

Bio-mimicked TiO₂ Architectures for Enhanced Photocatalytic Activity under UV and Visible Light

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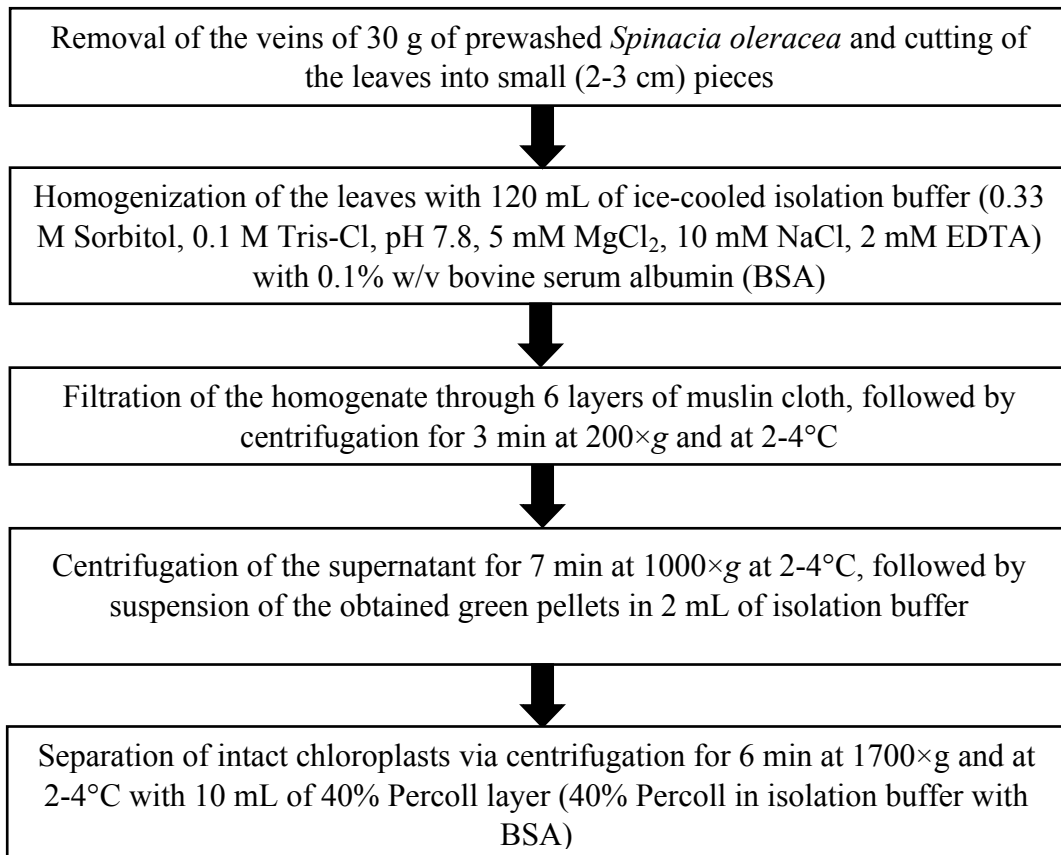
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Supplementary Information



Scheme S1. Chloroplast isolation procedure; all steps were performed at 2-4°C.

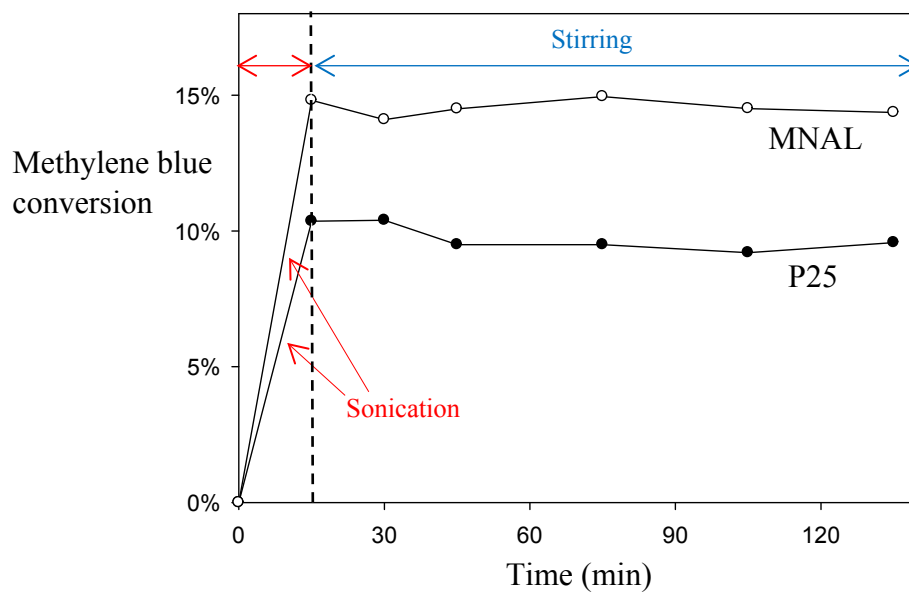


Figure S1. Adsorption of methylene blue under dark on the MNAL and the reference P25. The experimental conditions are 6.5 ppm dye solution, a catalyst loading of 150 mg cat./L, a pH of 7, 30°C.

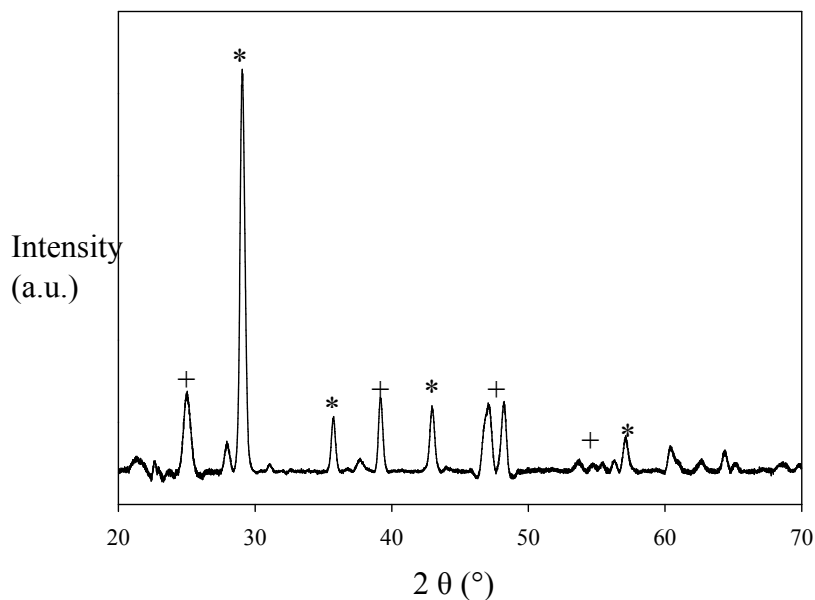


Figure S2. XRD pattern of the non-coated Ti^{3+} exchanged samples. Corresponding peaks of the anatase phase and the rutile phase TiO_2 are marked by “+” and “*”, respectively.

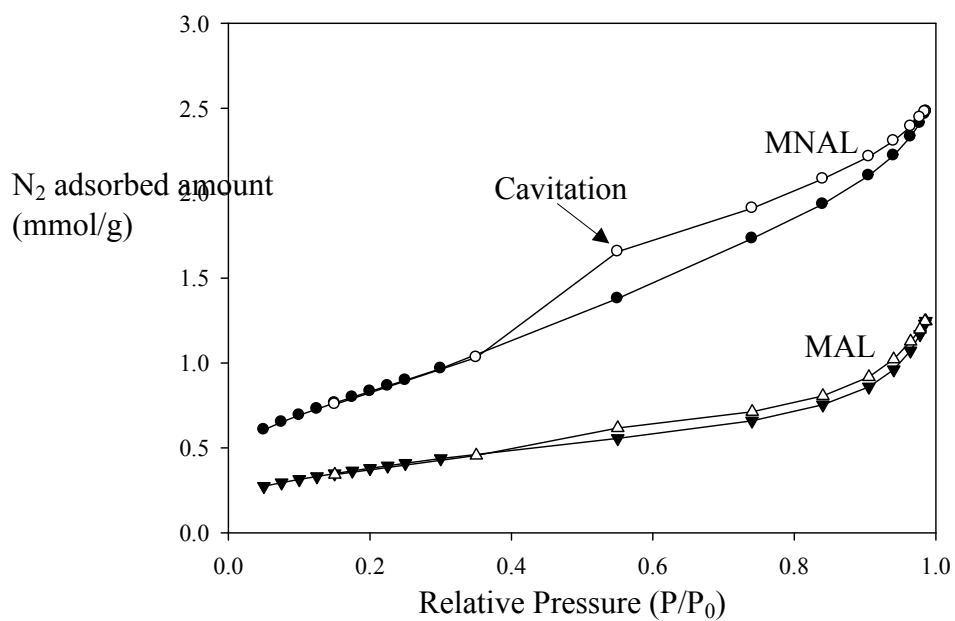


Figure S3. Nitrogen adsorption-desorption isotherm of the TiO₂ artificial leaves.

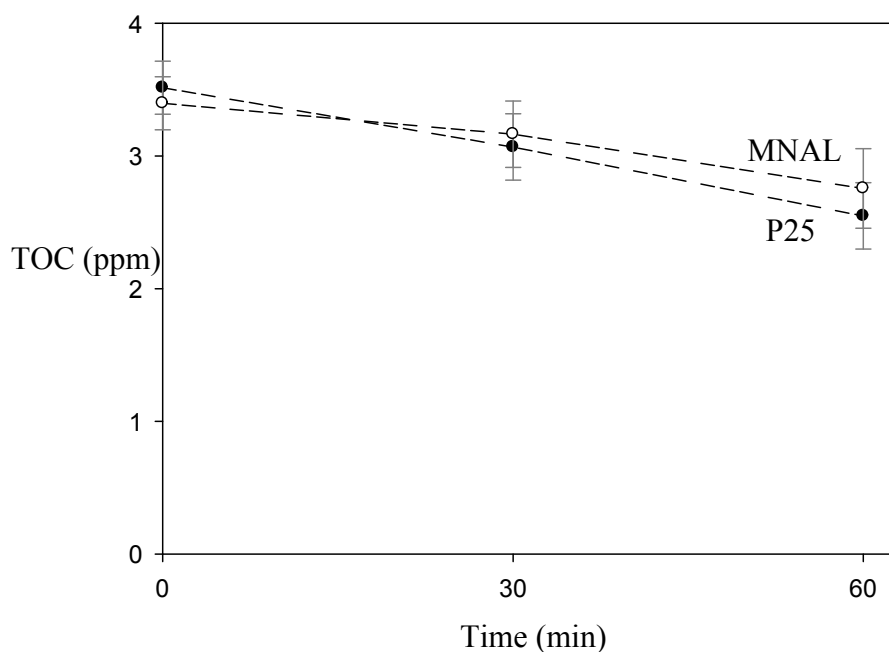


Figure S4. Total organic carbon (TOC) removal of methylene blue solution under UV light with a maximum intensity at 370 nm. The experimental conditions are 6.5 ppm dye solution, a catalyst loading of 150 mg cat/L, a pH of 7, 30°C. Note: the starting level of TOC reported

is slightly different due to the differences in efficiency of dye removal by adsorption in the dark.

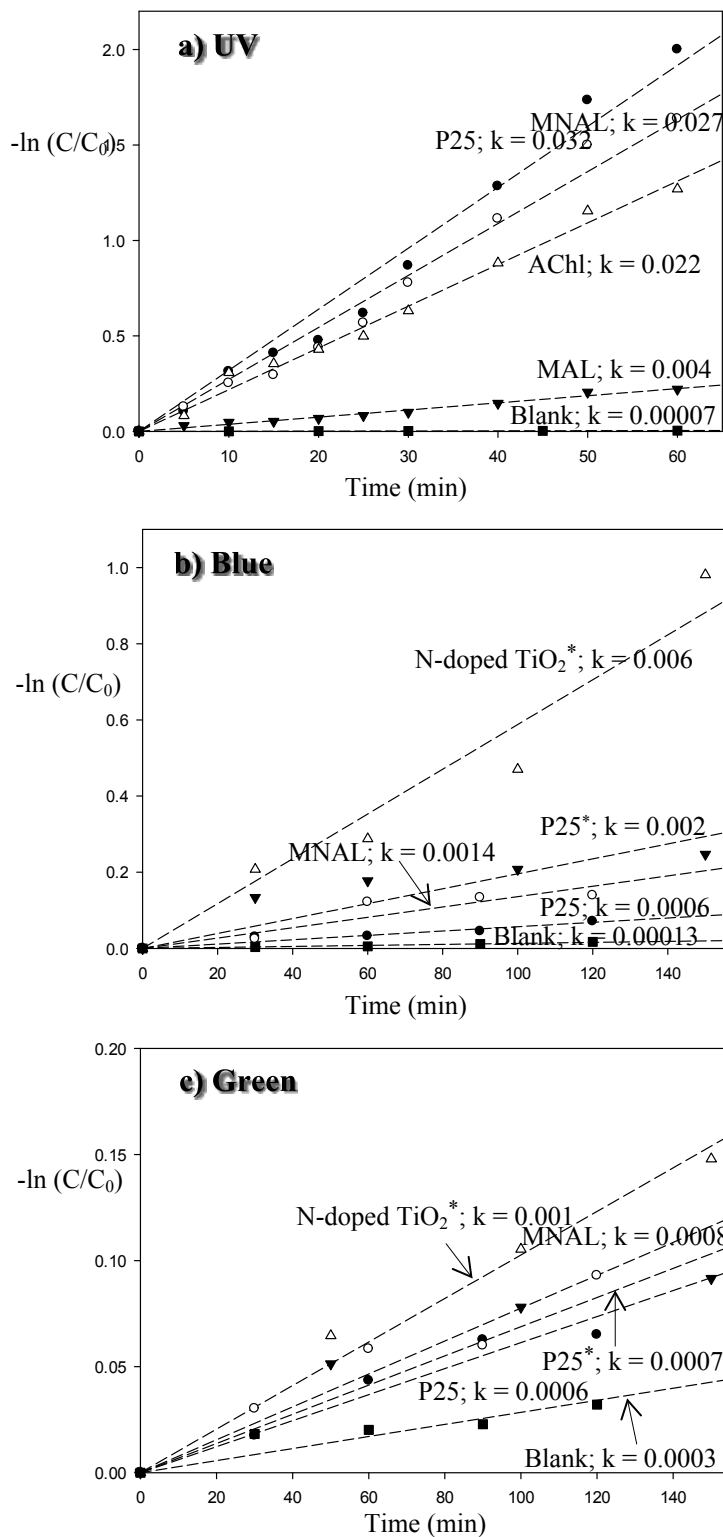


Figure S5. Apparent rate constants of methylene blue photodegradation under a) UV LEDs (370 nm), b) blue LEDs (440 nm) and c) green LEDs (515 nm). Notes: (i) The accuracy of all

experiments was verified and the relative error was less than 10%. (ii) The experimental data reported by Burda *et al.*¹⁰⁰ were used to estimate the apparent rate constants given by N-doped TiO₂* and P25* TiO₂.

Table S1. Energy-dispersive X-ray spectroscopy (EDS) results for the final catalysts.

Content (wt %)	Ti	O	N	P	C [†]
MNAL	70.8	29.2	---	---	---
MAL	67.3	32.2	0.6	---	---
AChI	72.3	27.2	0.4	0.2	---

[†]No carbon dopant was detected by EDS for all three bio-templated samples.

Table S2. Elemental composition (in atomic %) of the surface of the MNAL sample measured by XPS analysis.

P	Ca	N	O			Ti	C			
(133.7 eV)	(347.7 eV)	(400.1 eV)	(530.2 eV)	(531.6 eV)	(532.8 eV)	(458.9 eV)	(284.8 eV)	(286.5 eV)	(288.6 eV)	(290.0 eV)
1.11 %	2.57 %	0.49 %	49.08 %	8.95 %	4.17 %	24.82%	4.27 %	1.38 %	0.51 %	1.38 %

Table S3. Normalized results of methylene blue dye degradation.

Sample name	BET (m ² /g)	under UV (370 nm)		under Blue (440 nm)		under Green (515 nm)	
		mg/g-cat. ^(a)	mg/m ² ^(b)	mg/g-cat. ^(a)	mg/m ² ^(b)	mg/g-cat. ^(a)	mg/m ² ^(b)
P25	53	37.3	0.700	3.1	0.058	2.7	0.052
MNAL	66	34.7	0.530	5.7	0.086	3.9	0.060
MAL	30	8.7	0.290	0.0	0.000	---	---
AChl	--- ^(c)	31.2	---	---	---	---	---

^(a) Average dye conversion (mg) per gram of catalyst.

^(b) Average dye conversion (mg) per m² of catalyst surface area.

^(c) The surface area of the AChl was not measured because of the very low yield of the intact chloroplast cells isolation procedure.