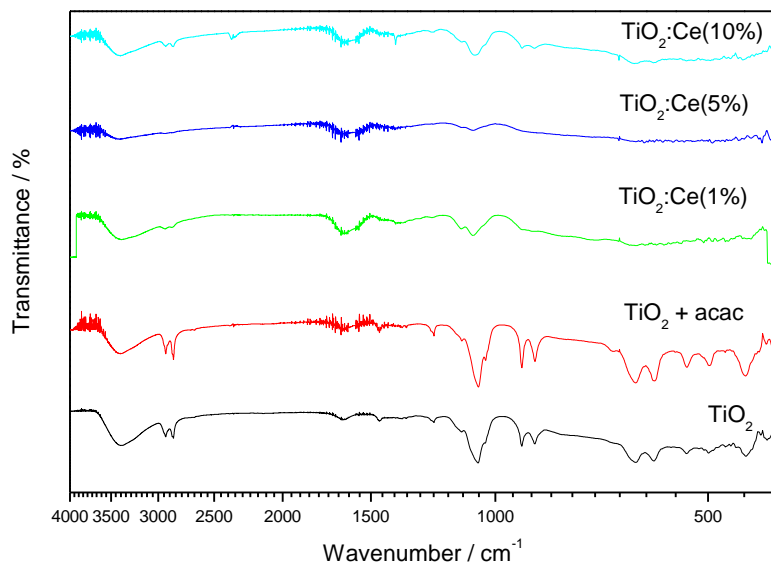
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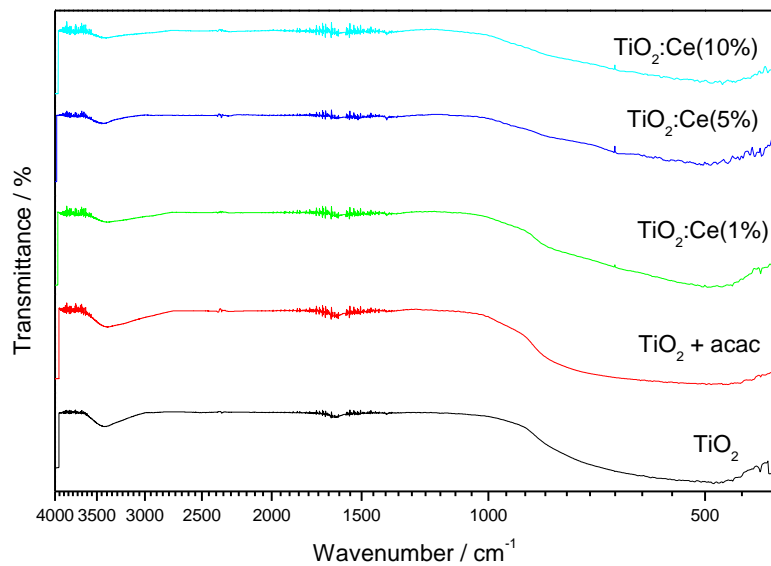
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FTIR spectra (Figure S1a) and thermogravimetric analysis (Figure S2) show the presence of organic species on the as-prepared nanostructured materials. After calcination, new FTIR spectra were collected (Figure S1b) evidencing the elimination of organic residues.

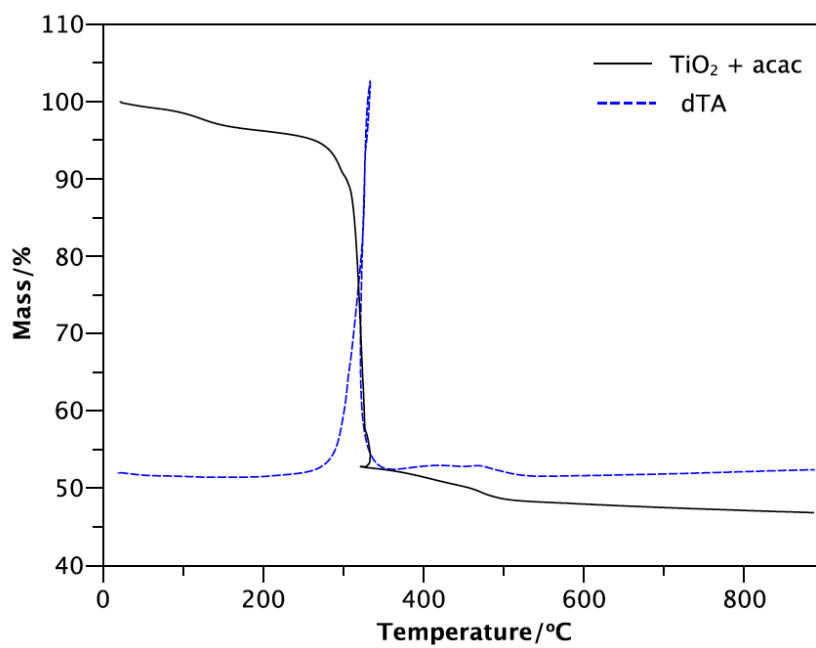


(a)

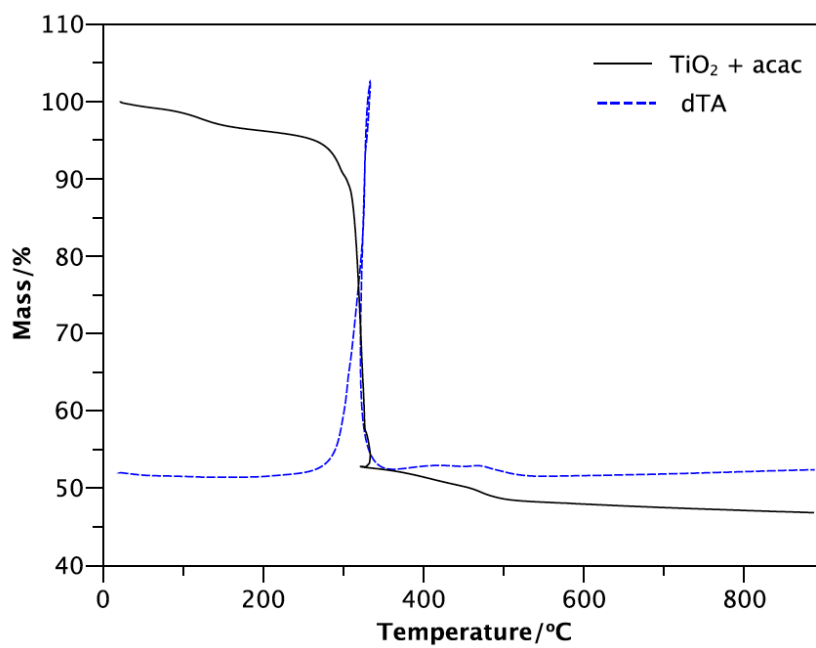


(b)

Figure S1. IR (KBr) spectra of $\text{TiO}_2:\text{Ce}x\%$ (a) as-prepared and (b) calcined at 400 °C for 4 h.



(a)



(b)

Figure S2. TGA/DTA for (a) $\text{TiO}_2 + \text{acac}$ and (b) $\text{TiO}_2:\text{Ce}(10\%)$.

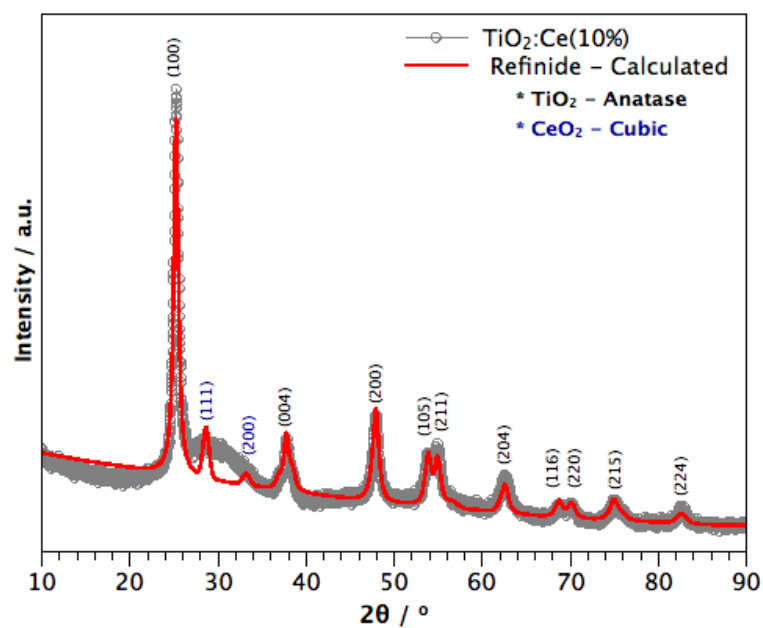


Figure S3. X-ray diffraction pattern for $\text{TiO}_2:\text{Ce}(10\%)$ refined by Rietveld using the MAUD[®] software.¹ (Refinement was calculated applying CIF files: 5000223 and 9009008).

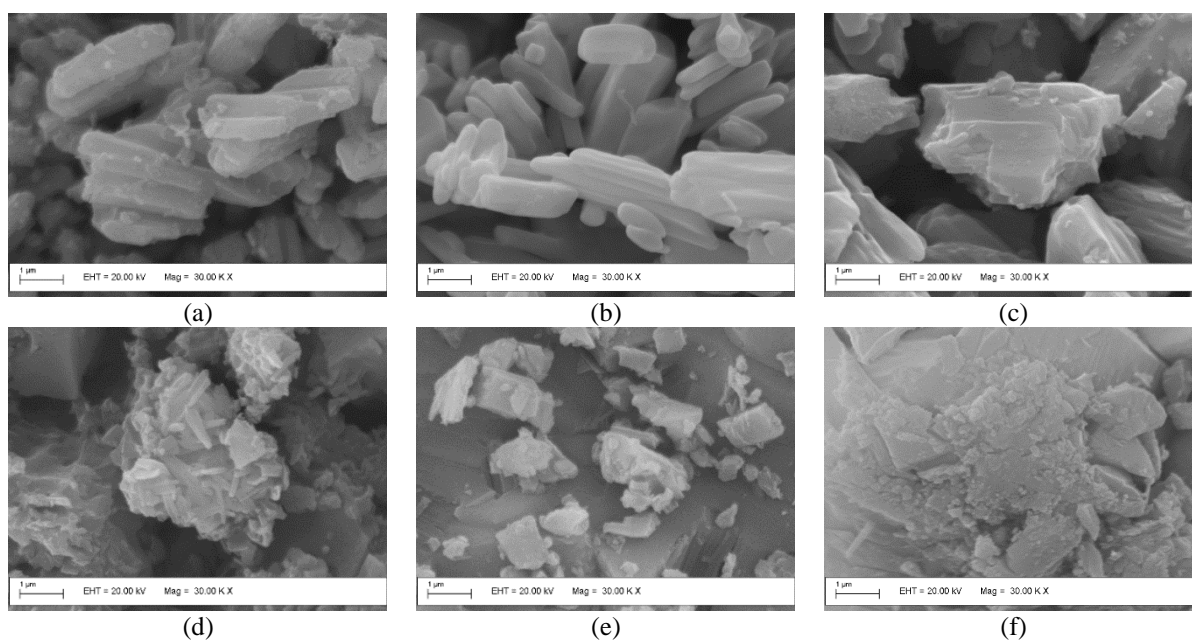


Figure S4. SEM images (in moderate magnification) for (a) Pure TiO_2 , (b) $\text{TiO}_2 + \text{acac}$, (c) $\text{TiO}_2:\text{Ce}(0.5\%)$, (d) $\text{TiO}_2:\text{Ce}(1\%)$, (e) $\text{TiO}_2:\text{Ce}(5\%)$ and (f) $\text{TiO}_2:\text{Ce}(10\%)$.

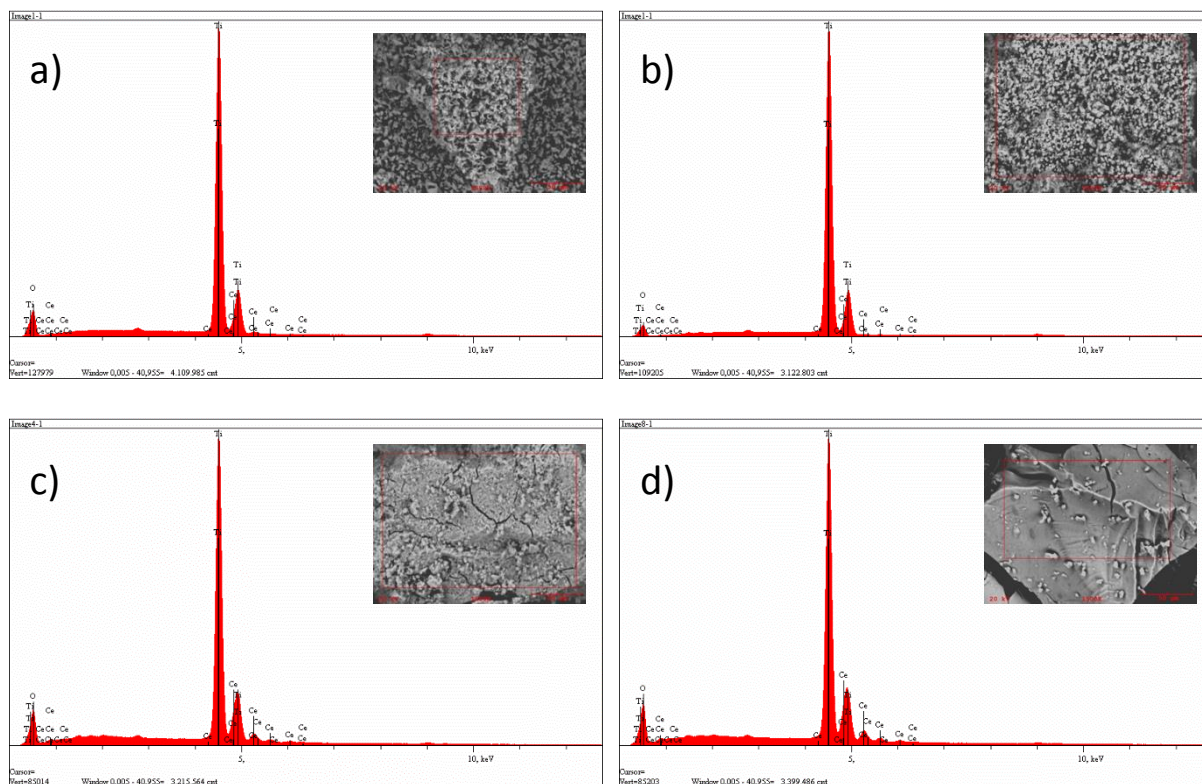


Figure S5. EDX mapping for (a) TiO₂:Ce(0.5%), (b) TiO₂:Ce(1%), (c) TiO₂:Ce(5%) and (d) TiO₂:Ce(10%).

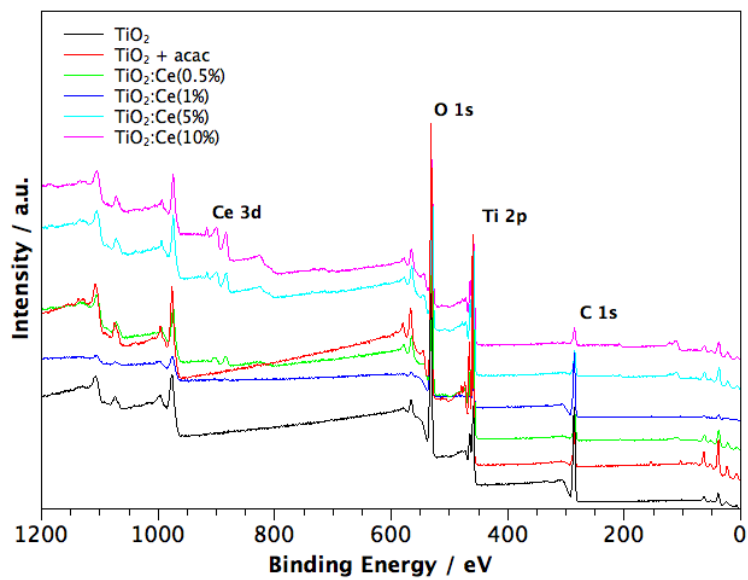


Figure S6. Comparative XPS spectra.

Table S1. Surface properties of photocatalysts determined by XPS

Sample	Ce/Ti	Ce ⁴⁺ / %	Ce ³⁺ / %
TiO ₂ :Ce(0.5%)	0.12	19	81
TiO ₂ :Ce(1%)	0.10	0	100
TiO ₂ :Ce(5%)	0.20	34	66
TiO ₂ :Ce(10%)	0.30	45	55

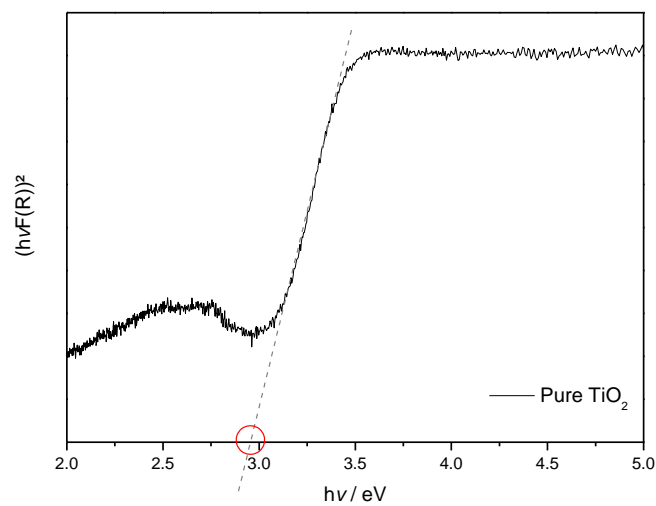
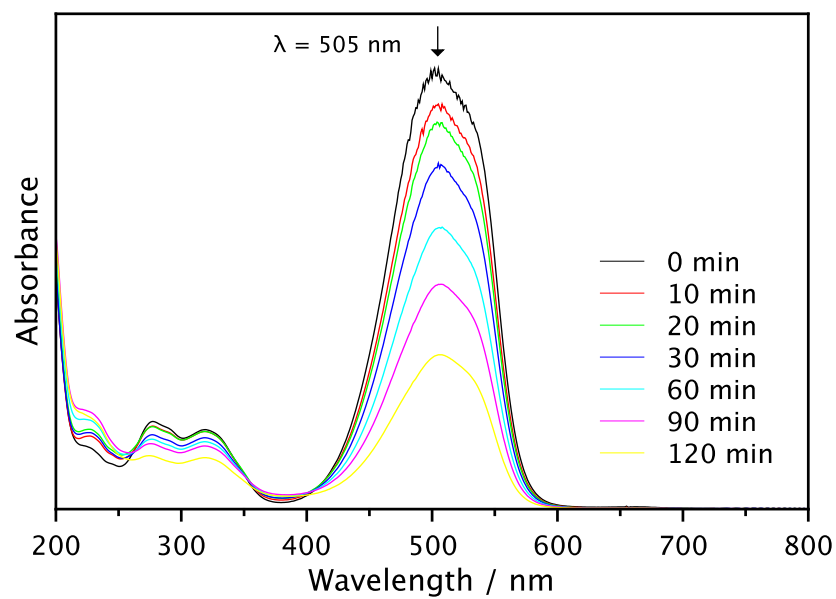


Figure S7. Plot of $((hvF)(R))^2$ versus photon energy for bandgap determination. Exemplified for Pure TiO₂.



(a)

Figure S8. UV-Vis spectra of protonated MO (pH = 2.0) in the presence of TiO₂:Ce(10%) irradiated by UV lamp during 120 min, with water cooling to ensure temperature ca. 25 °C for the experiments.

Reference

1. Lutterotti, L.; Matthies, S.; Wenk, H.-R.; *IUCr: Newsletter of the CPD* **1999**, *21*, 14.