

**Photocatalytic activity of hierarchically structured, thermally stable, anatase particles**

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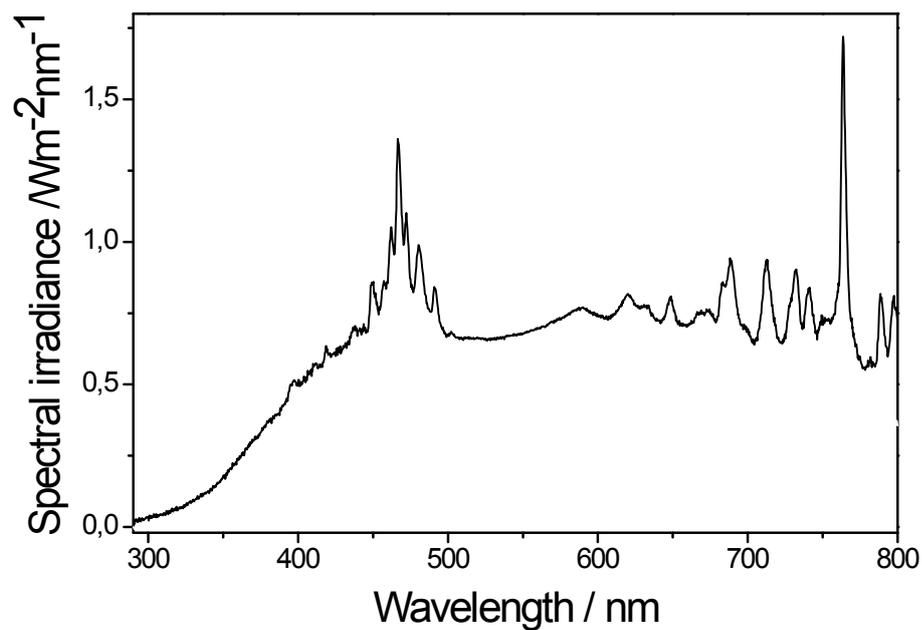


Fig. S1 Spectral power distribution of the applied light source (Xe lamp) measured at a distance of 6 cm from the lamp.

The spectral power distribution of the light source used for the evaluation of the photocatalytic activity of the synthesized titania is presented in Fig. S1.

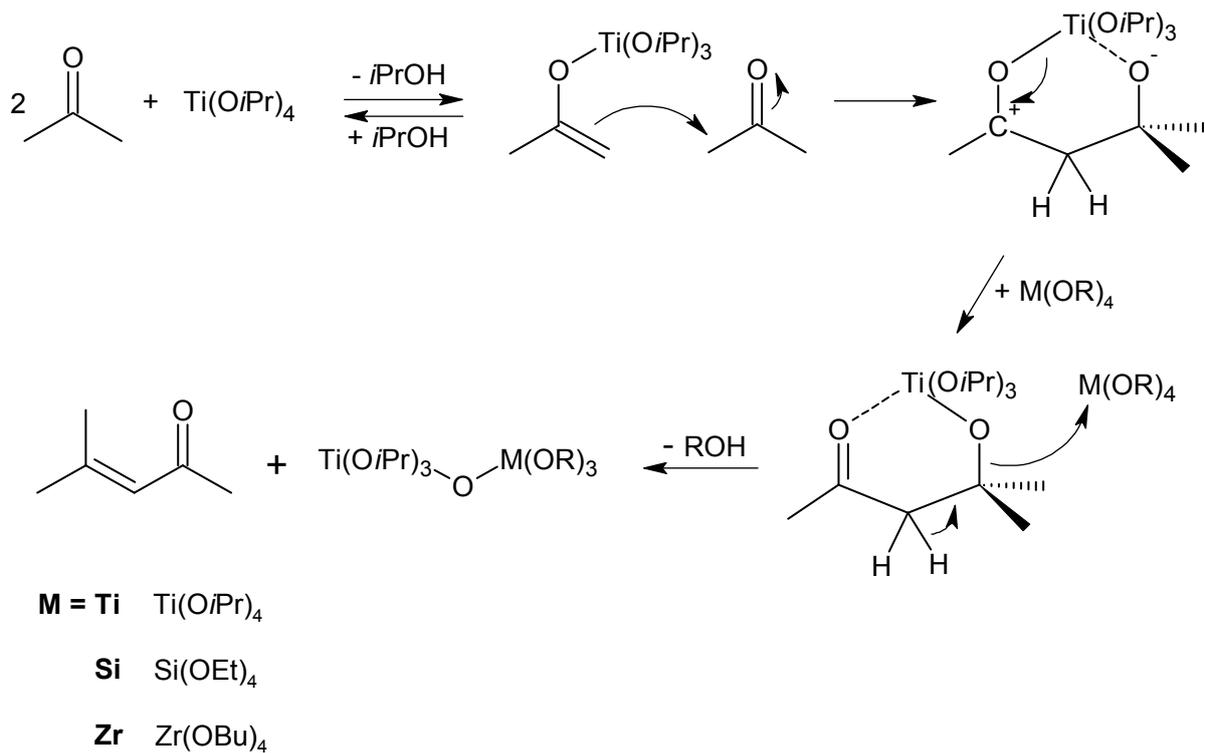


Fig. S2 Scheme of the proposed mechanism for the synthesis of multiple doped and undoped anatase.

Fig. S2 presents a proposed mechanism for the Ti-O-M (M=Ti, Si or Zr) bond formation during the solvothermal synthesis of the doped and undoped anatase.

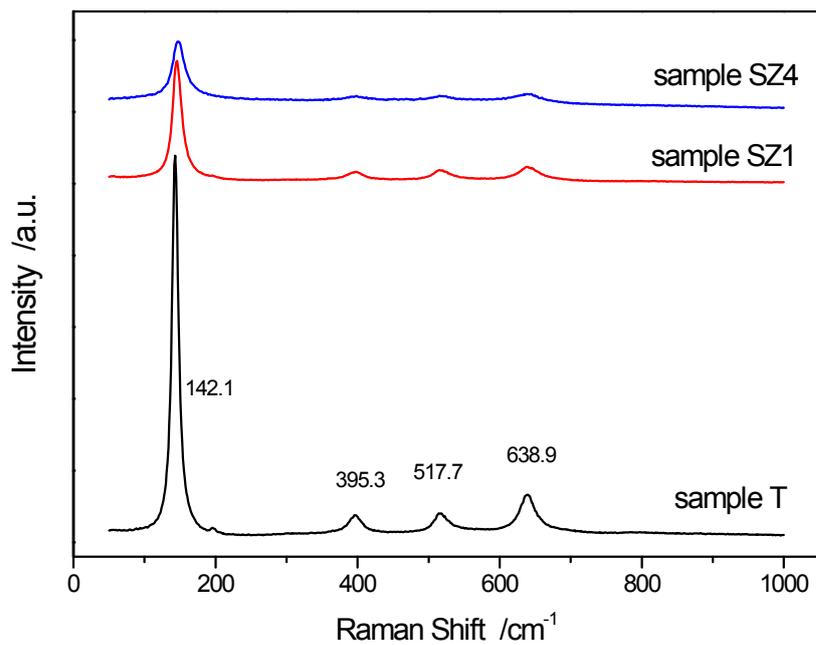


Fig. S3 Raman spectra of the as-prepared samples T, SZ1 and SZ4.

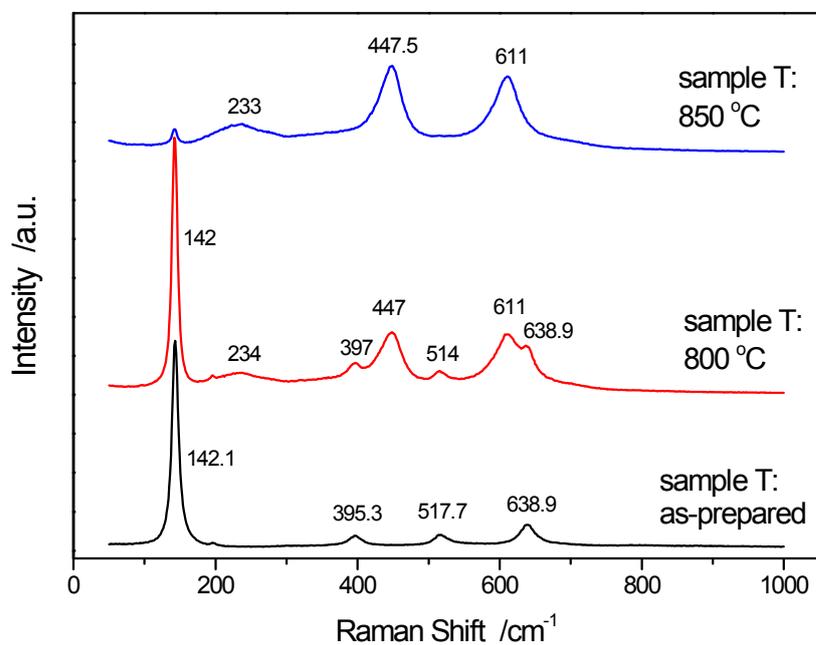


Fig. S4 Raman spectra of the sample T: as-prepared and heat treated at 800  $^{\circ}\text{C}$  and at 850  $^{\circ}\text{C}$ .

The Raman measurements of the as-prepared samples and also the heat-treated samples were performed (LabRAM HR800; Horiba Jobin-Yvon). Fig. S3 shows the Raman spectra of the as-prepared samples T, SZ1 and SZ4, which exhibit Raman bands at 142, 395, 517 and 639  $\text{cm}^{-1}$  and are typical of the anatase-phase Raman spectra of the other as-prepared and heated samples at 500  $^{\circ}\text{C}$  are the same. Furthermore, Fig. S4 presents the Raman spectra of the as-prepared sample T, which is anatase and the sample T heated at 800  $^{\circ}\text{C}$ , which already exhibits bands of the anatase and rutile phases, and the sample T heated at 850  $^{\circ}\text{C}$ , showing the bands for the rutile phase at 233, 447 and 611  $\text{cm}^{-1}$ .<sup>(S1-3)</sup> These results confirmed the XRD results, described in the manuscript, and they show that both the as-prepared samples and the samples heated to 500  $^{\circ}\text{C}$  were single-phase anatase.

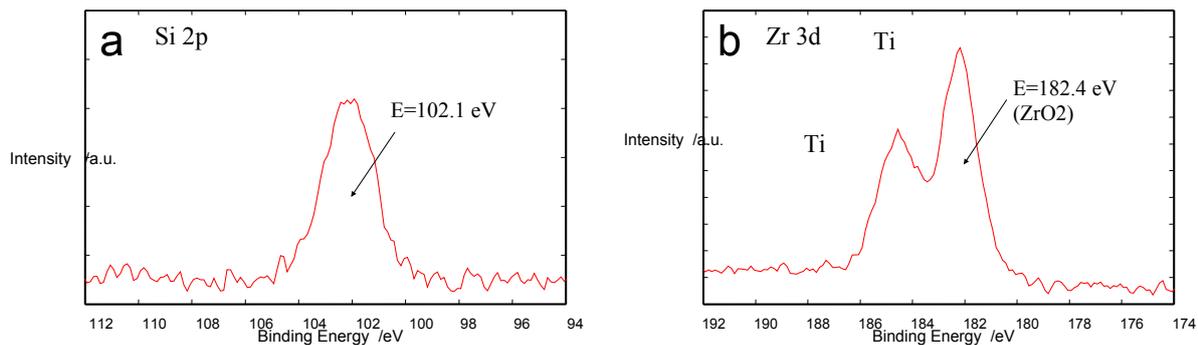


Fig. S5 High-resolution XPS spectra of Si 2p (a) and Zr 3d (b) for the sample SZ4 calcined at 500 °C.

The binding energy of the Si 2p<sub>3/2</sub> of the pure SiO<sub>2</sub> (fused silica) is around 103.9 eV and of the Zr 3d<sub>5/2</sub> band of the pure ZrO<sub>2</sub> is 182.5 ± 0.1 eV.<sup>(S4,S5)</sup>

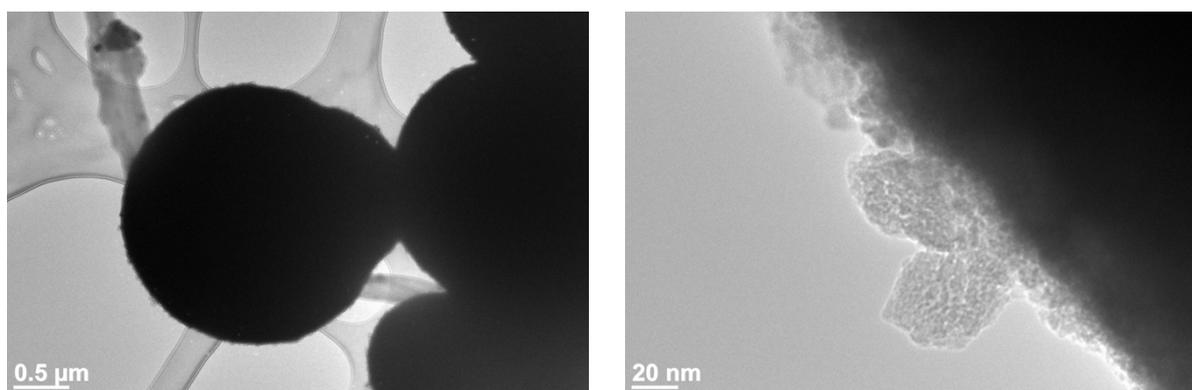


Fig. S6 Bright-field TEM images of the as-prepared spherical particle of the sample SZ4, calcined at 500 °C, at different magnifications.

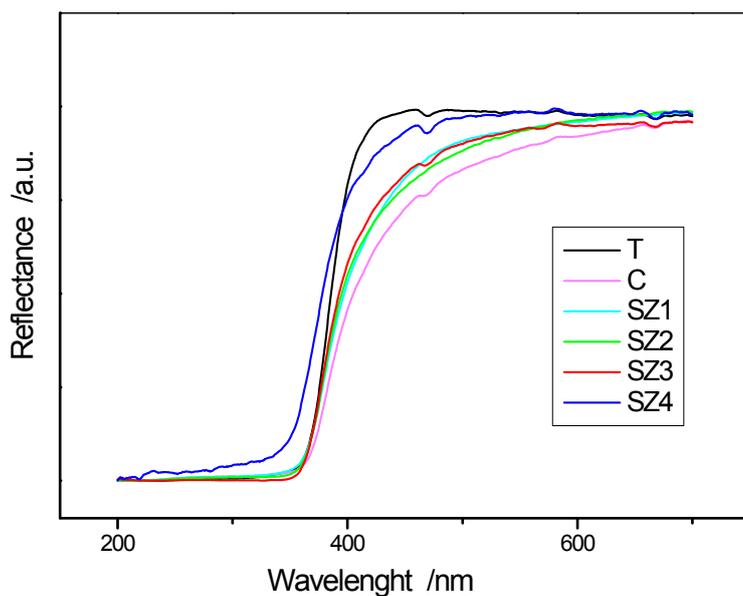


Fig. S7 Diffuse reflectance spectra for the prepared samples calcined at 500 °C.

Table S1: Band-gap energies for the prepared samples calcined at 500 °C

Sample	$E_{bg}$ [eV]
T	3.21
C	3.12
SZ1	3.19
SZ2	3.18
SZ3	3.23
SZ4	2.98

## References

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