Supporting Information

Three-dimensional Assembly of Carbon Nitride Tubes as Nanoreactors for Enhanced Photocatalytic Hydrogen Production

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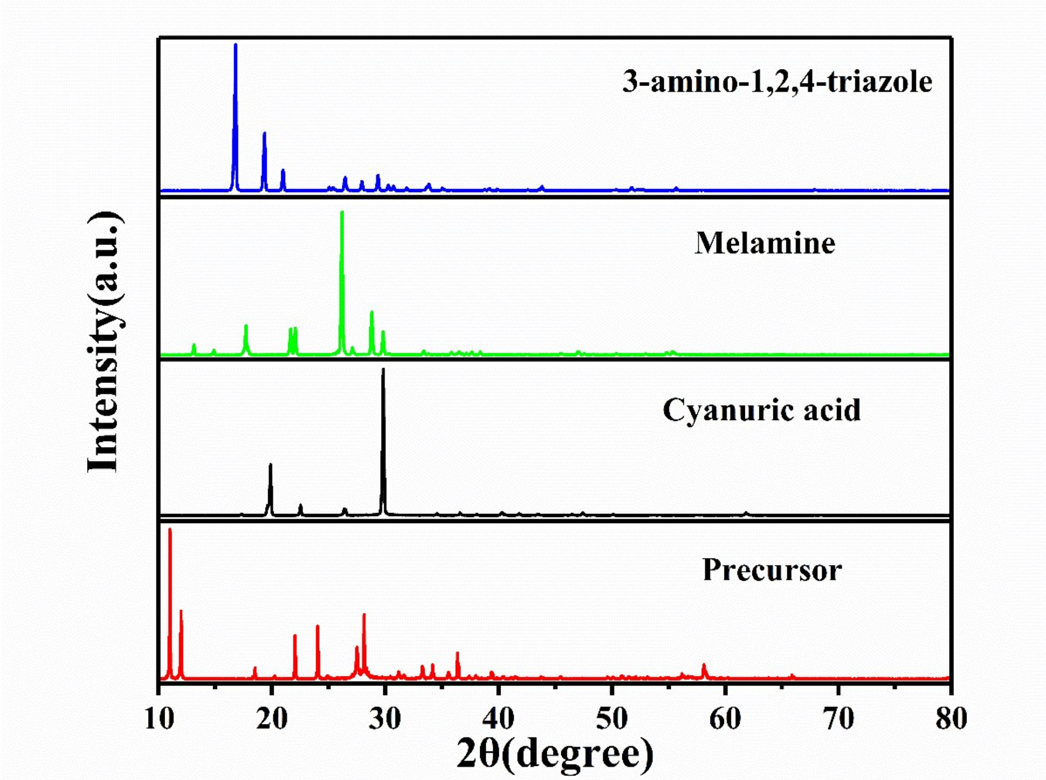

Figure S1. XRD pattern of precursor (red line), commercial cyanuric acid (black line), commercial melamine (green line) and commercial 3-amino-1,2,4-triazole (blue line).

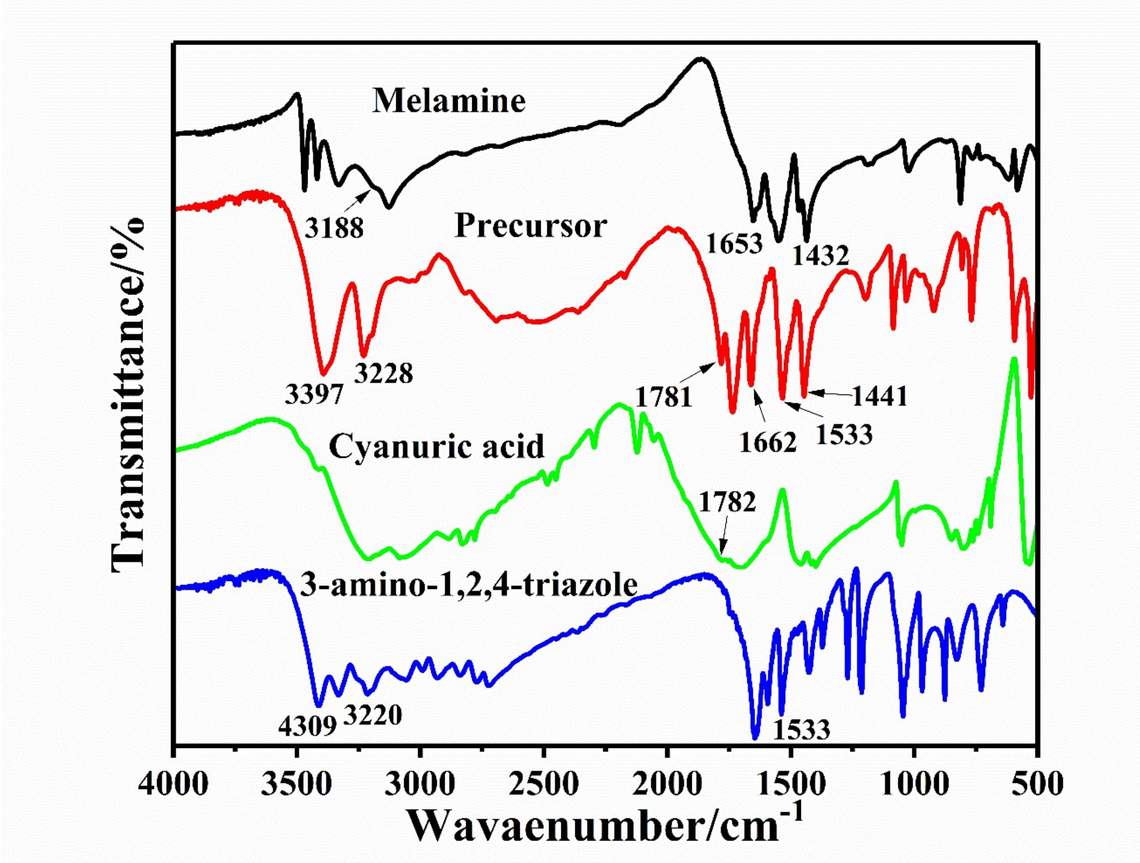

Figure S2. The FI-IR spectra of commercial melamine (black line), the precursor (red line), commercial cyanuric acid (green line) and commercial 3-amino-1,2,4-triazole (AT, blue line).

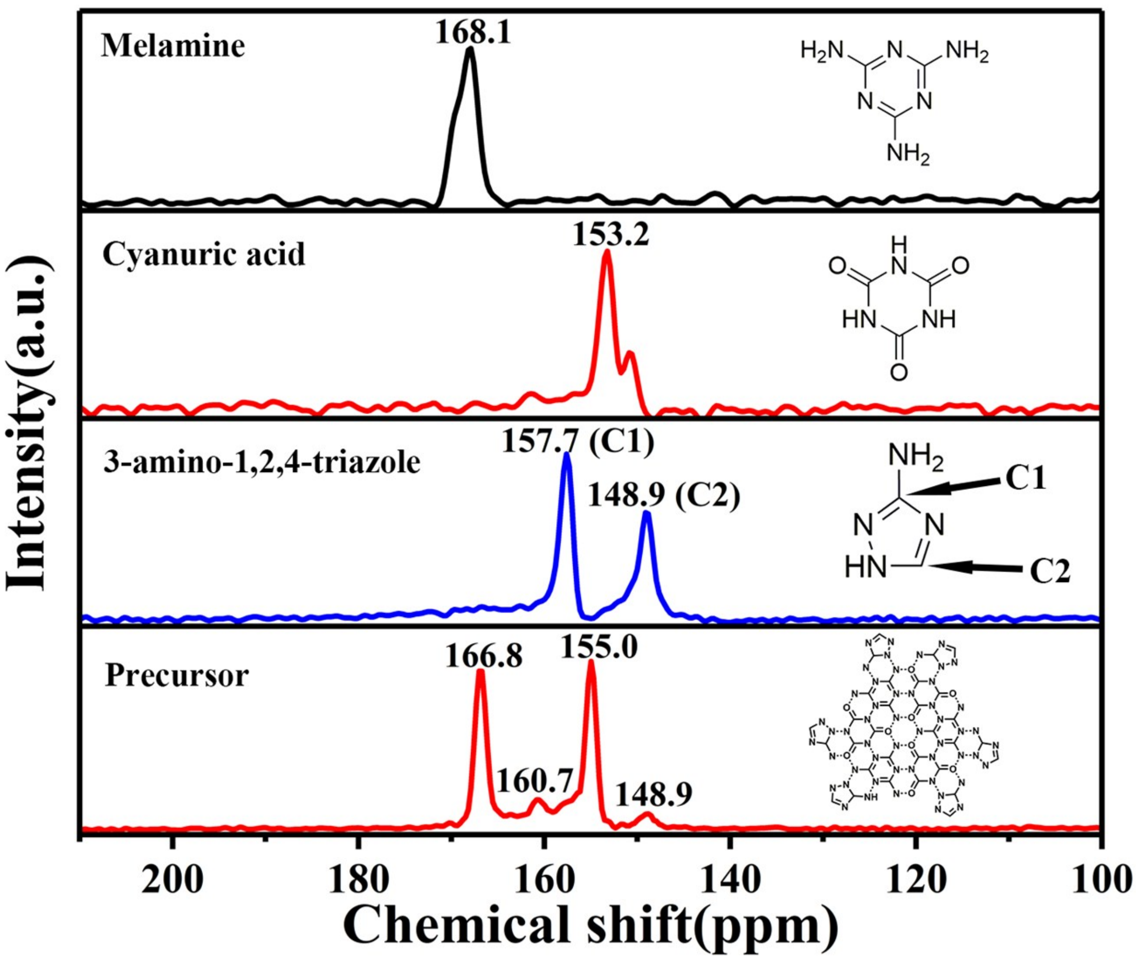

Figure S3. Solid-state ^{13}C MAS NMR spectra of melamine, cyanuric acid 3-amino-1, 2, 4-triazole and precursor.

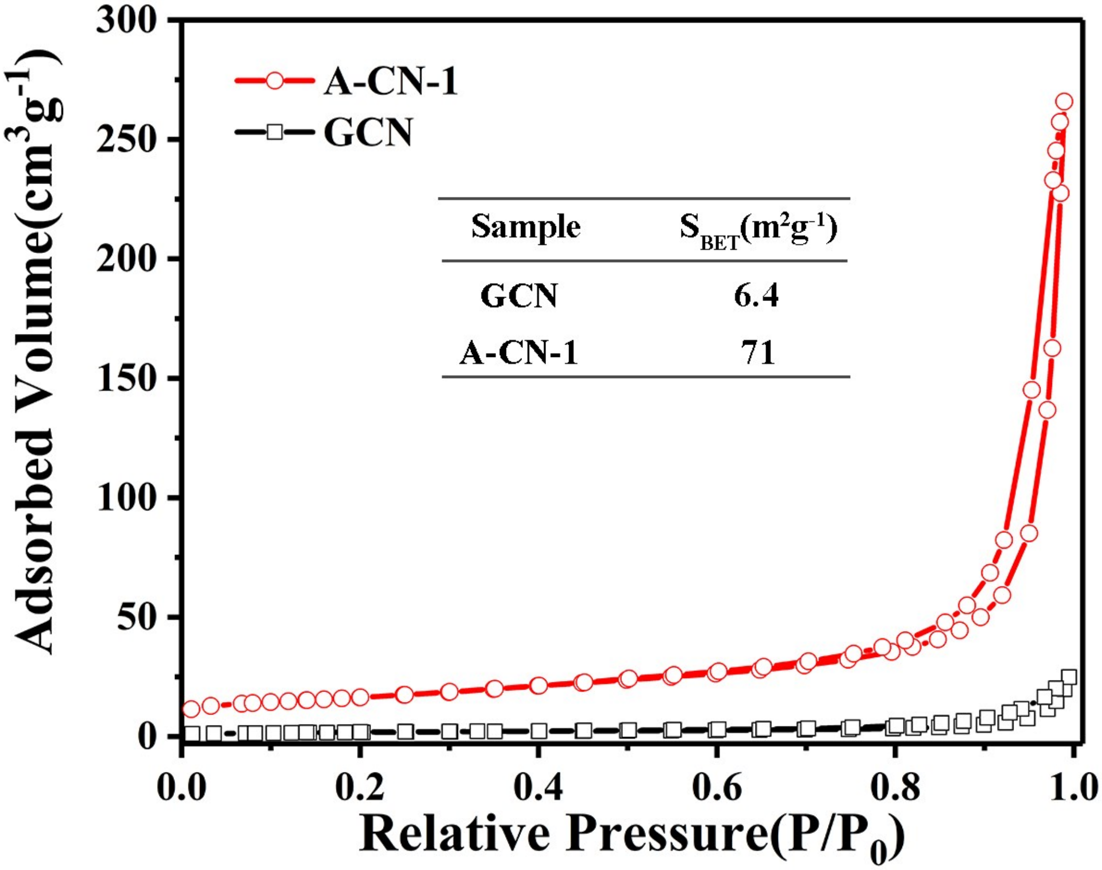

Figure S4. N_2-sorption isotherms of GCN and A-CN-1.

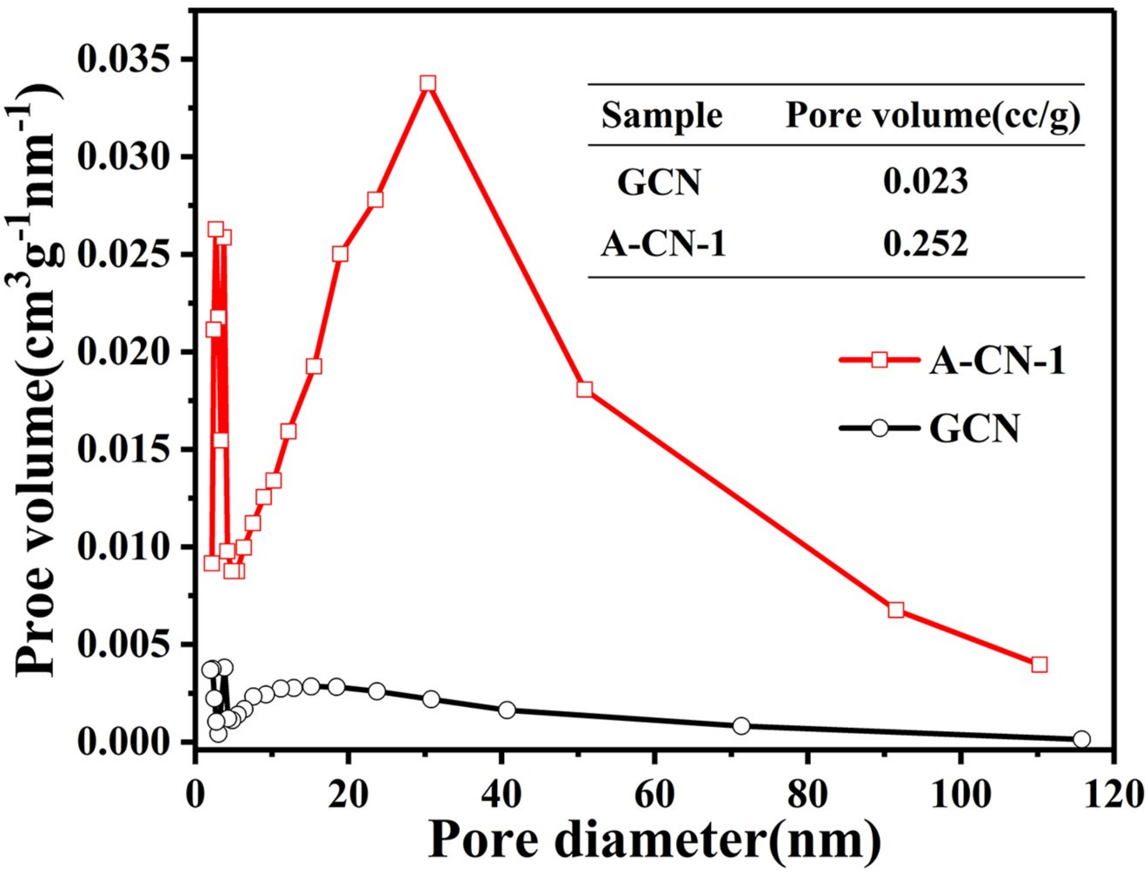

Figure S5. The pore size distribution of GCN and A-CN-1.

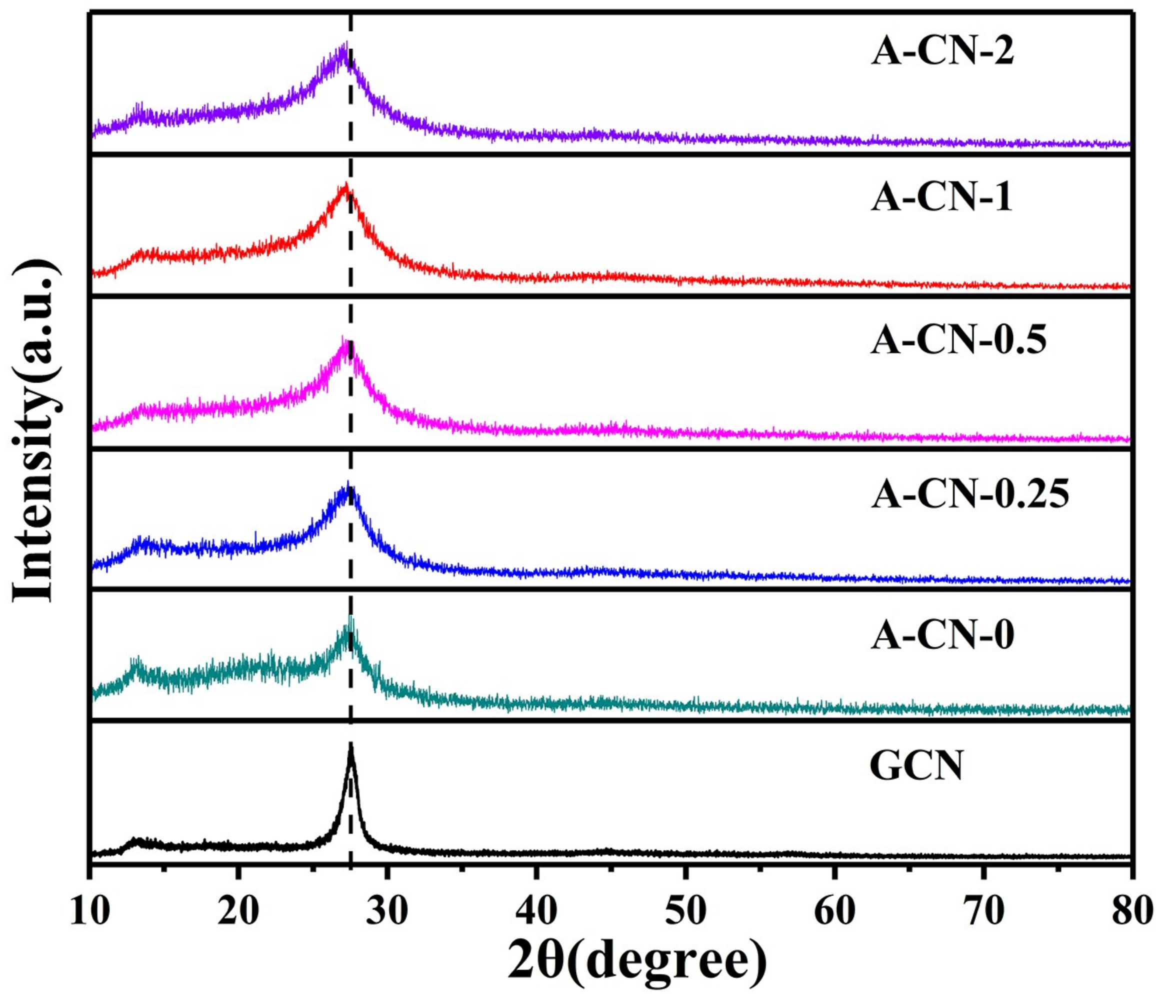

Figure S6. XRD pattern of serials of products with different proportions 3-amino-1, 2, 4-triazole and reference sample GCN.

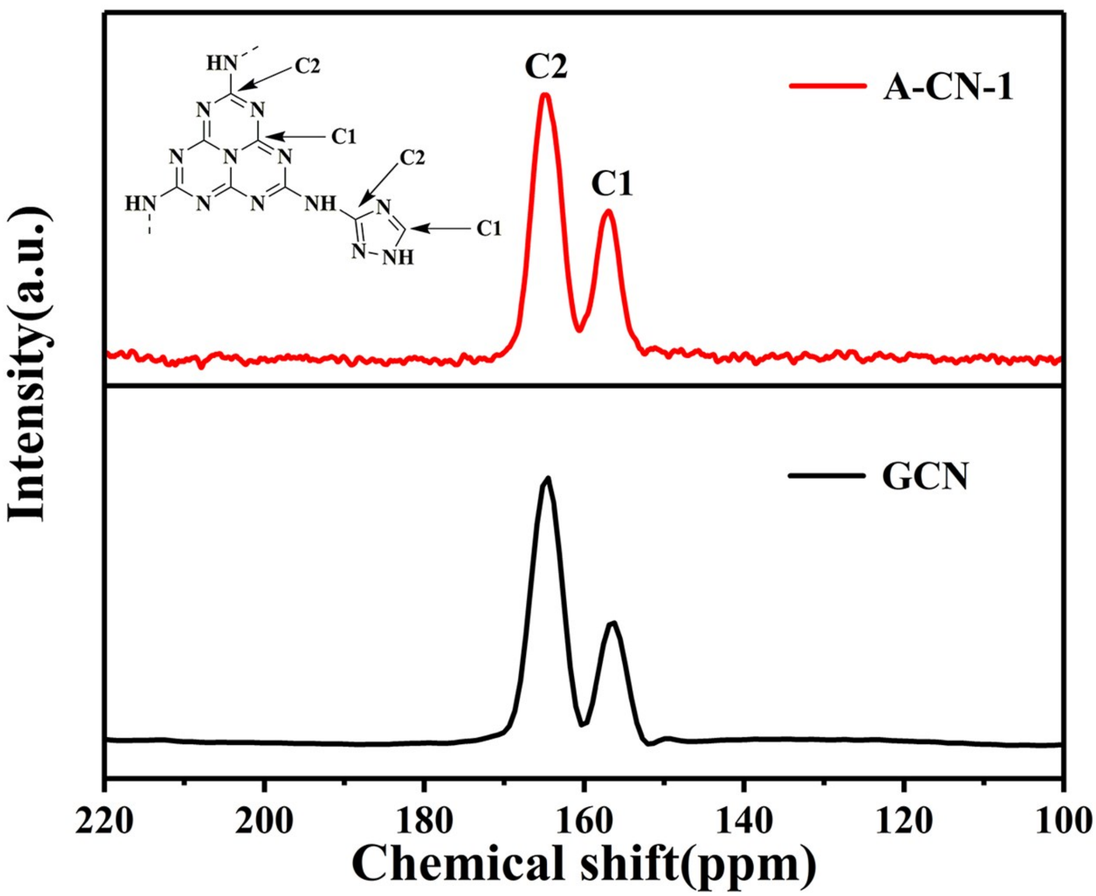

Figure S7. Solid-state ^{13}C MAS NMR spectra of GCN and A-CN-1.

Table S1. XPS analysis of GCN and A-CN-1

Sample	C (Atom conc%)	N (Atom conc%)	P (Atom conc%)	N/C
GCN	41.12	55.46	0	1.35
A-CN-1	40.45	58.88	0	1.46

Table S2. Organic elemental analysis of GCN and A-CN-1.

Sample	C (wt%)	N (wt%)	N/C
GCN	35.12	56.34	1.38
A-CN-1	34.11	58.98	1.48

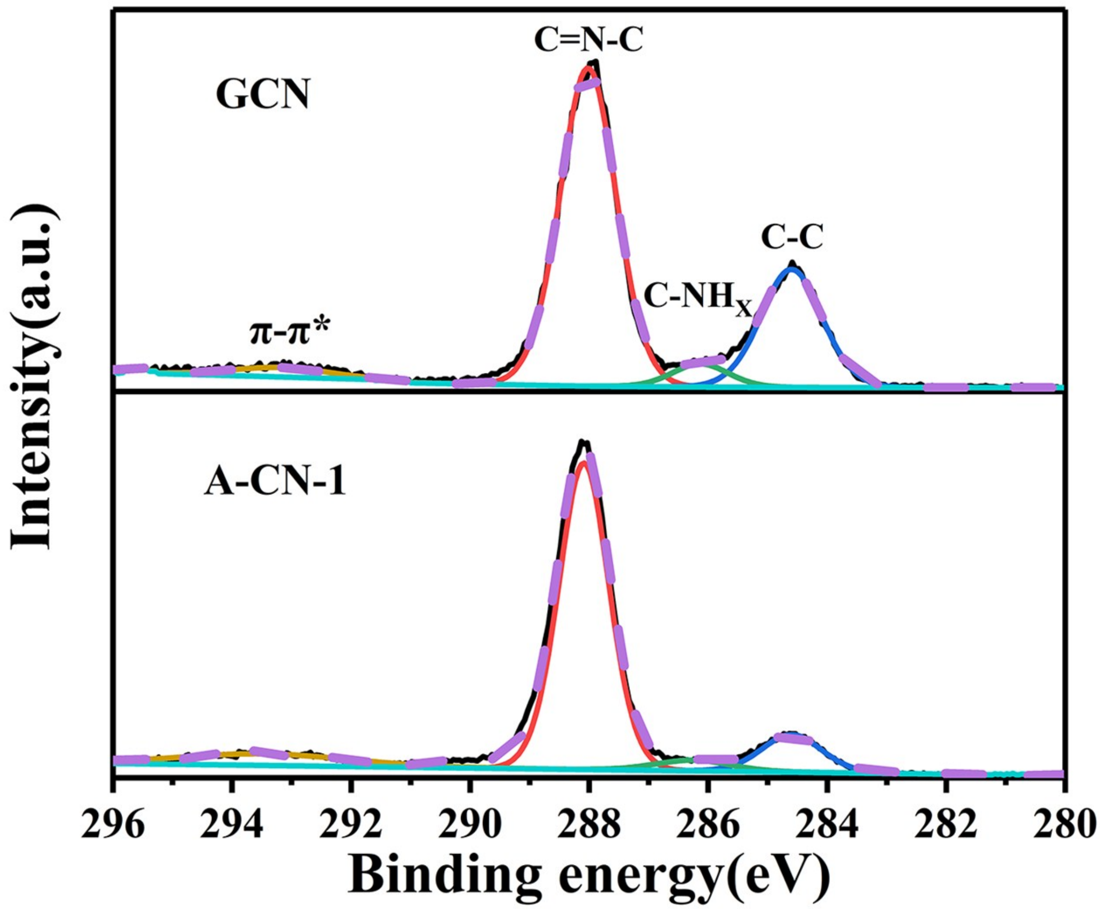

Figure S8. C 1s XPS spectra of GCN and A-CN-1.

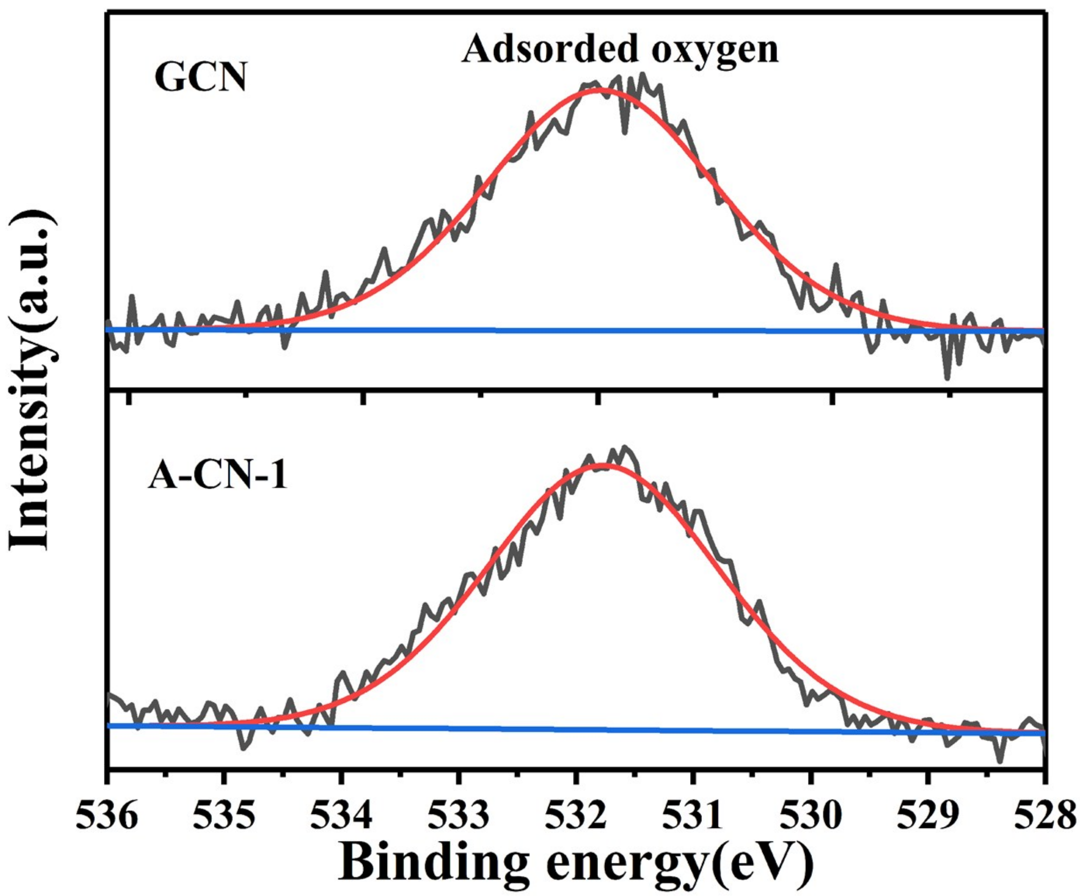

Figure S9. O 1s XPS spectra of GCN and A-CN-1.

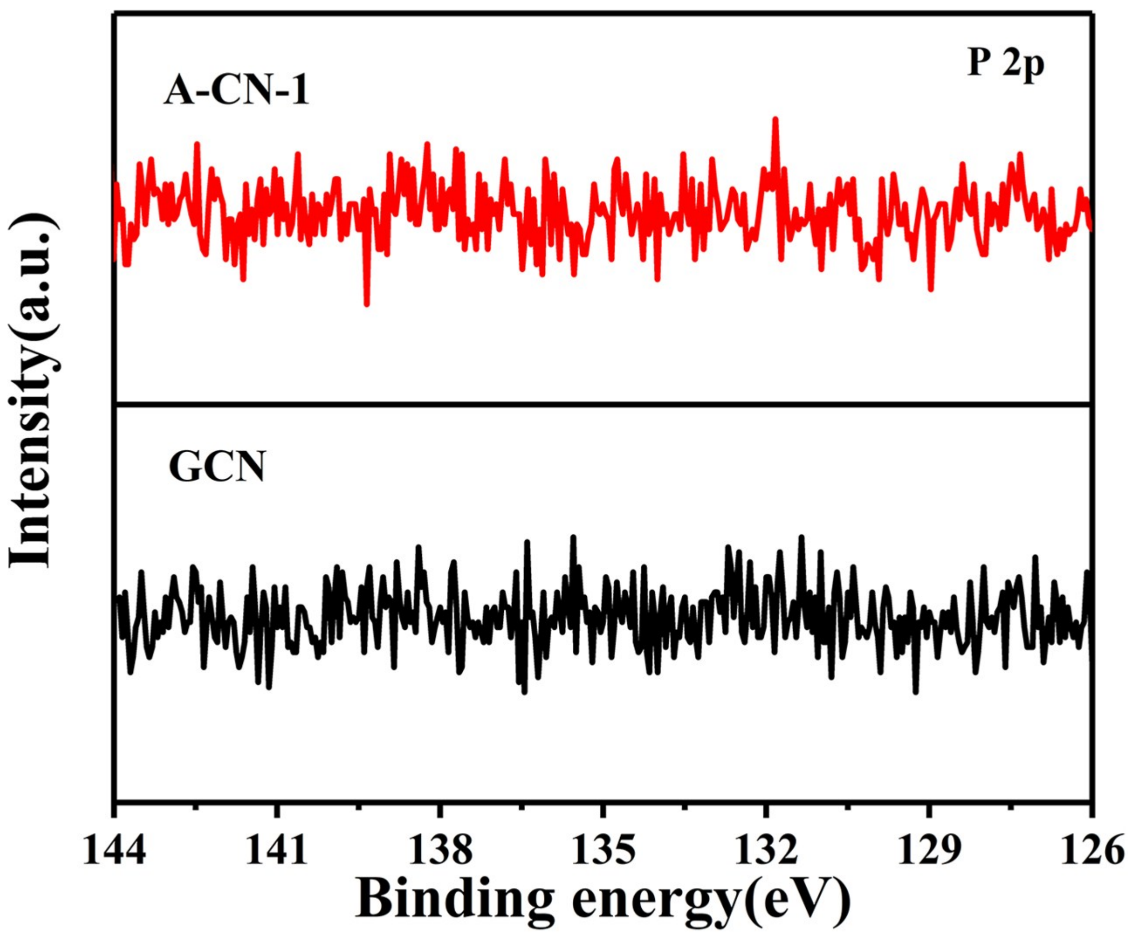

Figure S10. P 2p XPS spectra of GCN and A-CN-1.

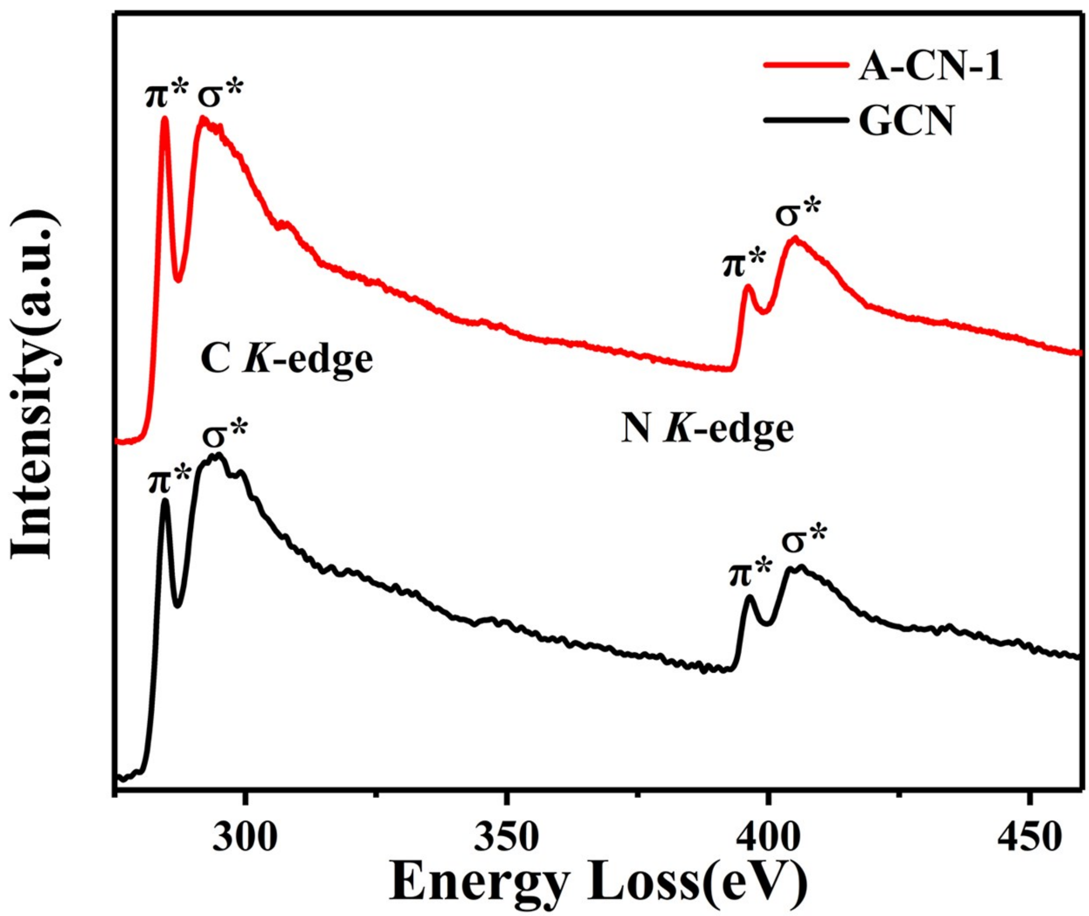

Figure S11. EEL spectrum of GCN and A-CN-1.

a b

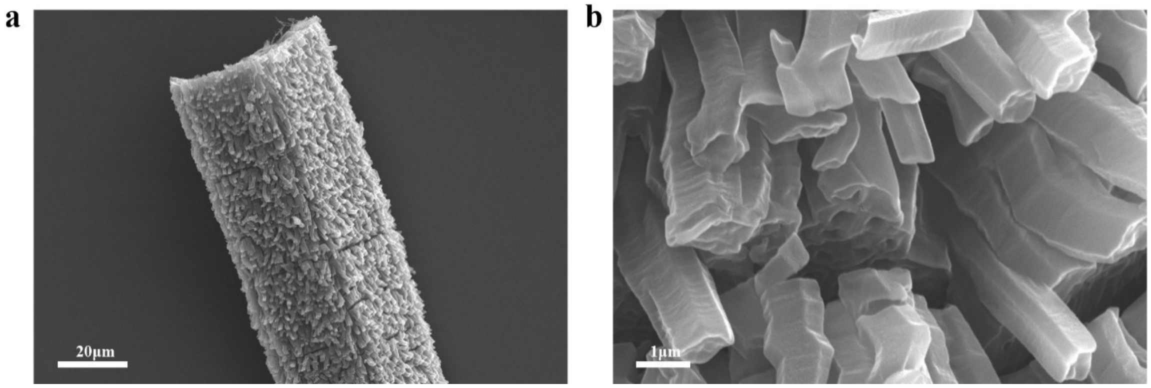

Figure S12. SEM images (a, b) of A-CN-1 after photocatalytic hydrogen production process.

Table S3. Kinetic analysis of emission decay for GCN and A-CN-1.

Sample	τ_1(ns)	Rel.%	τ_2(ns)	Rel.%	τ_3(ns)	Rel.%
GCN	1.47	31.62	5.76	47.68	32.75	20.70
A-CN-1	1.10	29.99	5.01	46.17	27.88	23.84

Table S4. Summary of C_3N_4-base nanostructures photocatalysts reported for hydrogen evolution rate.

Catalyst	Hydrogen evolution rate (μmol/h)	Hydrogen evolution rate (μmol/h/g)	Experimental conditions	Light source filter (nm)	BET(m^2g^{-1})	Reference
A-CN-1	71 (10mg)	7100	1wt% Pt 20% methanol	AM 1.5	71	This work
g-C_3N_4/$KNbO_3$(1:1)	101.9 (100mg)	1019.38	2 wt% Pt 20%TEOA	AM 1.5	--	1
UCN	47.2 (80mg)	590	3 wt% Pt 10% TEOA	AM 1.5	69.6	2
KSCN-treated Melon	24.7 (20mg)	1235	8 wt% Pt 20% methanol	AM 1.5	55	3
Urea-CNx	56.2 （20mg）	2810	2 wt% Pt 10% methanol	AM 1.5	64.6	4
C_3N_4-Ni-Tu-TETN	51 （100mg）	510	0.05 mmol Ni^{2+} 3 mmol Tu 22% TEOA	AM 1.5	--	5
CNHS	57.4 (20mg)	2860	3 wt% Pt 10% TEOA	>400	277.89	6
PCN-S	79.8 (50mg)	1596	1 wt% Pt 20% TEOA	>400	122.6	7
P-TCN	67 (100mg)	670	1wt% Pt 20% methanol	>420	22.9	8
R-CN-350	19 (10mg)	1900	3wt% Pt 10% TEOA	>420	29.9	9
CN-NaK	278 (50mg)	5560	3wt% Pt 10% TEOA	>420	74	10

Reference:

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