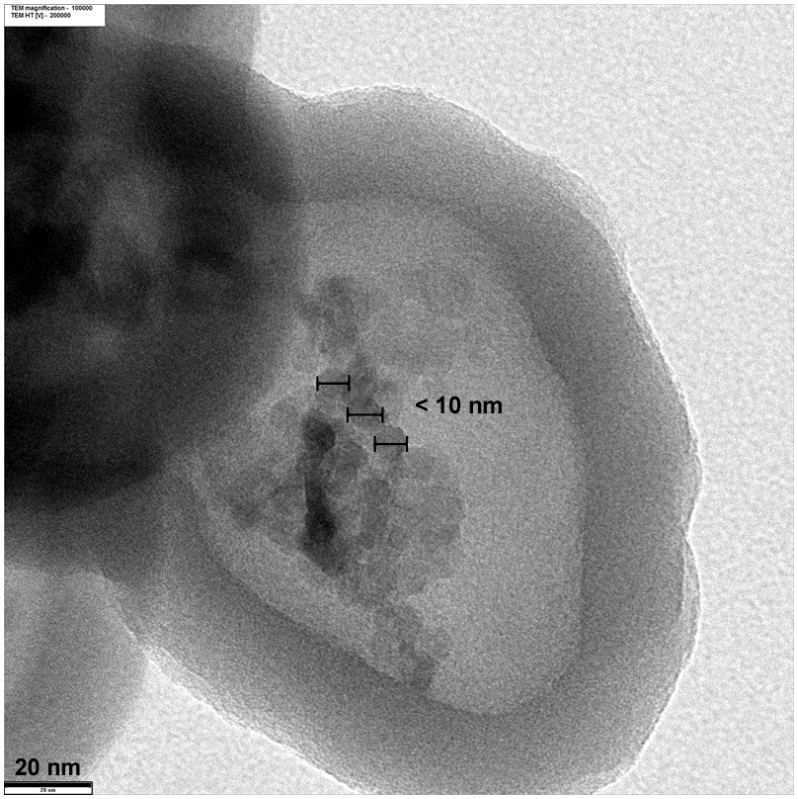
Supporting materials

S1. Magnified TEM image of SϕT displays the TiO_2 particle size in the range under 10 nm.

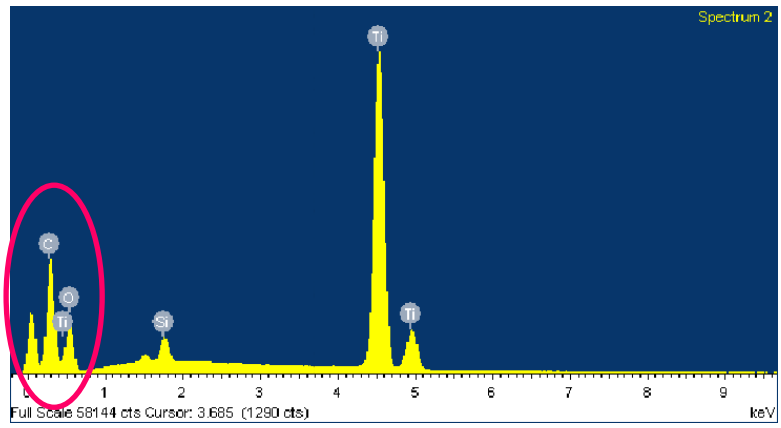


S2. Photo images of the as-synthesized nanomaterial powder showing the color change from brown of S/C/T to white of SϕT after calcination process.

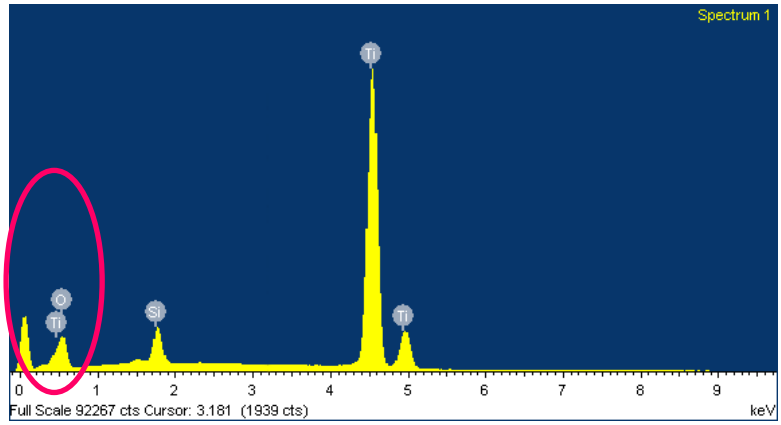
S/C/T: With carbon under silica layer (brown).

SϕT: When carbon has been removed (white).

S3. EDX results comparing the presence of carbon signal in S/C/T and SϕT.



S/C/T: EDX data shows the carbon signal in the S/C/T sample.



SϕT: Carbon signal could not be detected.

Percent weight content of all elements from EDX analysis

Samples	% Weight			
	O	Si	Ti	C
S/C/T$^{\#1}$	31.80	1.43	37.77	28.99
S/C/T$^{\#2}$	30.86	2.35	45.28	21.52
S/C/T$^{\#3}$	36.47	1.82	28.73	32.98
S/C/T$^{\#4}$	37.62	2.43	31.60	28.35
Average	34.19	2.01	35.85	27.96
SϕT$^{\#1}$	37.42	3.83	58.74	-
SϕT$^{\#2}$	38.86	3.98	57.16	-
SϕT$^{\#3}$	36.48	2.70	60.82	-
SϕT$^{\#4}$	41.24	2.96	55.79	-
Average	38.50	3.37	58.13	-

S4. Interpretation of IR spectra

The IR spectrum of silica are generally observed to consist of strong signals at approximately 1100, 800, and 460 cm^{-1}, which are attributed to the Si-O-Si antisymmetric and symmetric stretching, as well as bending vibration [Ref.34]. The range at 1125-1010 cm^{-1} is the characteristic of Si-O-Si antisymmetric stretching vibration. According to Launer [Ref.27], "disiloxanes and small-ring cyclosiloxanes would appear as a single band". However, "as the siloxane chains become longer and branched, the Si-O-Si absorption becomes broader and more complex." Broad signal of Si-O-Si stretching of amorphous silica is widely accepted among scientists in this research area. The similar conclusion can be simply found in their reports [Ref.12, 28, 29, 30].

S5. Residue of dye after photocatalysis.

The subtraction of C/C_0 adsorption rate of the Cycle 1 (1.0-0.6 = 0.4) by that of Cycle 2 (1.0-0.85 = 0.15) in Fig.10 shows that about (0.4-0.15) 0.25 or 25% of the residual MB was still adsorbed on SϕT at this irradiation period, and this value continued to be steady in the next recycle run, Cycle 3.