Supporting Information

N-doped rutile TiO_2 nanorod@g-C_3N_4 core/shell S-scheme heterojunction for boosting photoreduction CO_2 activity

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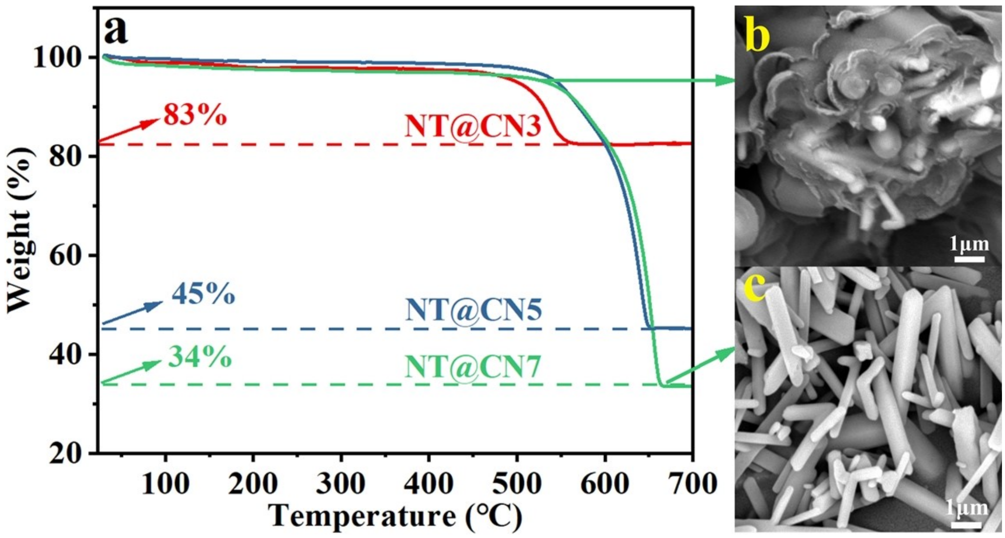

Figure S1. (a) TG curves of NT@CN3, NT@CN5, and NT@CN7. SEM images of NT@CN7 before (b) and after (c) thermogravimetric analysis.

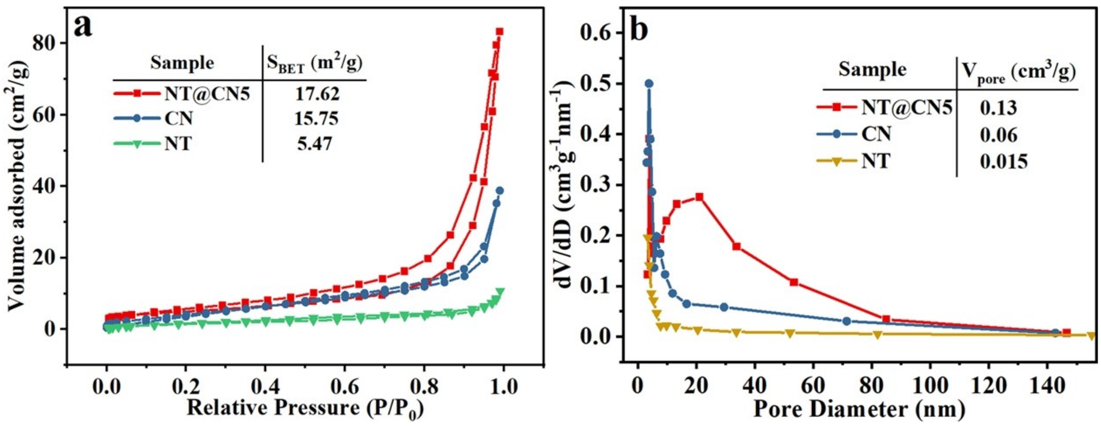

Figure S2. N_2 adsorption-desorption isotherms (a) and corresponding Barrett-Joyner-Halenda (BJH) pore-size distribution plots (b) of NT, CN, and NT@CN5 samples.

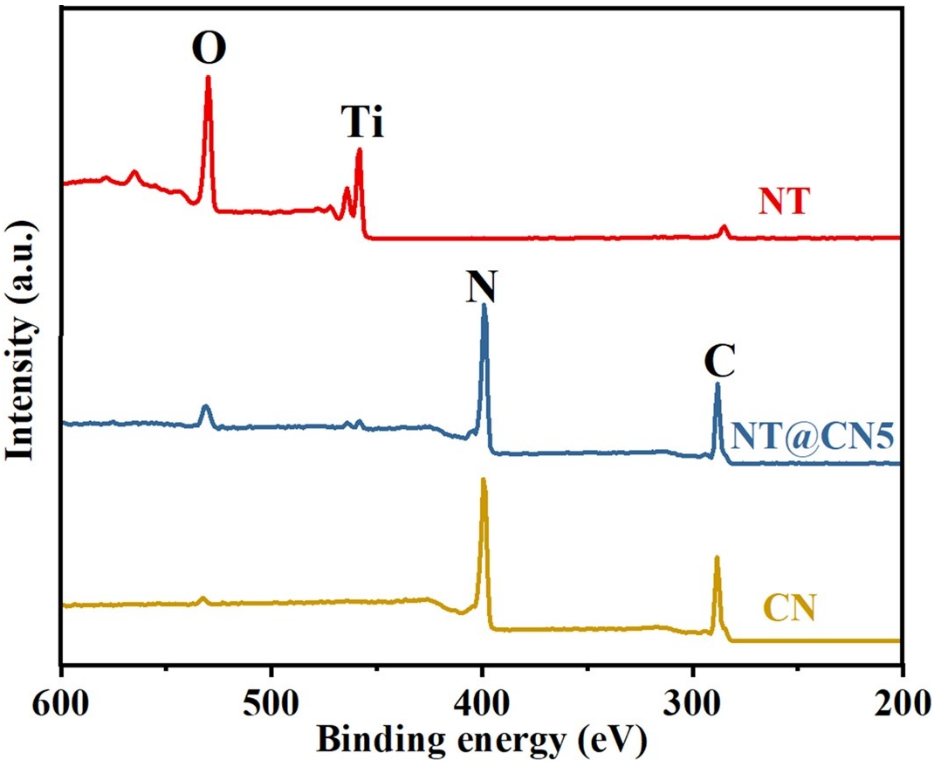

Figure S3. XPS survey spectra of CN, NT, and NT@CN5.

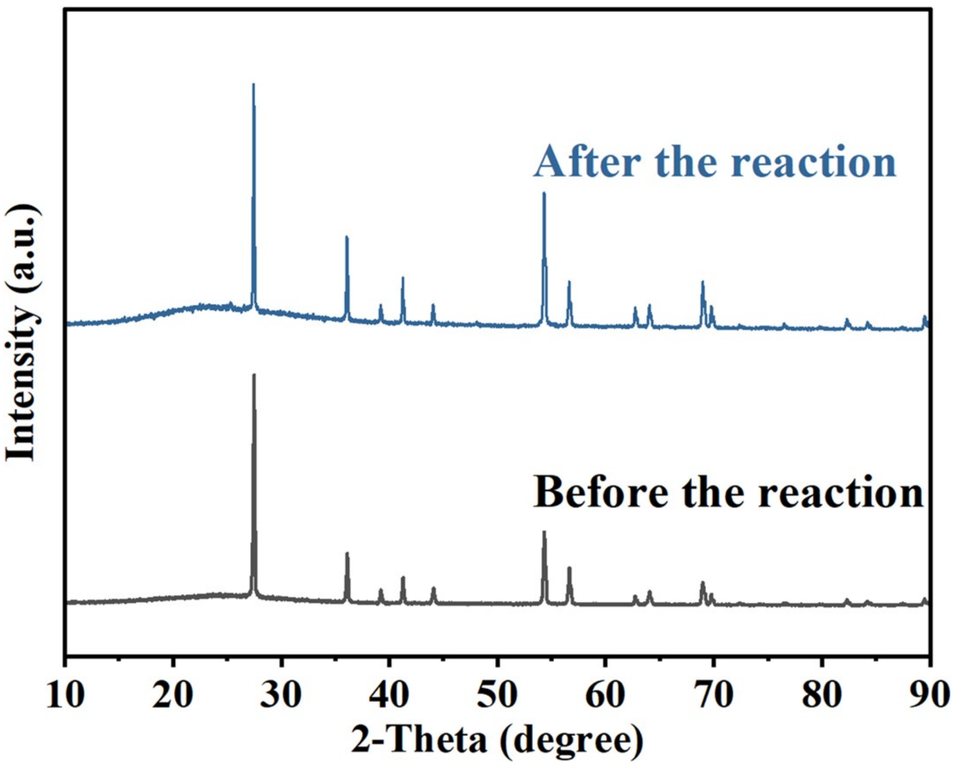

Figure S4. XRD patterns of as-prepared NT@CN5 before and after reaction.

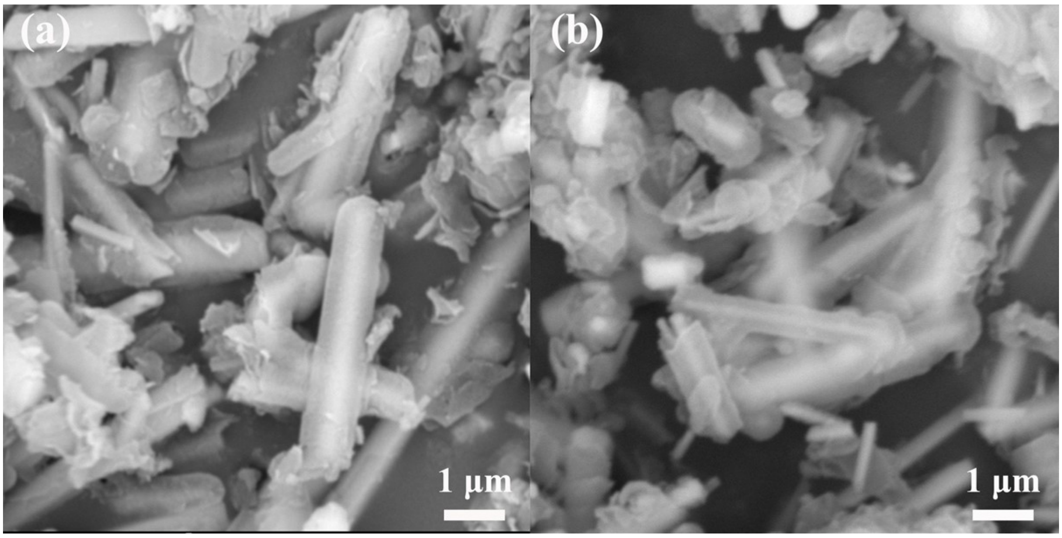

Figure S5. SEM images of as-prepared NT@CN5 before (a) and after (b) reaction.

Table S1. Photocatalytic CO production on NT@CN5 sample, compared with reported data for other photocatalysts.

Photocatalyst	**Reaction conditions**	**Reaction time (h)**	**CO Production (μmol $g^{-1}h^{-1}$)**	**Reference**
A-TiO_2/R-TiO_2 (Anatase and Rutile)	300 W Hg-Xe, liquid phase (0.1 M $KHCO_3$ aqueous solution), 100 mg catalyst	5	1.39	S1
TiO_2/g-C_3N_4 nanosheet (Anatase)	150 W Xe, λ>325 nm, gas phase, 25 mg catalyst	6	2.04	S2
TiO_2 nanosheets-{001} (Anatase)	2x18W Hg, λ=245 nm, liquid phase (2 M NaOH aqueous solution), 300 mg catalyst	5	0.12	S3
TiO_2-CoO_x (Anatase)	150 W UV, λ=365 nm, gas phase, 50 mg catalyst, 120 °C	5	1.24	S4
Au/TiO_2 (Anatase)	300 W Xe, λ=320-780nm, gas phase	6	0.3	S5
$AuPd_3$/TiO_2 (Anatase)	300 W Xe, λ=320-780nm, gas phase	6	2.6	S5
Pd/TiO_2 (Anatase)	300 W Xe, λ=320-780nm, gas phase	6	3.9	S5
g-C_3N_4/TiO_2-{210} cubes (Brookite)	300 W Xe, λ=320-780nm, gas phase, 60 mg catalyst	2	1.27	S6
I/TiO_2-{001} (Anatase)	500 W Xe, λ=320-780nm, gas phase, 0.3 g catalyst	6	3.43	S7
TiO_2 (P25)	300 W Xe, λ=320-780nm, gas phase, 100 mg catalyst	5	1.84	S8
PdS QD-Cu/TiO_2	300 W Xe, λ=320-780nm, gas phase	6	0.82	S9
I doped TiO_2	450 W Xe, λ=320-780nm, gas phase, 200 mg catalyst	3	2.4	S10
N-doped rutile TiO_2@g-C_3N_4 (Rutile)	300 W Xe, λ=320-780nm, gas phase, 50 mg catalyst, 80 kPa,	5	6.67	this work

Table S2. Decay parameters and average lifetime according to a biexponential fitting model of the PL decay curves.

Sample	A_1	τ_1 (ns)	A_2	τ_2 (ns)	τ_{ave} (ns)
NT	11.02	1.95	0.41	7.99	6.36
CN	6.76	2.33	0.44	11.71	11.36
NT@CN5	6.62	2.2	0.31	15.32	14.28

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