Electronic Supplementary Material (ESI) for CrystEngComm.

Supplementary Information

Amino acid-assisted controlling the shapes of rutile, brookite for enhanced photocatalytic CO_2 reduction

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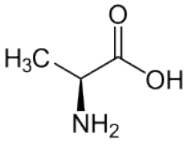
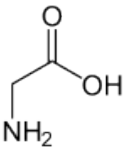
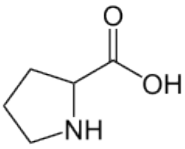
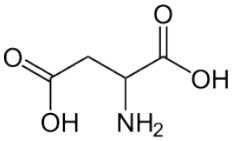
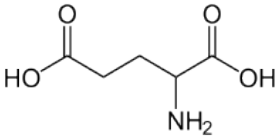
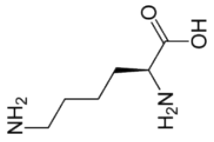
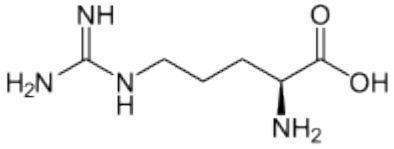
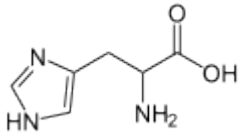
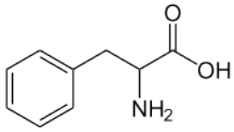
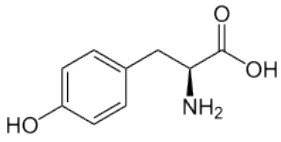
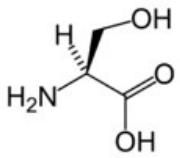
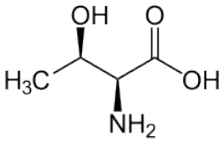
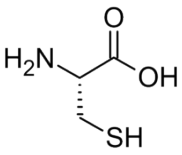
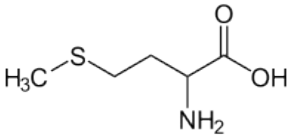
Table S1. Molecular structures, isoelectric points of amino acids and the pH of corresponding solution used for the synthesis. The table also lists the crystalline phase and calculated crystal sizes of TiO_2 nanocrystals in the as-prepared samples according to Scherrer Equation.

Code	Amino acid	Molecular structure	pI/ pH solution	Crystalline phase	Crystallite size (nm)
Ala	Alanine		6.00 5.00	R	23
Gly	Glycine		5.97 5.00	R	26
Pro	Proline		6.30 5.05	R	25
Asp	Aspartic acid		2.77 3.75	A	10
Glu	Glutamic acid		3.22 3.90	R	23
Lys	Lysine		9.59 9.11	B+A 80/20	10

Arg	Arginine		11.15 9.14	B+A 75/25	12
His	Histidine		7.47	B + R 70/30	10
Phe	Phenylalanine		5.48 4.80	R	17
Tyr	Tyrosine		5.66 4.80	A	10
Ser	Serine		5.68 4.82	R	23
Thr	Threonine		5.64 4.84	R	23
Cys	Cysteine		5.02 4.93	R	23
Met	Methionine		5.74 4.96	R	23

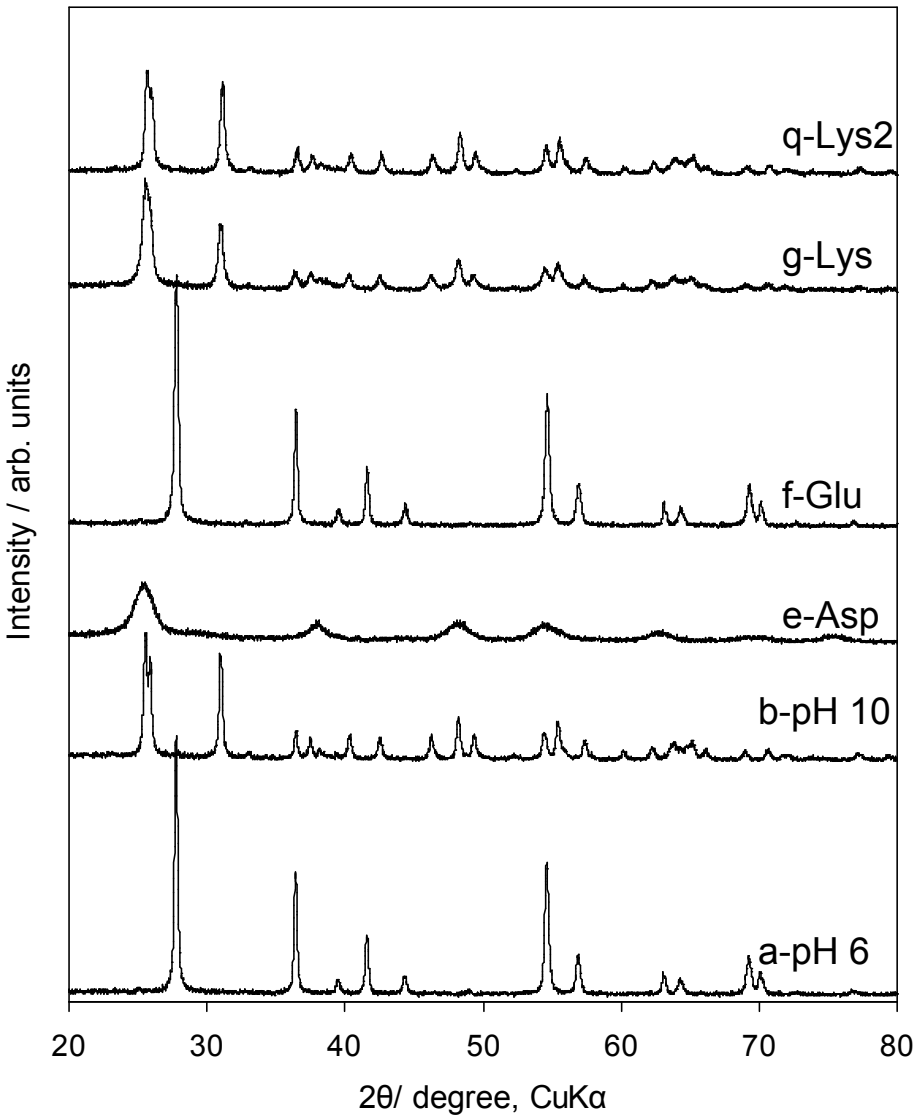


Fig. S1 XRD patterns of the particles synthesized by hydrothermal treatment of titanium-glycolate at different experimental conditions. A: anatase, B: brookite, R: rutile.

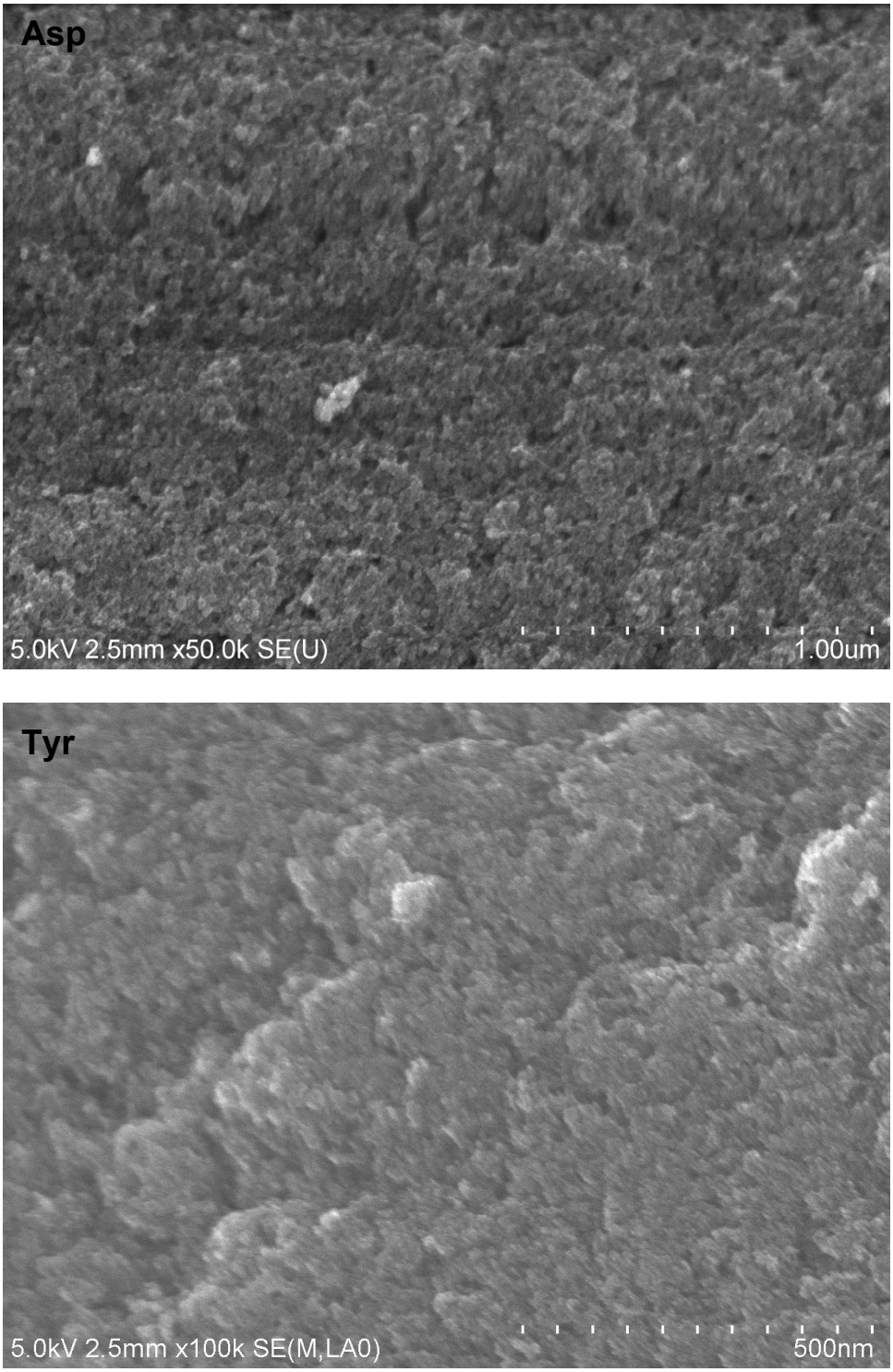


Fig. S2 SEM images of the anatase particles synthesized by hydrothermal treatment of titanium-glycolate in the presence of different amino acids.

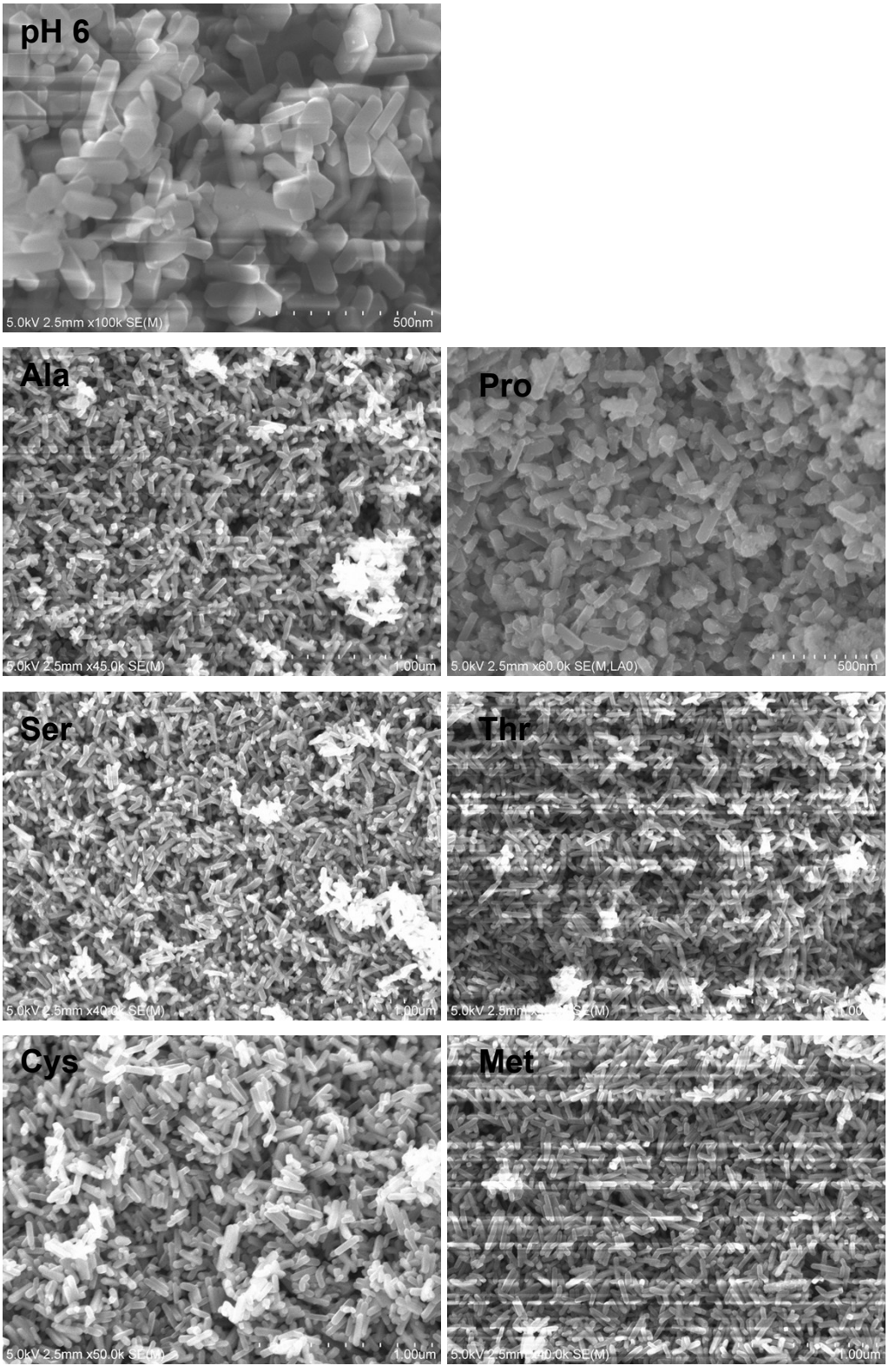


Fig. S3 SEM images of the rutile particles synthesized by hydrothermal treatment of titanium-glycolate in the presence of different amino acids.

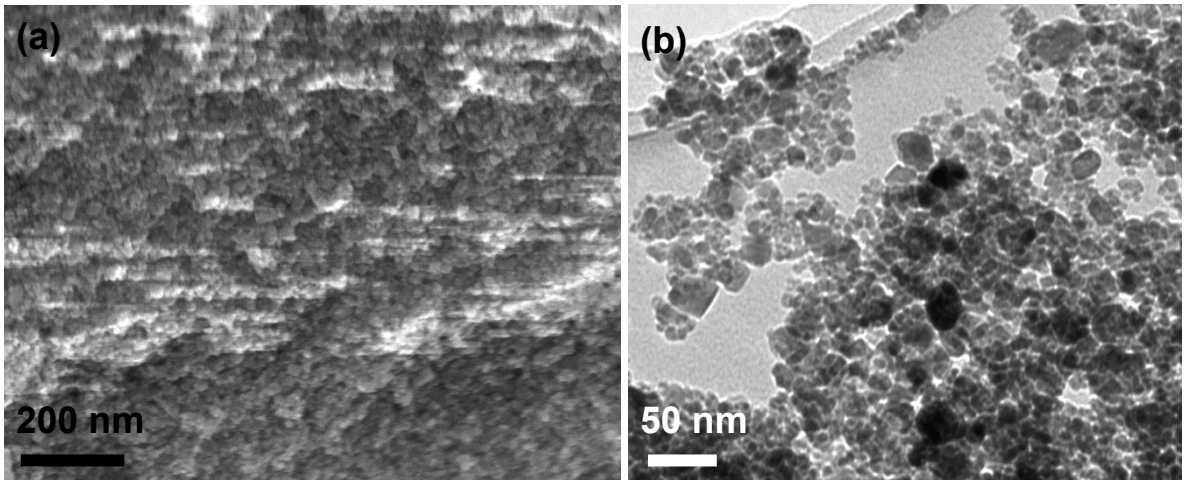


Fig. S4 SEM (a) and TEM (b) images of the synthesized anatase-brookite particles from titanium-glycolate in the presence of 2 mmol Lys.

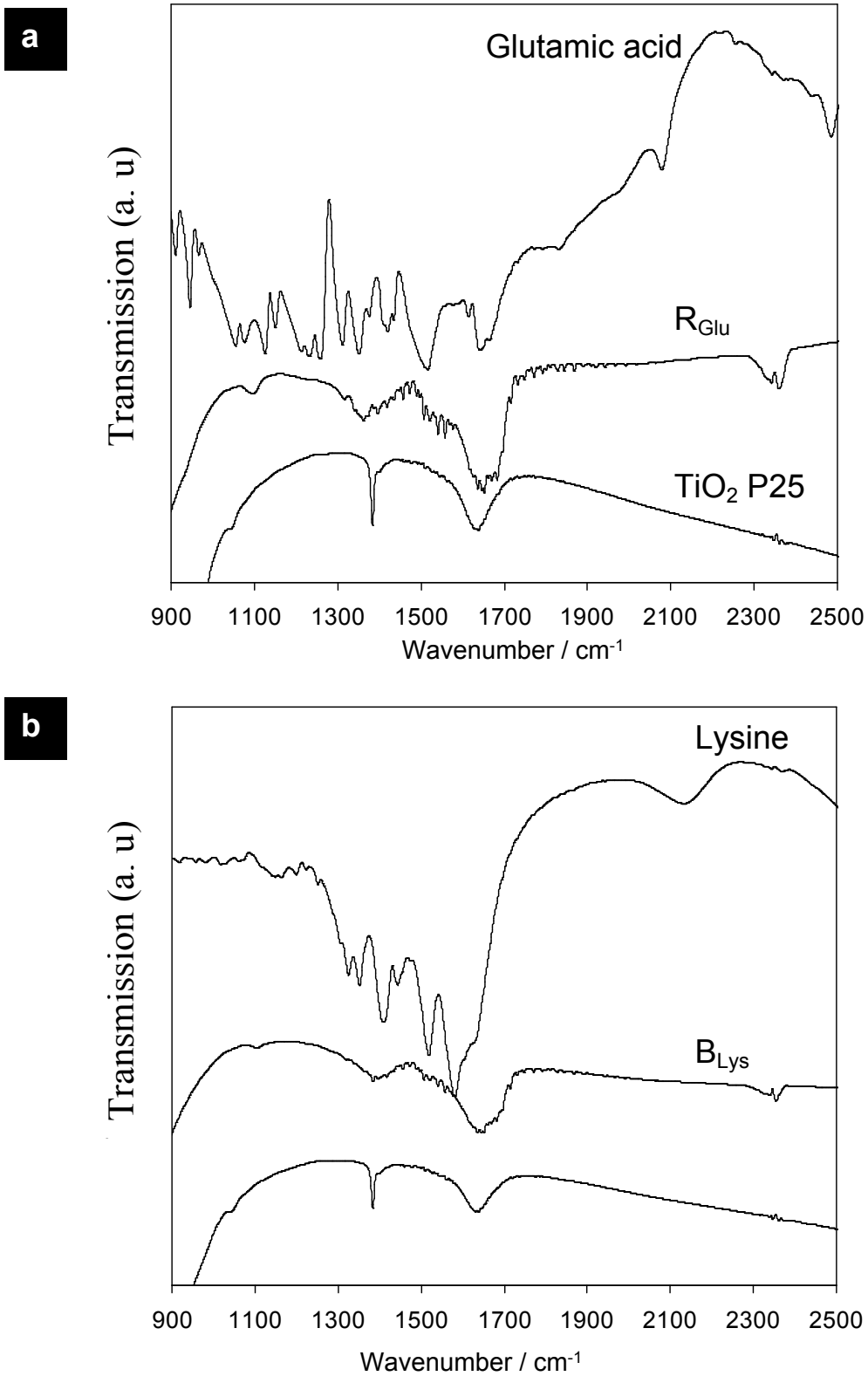


Fig. S5 (a) FT-IR spectra of TiO_2-P25, rod-like rutile nanostructures R_{Glu} and glutamic acid. (b) FT-IR spectra of TiO_2-P25, brookite B_{Lys} and lysine.

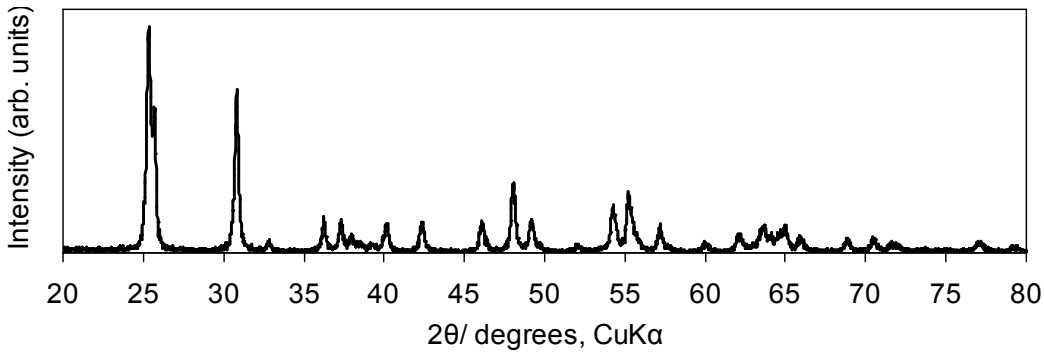


Fig. S6 XRD pattern of the brookite particles after the photocatalytic reaction.

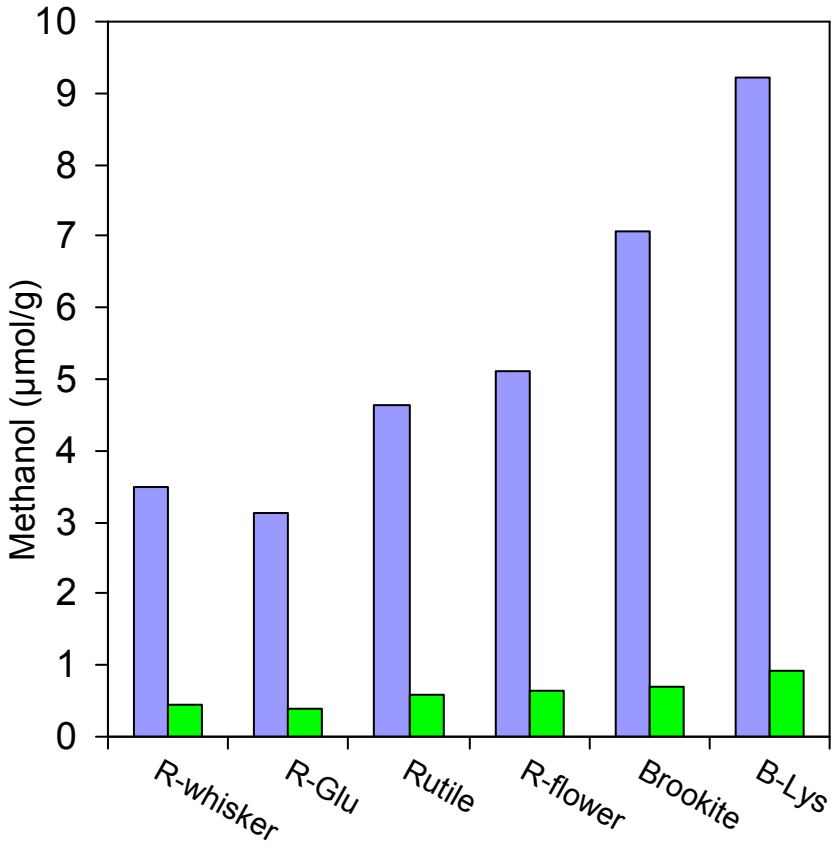


Fig. S7 Methanol yields under UV-Vis (violet) and visible light (green) irradiation over rutile and brookite TiO_2.