Electronic Supplementary Material for

Activating atomically dispersed Co-N/C sites on g-C_3N_4 nanosheets via incorporating sulfur enables efficient visible light H_2 evolution

Fang Wang[a,b], Yuan Xue[b], Weibing Xu[a]*, Shixiong Min[b]*

[a]*School of Chemistry and Chemical Engineering, Hefei University of Technology, Hefei, 230009, P. R. China.*

[b]*School of Chemistry and Chemical Engineering, North Minzu University, Yinchuan, 750021, P. R. China.*

*Corresponding authors: weibingxu@hfut.edu.cn; sxmin@nun.edu.cn

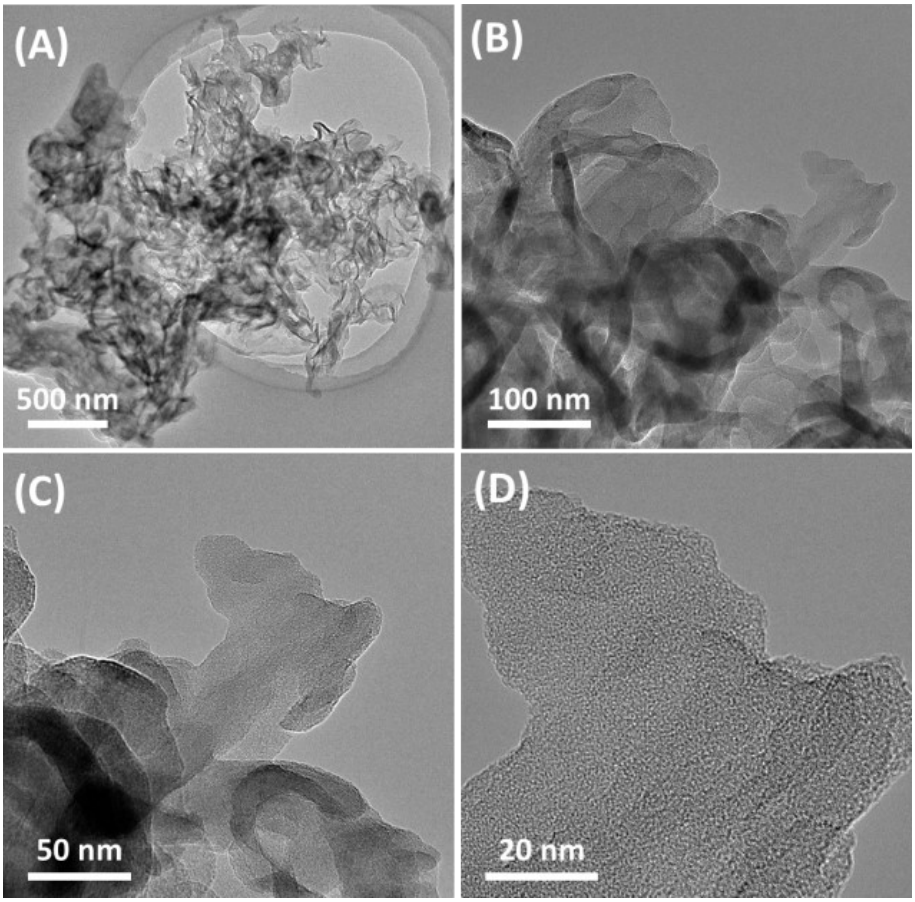

Fig. S1 TEM images of pristine CNs.

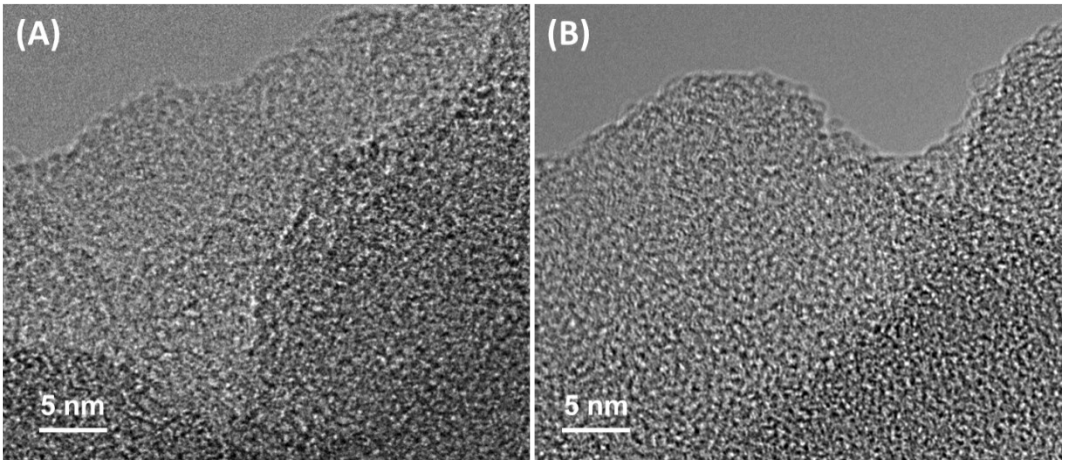

Fig. S2 HRTEM images of (A) Co-CNs and (B) S-Co-CNs.

Table S1 Chemical composition of Co-CNs and S-Co-CNs catalysts determined by using EDX analysis.

Sample	C (at.%)	N (at.%)	Co (at.%)	O (at.%)	S (at.%)
Co-CNs	41.94	56.03	0.18	1.85	0
S-Co-CNs	43.88	50.14	0.17	5.62	0.19

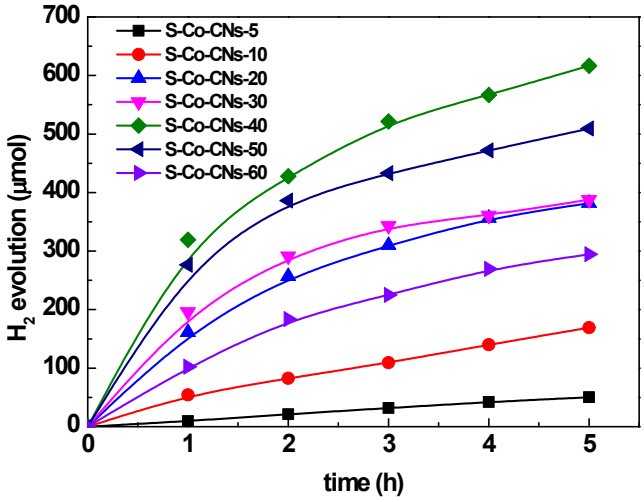

Fig. S3 Time courses of H_2 evolution over ErB-sensitized S-Co-CNs catalysts with different Co contents. Reaction conditions: catalyst, 50 mg; 100 mL of TEOA solution, 10%, pH 8; ErB, 0.2 mM; light source, 30-W LED lamp, λ≥450 nm.

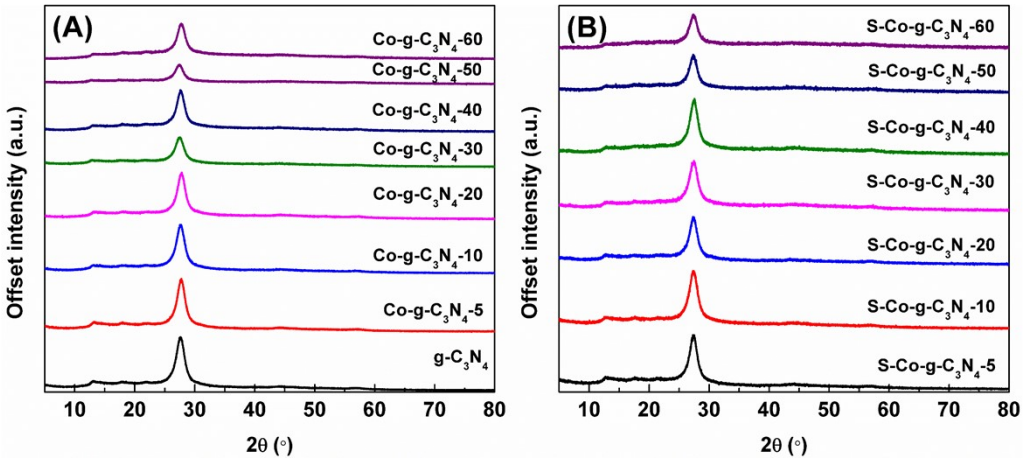

Fig. S4 XRD patterns of (A) Co-g-CNs and (B) S-Co-CNs prepared with with different amounts of $Co(NO_3)_2 \cdot 6H_2O$.

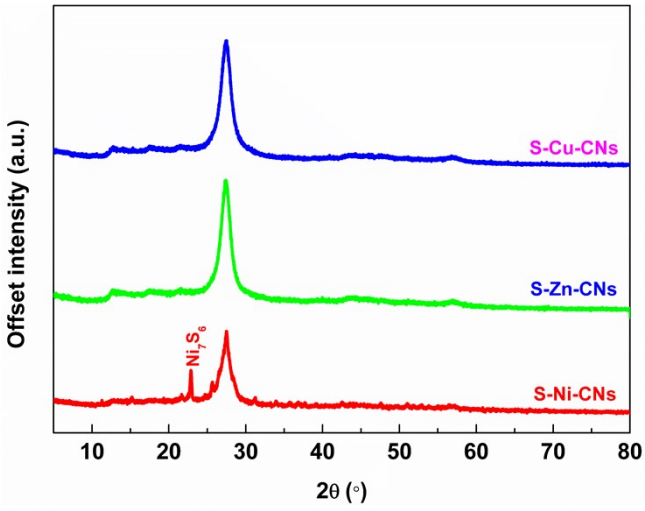

Fig. S5 XRD patterns of S-M-CNs catalysts.

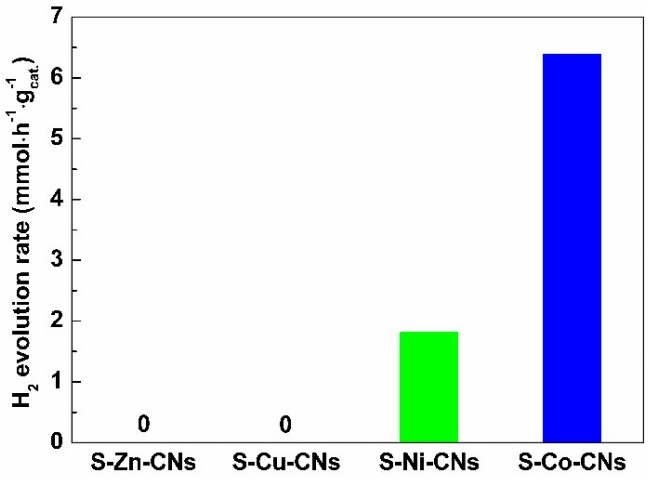

Fig. S6 H_2 evolution rates on different S-M-CNs catalysts in ErB-TEOA system. Reaction conditions: catalyst, 50 mg; 100 mL of TEOA solution, 10%, pH 8; ErB, 0.2 mM; light source, 30-W LED lamp, λ≥450 nm.

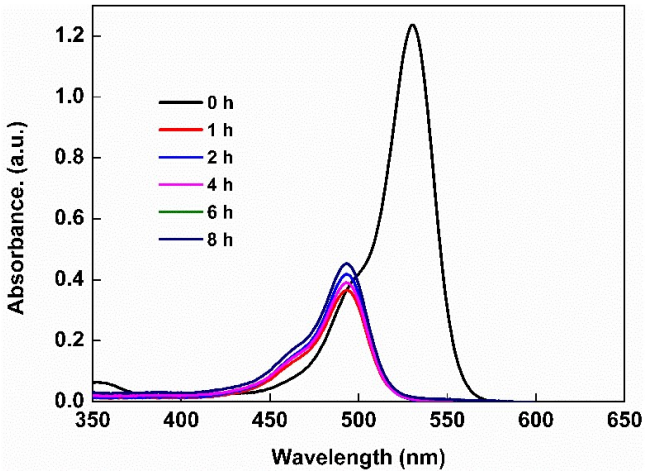

Fig. S7 UV-vis absorption spectra of ErB during the photocatalytic H_2 reaction under visible light irradiation. Reaction conditions: S-Co-CNs, 50 mg; ErB, 0.2 mM; 100 mL TEOA solution, pH 8; light source, 30-W LED lamp, λ≥450 nm. The S-Co-CNs was removed by filtration and the remaining ErB solution was diluted by 10 times.

Table S2 The comparison of photocatalytic H2 evolution activity and AQY in dye-sensitized g-C_3N_4 loaded with different cocatalysts under visible light irradiation.

Catalyst	Dye	Reaction conditions	Light source	Activity (μmol h^{-1})	AQY (%)	ref
mpg-C_3N_4/Pt (1 wt.%) (30 mg)	EY (0.4 M)	TEOA (80 mL, 15 vol.%, pH 7)	250 W high pressure Hg lamp (≥420 nm)	115.5	14.4% (520 nm)	1
g-C_3N_4/Pt (7 wt.%) (100 mg)	EY (12.5 μM)	TEOA (80 mL, 0.79 M, pH 7)	400 W high pressure Hg lamp (≥420	160	18.8 (400~700)	2

			nm)			
g-C_3N_4/Pt (1.25 wt.%) (100 mg)	ErB (2.27 mM)	TEOA (100 mL, 5 vol.%, pH 9)	300 W Xe lamp (≥420 nm)	652.5	33.4% (460 nm)	3
Pt (1 wt.%)/g-C_3N_4 (10 mg)	Zn-tri-PcNc (5.0 μmol g^{-1})	AA (10 mL, 50 mM, pH 1.5−1.8)	300 W Xe lamp (≥500 nm)	125.2	1.85% (700 nm）	9
Pt (0.5 wt.%)/g-C_3N_4 (10 mg)	LI-4/Zn-tri-PcNc (5.0 μmol g^{-1})	AA (10 mL, 50 mM, pH 1.5)	300 W Xe lamp (≥420 nm)	371.4	7.7% (500 nm)	10
MoS_x (0.5 wt%)-g-C_3N_4 (100 mg)	ErB (12.5 μM)	TEOA (80 mL, 0.79 M, pH 7)	400 W high pressure Hg lamp (≥420 nm)	26	8.3% (545 nm)	8
$Co(OH)_2$ (23 wt.%)/g-C_3N_4 (26 mg)	EY/RB (17 mg/25 mg)	TEOA (100 mL, 10 vol.%, pH 10)	300 W Xe lamp (≥420 nm)	144.2	29.6% (520 nm); 27.3% (550 nm)	11
g-C_3N_4/Pt SAs (0.74 wt.%) (10 mg)	EY (0.4 mM)	TEOA (100 mL, 10 vol.%, pH 7)	30 W LED (520 nm)	34.2	0.84% (520 nm)	4
g-C_3N_4/Pt/GO (50mg)	EY (50 mg)	TEOA (100 mL, 20 vol.%, pH 7)	300 W Xe lamp (≥420 nm)	191	9.7% (420nm)	6
PtNi (0.5 wt.%)/g-C_3N_4 (50 mg)	EY (50 mg)	TEOA (100 mL, 20 vol.%, pH 7)	300 W Xe lamp (≥420 nm)	294.5	NA	12
MMT/g-C_3N_4/NiCoP (15 wt.%) （10mg）	EY(0.1mM)	TEOA (100 mL, 10 vol.%, pH 11)	300 W Xe lamp (≥420 nm)	125	40.3% (420nm)	7
$SnIn_4S_8$/g-C_3N_4(11 wt.%) (50mg)	CoPc (1.75 mg)	TEOA (100 mL, 15 vol.%)	500 W Xe lamp (≥430 nm)	636.99	NA	5
MoS_2 (50 wt.%)/g-C_3N_4 (5 mg)	EY (20 μM)	TEOA (40 mL, 10 vol.%)	300 W Xe lamp (≥420 nm)	8.9	NA	13
S-Co-CNs (0.18 at.% Co, 50 mg,)	ErB (0.2 mM)	TEOA (100 mL, 10 vol.%, pH 8)	30 W LED (≥450 nm nm)	319	13.02% (520 nm)	This work

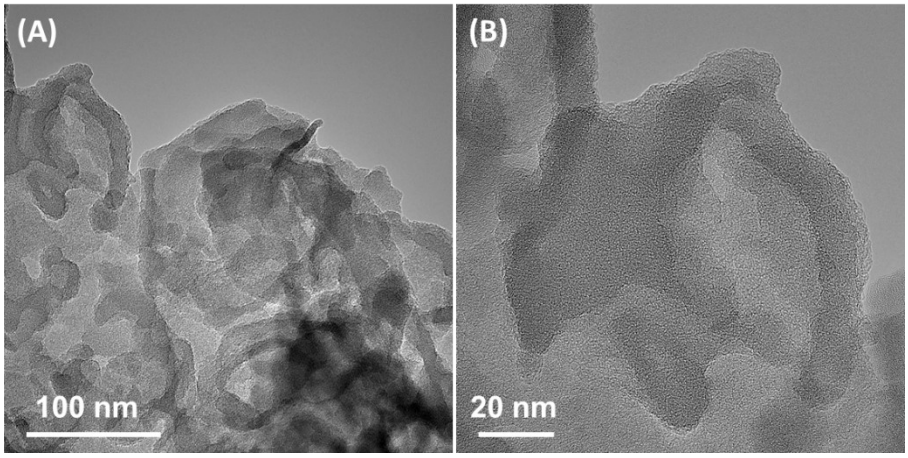

Fig. S8 TEM images of S-Co-CNs catalyst after stability test.

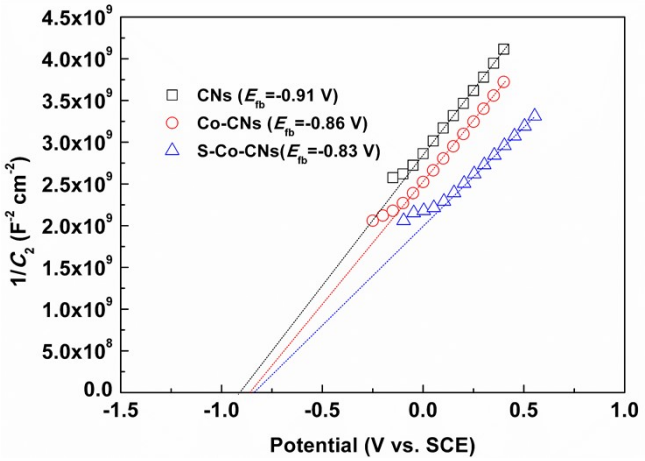

Fig. S9 Mott-Schottky plots of pristine CNs, Co-CNs, and S-Co-CNs.

References

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