Supporting Information

An Insight into the Crucial Factors for Photochemical Deposition of Cobalt Cocatalyst on g-C_3N_4 Photocatalyst

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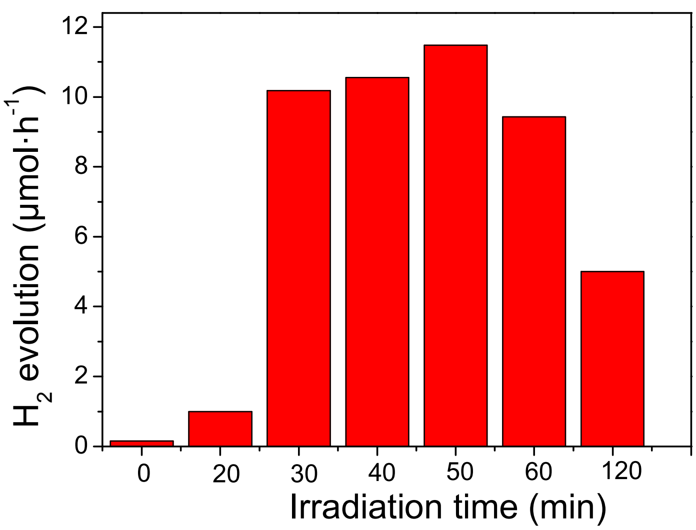


Figure S 1. Photocatalytic HER activity of Co-T/g-C_3N_4 (T=0, 20, 30, 40, 50, 60 and 120 min), and the data were obtained by photocatalytic processes of 5 mg photocatalyst in 15 mL 20 vol% TEOA aqueous solution for 2 h.

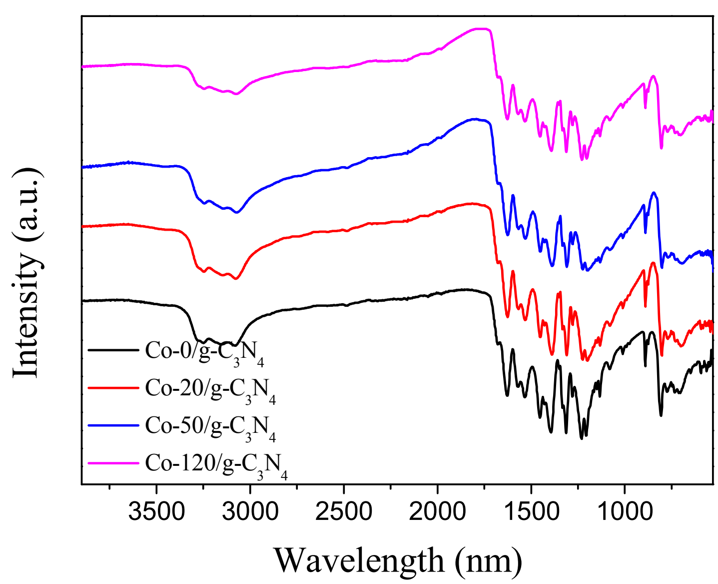


Figure S 2. IR spectra of pure g-C_3N_4 and Co-T/g-C_3N_4 (T=20, 50, 120) with different deposition time.

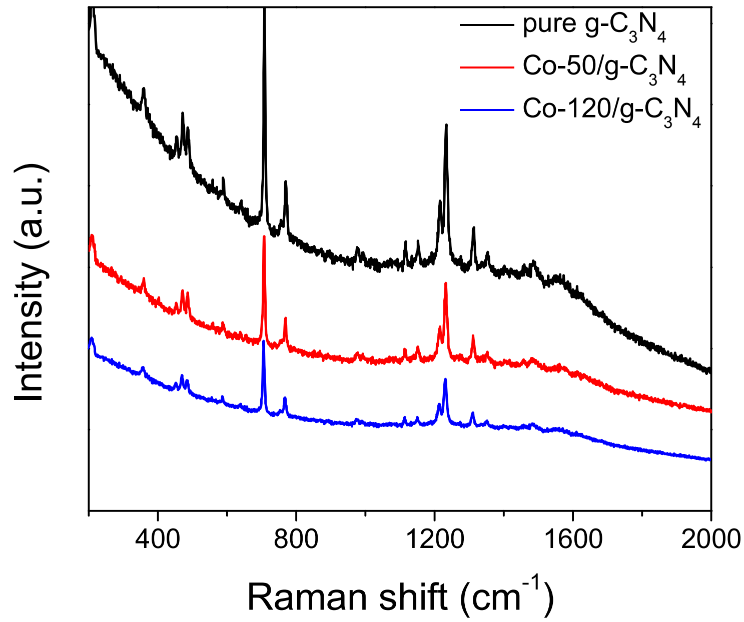


Figure S 3. Raman spectra of Co-T/g-C_3N_4 (T=0, 50, and 120 min) excited by laser of 785 nm.

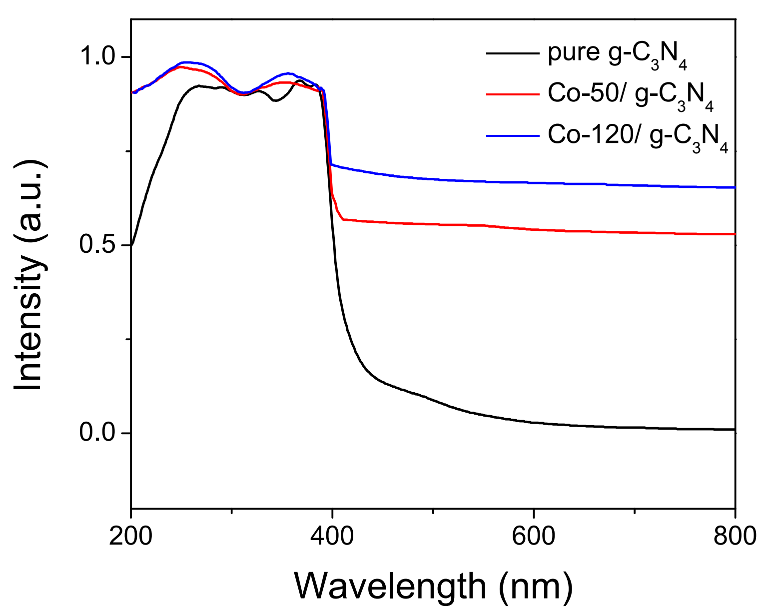


Figure S 4. UV-vis diffuse reflectance spectra of Co-T/g-C_3N_4 (T=0, 50 and 120 min).

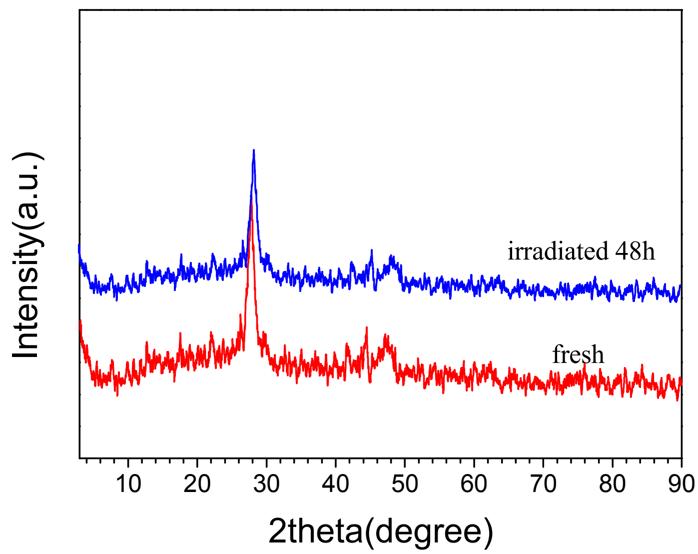


Figure S 5. XRD of Co-50/g-C_3N_4 before and after irradiation for 48 h.

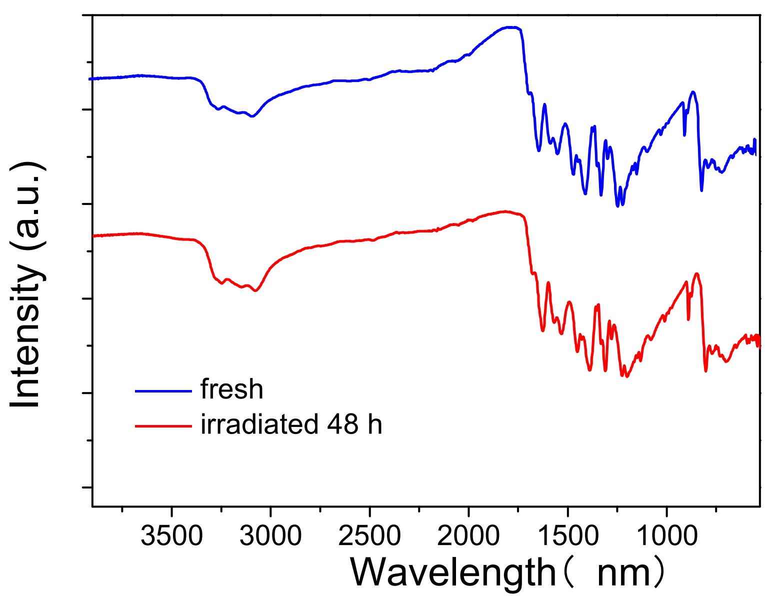


Figure S 6. IR of Co-50/g-C_3N_4 before and after irradiation for 48 h.

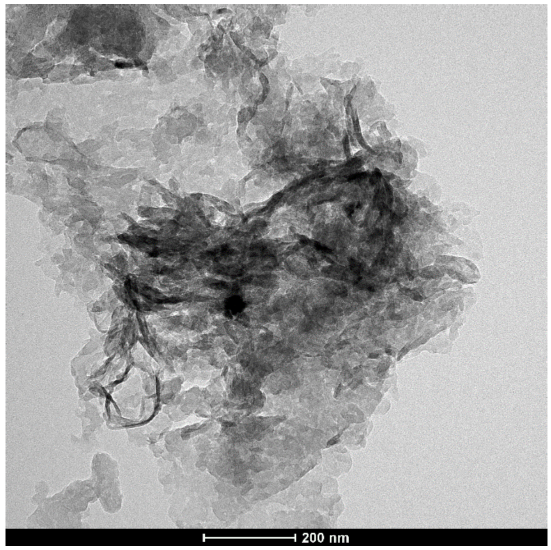


Figure S 7. TEM image of Co/g-C_3N_4 after irradiation for 48 h.

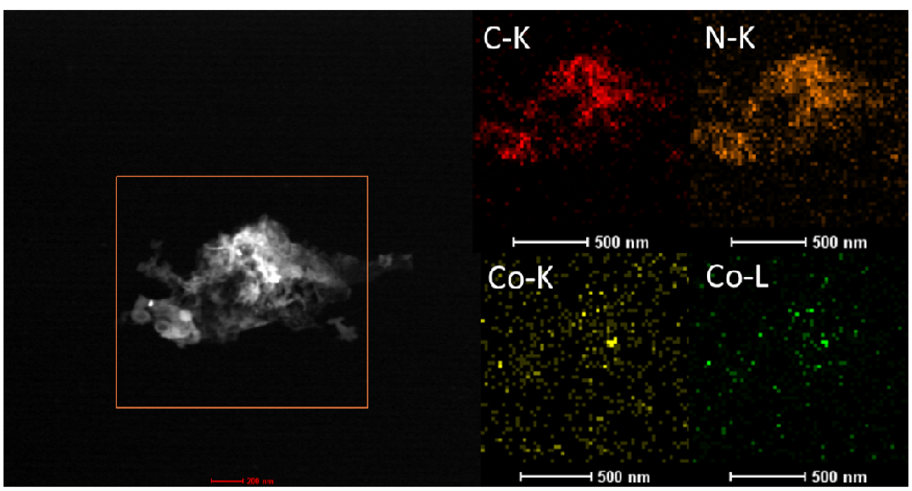
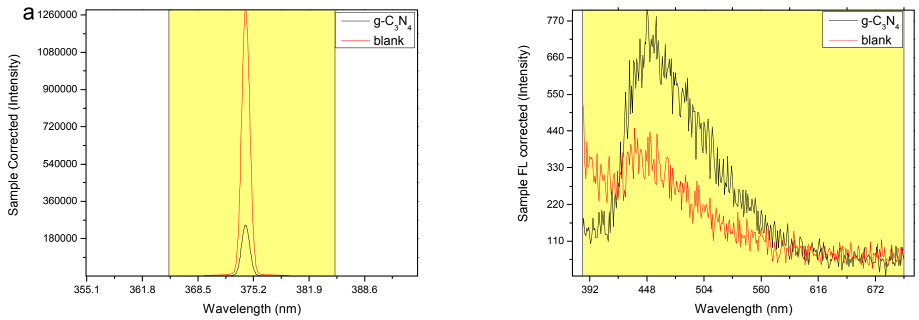
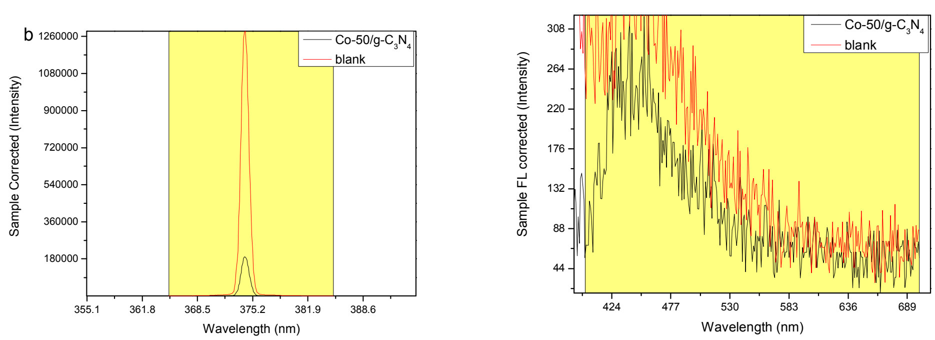


Figure S 8. EDX-Mapping image of Co/g-C_3N_4 after irradiation for 48 h.



Excitation / Scatter				Emission / Fluorescence			
Enter Start and End Wavelengths				Enter Start and End Wavelengths			
Start Wavelength	365.000	Area Balance Factor		Start Wavelength	385.000		
End Wavelength	385.000	1		End Wavelength	700.000		
Area		Err		Area		Err	
La	308116.33	555.08227		*Ea*	80097.29	283.01464	
Lc	1.61E+06	1269.70679		*Ec*	55382.48	235.33483	



Excitation / Scatter				Emission / Fluorescence			
Enter Start and End Wavelengths				Enter Start and End Wavelengths			
Start Wavelength	365.000	Area Balance Factor		Start Wavelength	385.000		
End Wavelength	385.000	1		End Wavelength	700.000		
Area		Err		Area		Err	
La	240185.53	490.08727		*Ea*	33939.51	184.2268	
Lc	1.61E+06	1269.68321		*Ec*	49860.96	223.29567	

Figure S 9. The emission quantum yields of (a) g-C_3N_4 and (b) Co-50/g-C_3N_4 compared with blank samples.

Table S 1. Photocatalytic H_2 evolution over different semiconductors modified with cobalt-based cocatalysts.

Catalysts	Mass fraction	Sacrificial agent	Light source	Activity (μmol g^{-1} h^{-1})	Quantum yield	Ref.
Co/ g-C_3N_4	2.63 wt%	triethanolamine	300 W Xe lamp	2295	6.2% (400 nm)	This work
Co/CN	0.46 wt%	triethanolamine	300 W Xe lamp	560	/	S1
$Co(OH)_2$/ g-C_3N_4	30.0 wt%	triethanolamine	300 W Xe lamp	7200	27.3% (550 nm)	S2
CoP/ g-C_3N_4	0.25 wt%	triethanolamine	300 W Xe lamp	474.4	/	S3
CoS/ mpg-CN	1.0 at %	triethanolamine	300 W Xe lamp	740	/	S4
CoIII(dmgH)$_2$pyCl /g-C_3N_4	/	triethanolamine	300 W Xe lamp	216.7	0.62% (365 nm)	S5
$Co(OH)_2$/ CdS	6.8 mol %	ethanol	500 W Xe lamp	61	/	S6
Co_2P/ CdS	31.25 wt%	DL-mandelic acid	LED light 30 * 3 W	19373	6.8% (≥420 nm)	S7
Co/CdS	6 mol%	lactic acid	350 W Xe lamp	796	/	S8
CoS/CdS				1232	/	
$Co(OH)_2$/ CdS				1958	/	
Co_3O_4/ CdS				3014	9.7% (420 nm)	
CoS_x/ TiO_2	5 mol%	ethanol	300 W Xe lamp	838	/	S9
Co/TiO_2	0.1 wt%	methanol	250 W high pressure mercury lamp	200	/	S10
Co/TiO_2	1.0 wt%	glycerol	solar light	11021	/	S11
Co/TiO_2	0.3 wt%	triethanolamine	150 W halogen lamp	1160	/	S12

References

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