Nitrogen self-doped graphitic carbon nitride as efficient visible light photocatalyst for hydrogen evolution

Jiawen Fang, Huiqing Fan*, Mengmeng Li and Changbai Long

State Key Laboratory of Solidification Processing, School of Materials Science and Engineering, Northwestern Polytechnical University, Xi'an 710072, China



Fig.S1 Pristine XPS spectra of the $g-C_3N_4$ and C_3N_{4+x} . (a) N1s spectra; (b) C1s spectra; (c) survey spectra; (d) O1s spectra; (e) Si2p spectra; (f) normalized spectra according to the peak around 288

sample	C 1s			N 1s			Oa	Sia
			C/C _{all}			N/N _{all}		
	position	assign	ratio	position	assign	ratio		
			(at%)			(at%)		
	284.60	C-C	71.82	398.41	C=N-C	73.26	3.8	1.7
g-C ₃ N ₄	286.12	C-NH ₂	3.17	400.23	C-N-C	24.05		
-	288.24	C=N-C	25.01	404.43	N-N	2.69		
	284.60	C-C	52.69	398.70	C=N-C	72.70	3.3	1.5
C_3N_{4+x}	286.32	C-NH ₂	2.49	400.51	C-N-C	24.47		
	288.20	C=N-C	44.83	404.12	N-N	3.83		

Table S1 XPS analysis of g- C_3N_4 and C_3N_{4+x}

a: the atom ratio among all the atom;

Table S2 Surface structures for $C_3N_{4\text{+}x}$ and $\text{g-}C_3N_4$

Samples	Surface	Pore	Pore	
	area	volume	width ^[a]	
	$[m^2 \cdot g^{-1}]$	$[cm^3 \cdot g^{-1}]$	[nm]	
g-C ₃ N ₄	9.78	0.56	46.55	
C_3N_{4+x}	9.21	0.71	46.08	

[a] Average pore width determined by Barrett-Joyner-Halenda method;

Table S3 Fitting results of the impedance plots based on the equivalent circuit for bulk g-C_3N_4 and $C_3N_{4\text{+}x}$

Samples	$\operatorname{R1}(\Omega)$	$R2(\Omega)$	CPE1(F)	$R3(\Omega)$	CPE2(F)	$W(\Omega)$
g-C ₃ N ₄	10.95	1877	1.85×10 ⁻³	6080	7.42×10 ⁻⁴	6.53×10 ⁻⁴
C_3N_{4+x}	3.218	3146	7.30×10^{-3}	802.1	1.37×10-4	9.42×10 ⁻²



Fig. S2 Top (left) and side (right) view of the pristine $g-C_3N_4$ configuration. Color scheme: C, grey; N, blue.



Fig. S3 Top (left) and side (right) view of the nitrogen self-doped carbon nitride (C_3N_{4+x}) configuration. Color scheme: C, grey; N, blue; substituting N, red.



Fig.S4 SEM images of C_3N_{4+x} (a) and g- C_3N_4 (b).



Fig. S5 EPR spectra of C_3N_{4+x} and $g-C_3N_4$ in the dark and after visible light irradiation at 103 K with a g-value 1.9996. The settings of experimental parameters are: center field 323.996 mT, power 0.998 mW.