Molten salt synthesis of a highly crystalline graphitic carbon nitride homojunction from a deep eutectic solvent for selective photocatalytic oxidation

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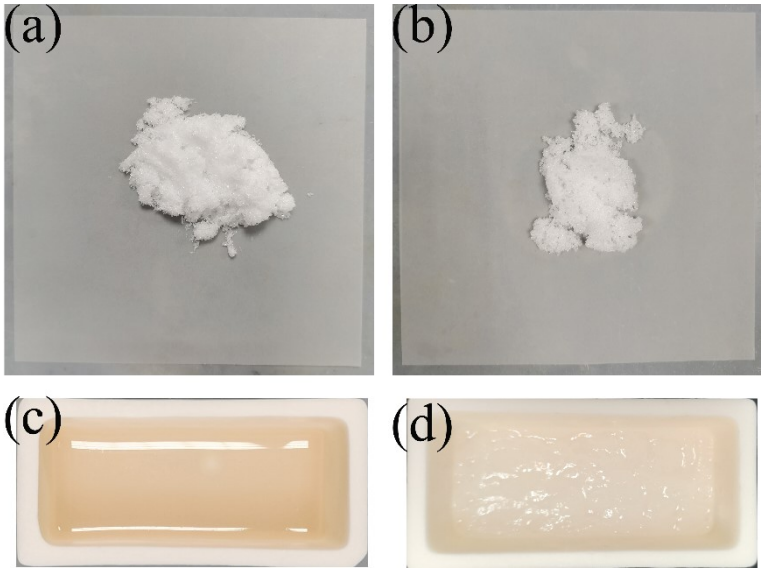


Figure S1. The photographs of (a) urea powder, (b) ammonium thiocyanate powder, (c) DES liquid consisting of urea and ammonium thiocyanate, (d) slurry consisting of urea, ammonium thiocyanate, NaCl and KCl.

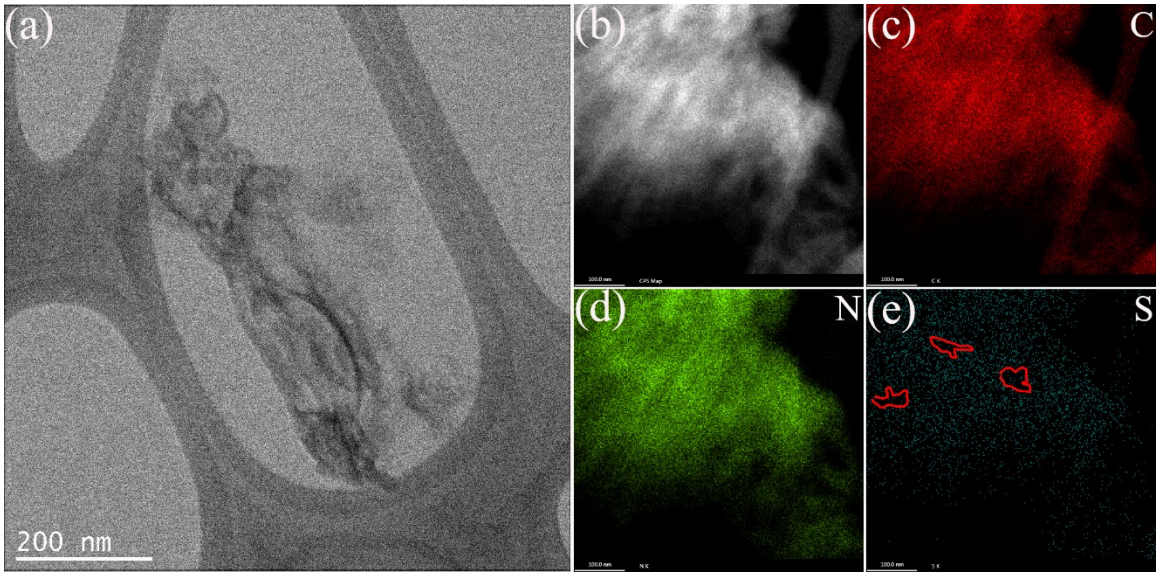


Figure S2. (a) TEM image of CNA/CNU, (b-e) EDX images of C, N and S elements.

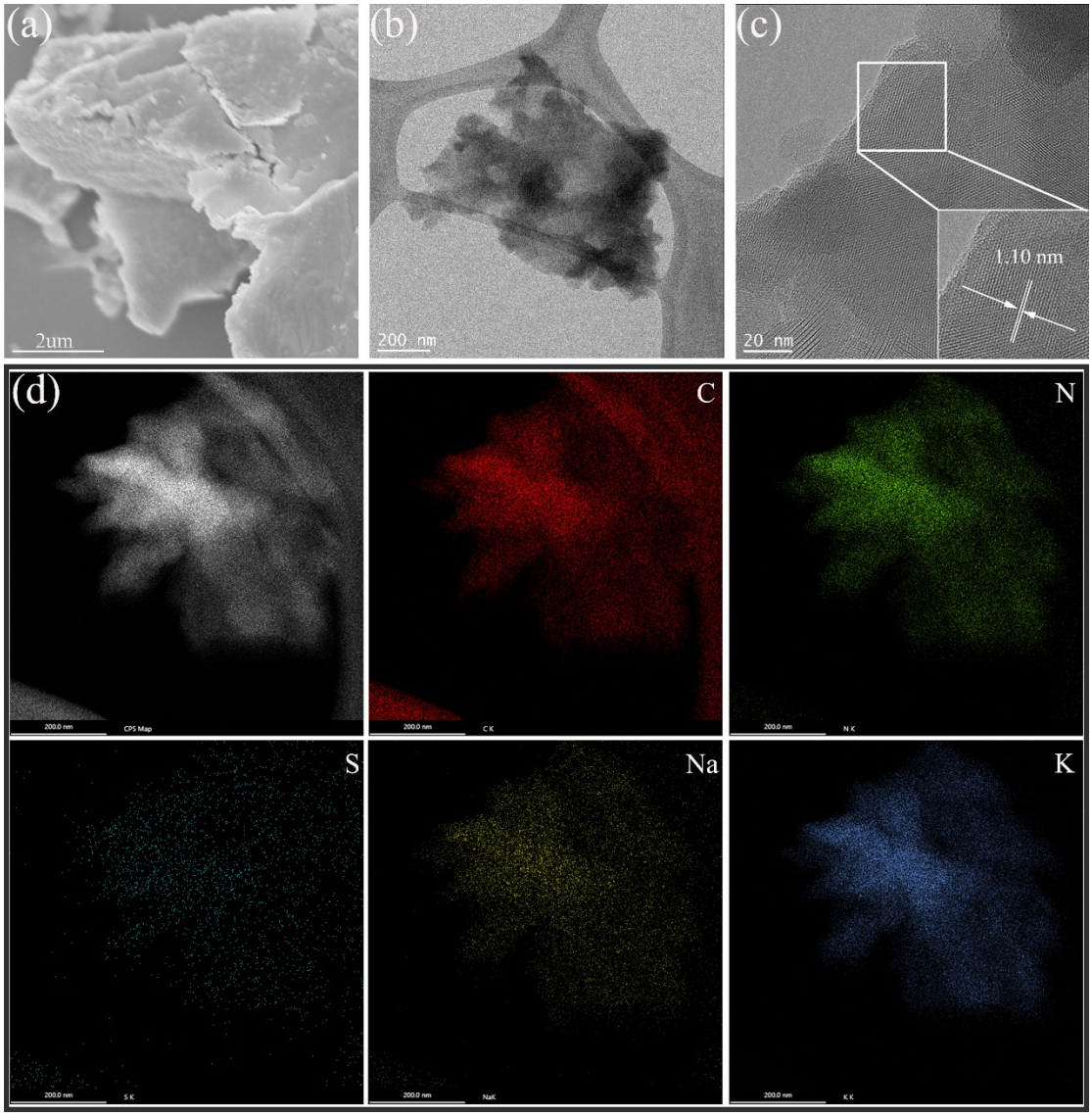


Figure S3. (a) SEM and (b-c) TEM images of CCNA, (d) EDX images of C, N, S, Na and K elements.

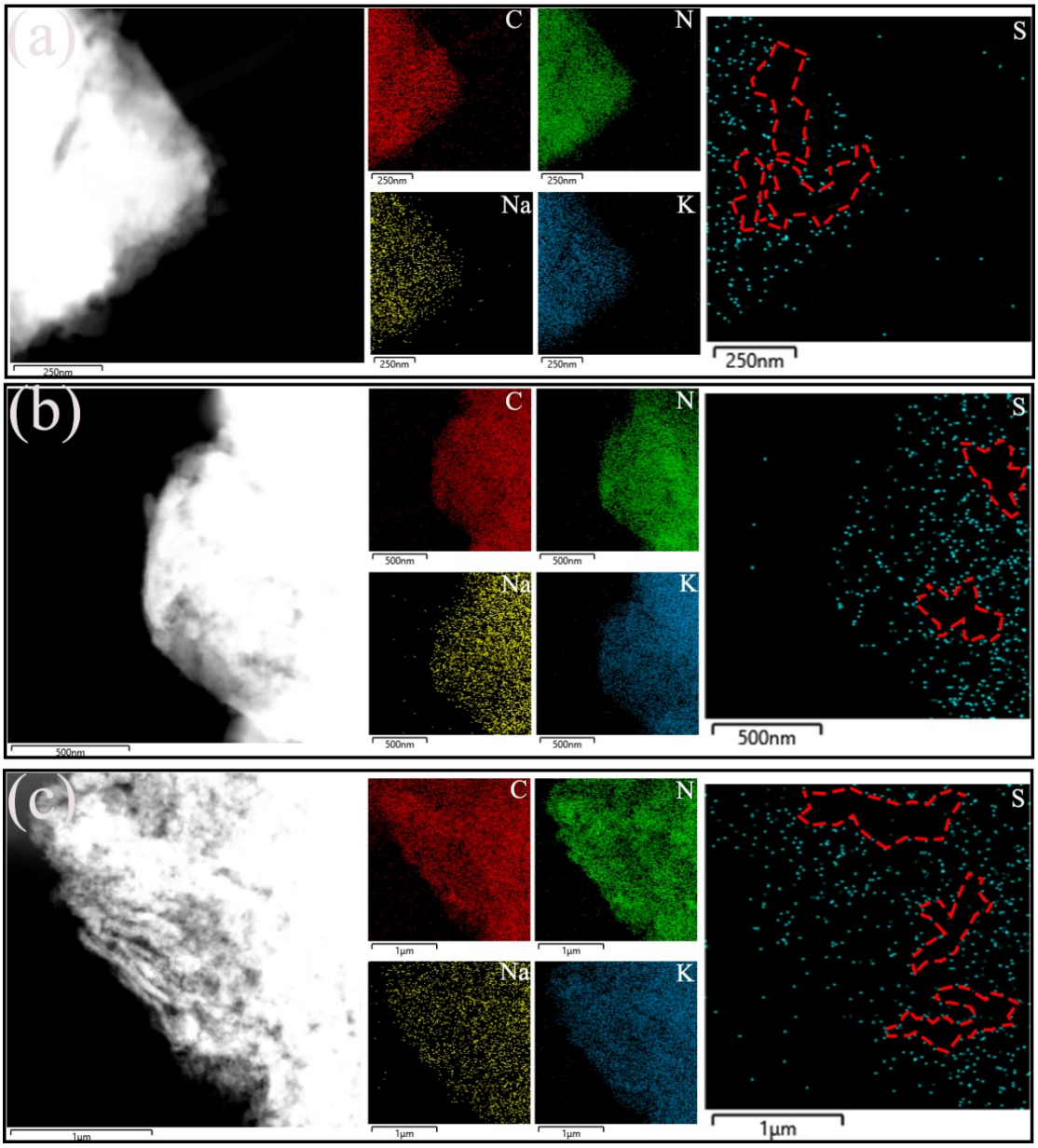


Figure S4. The EDX images of C, N, S, Na and K elements in CCNA/CCNU.

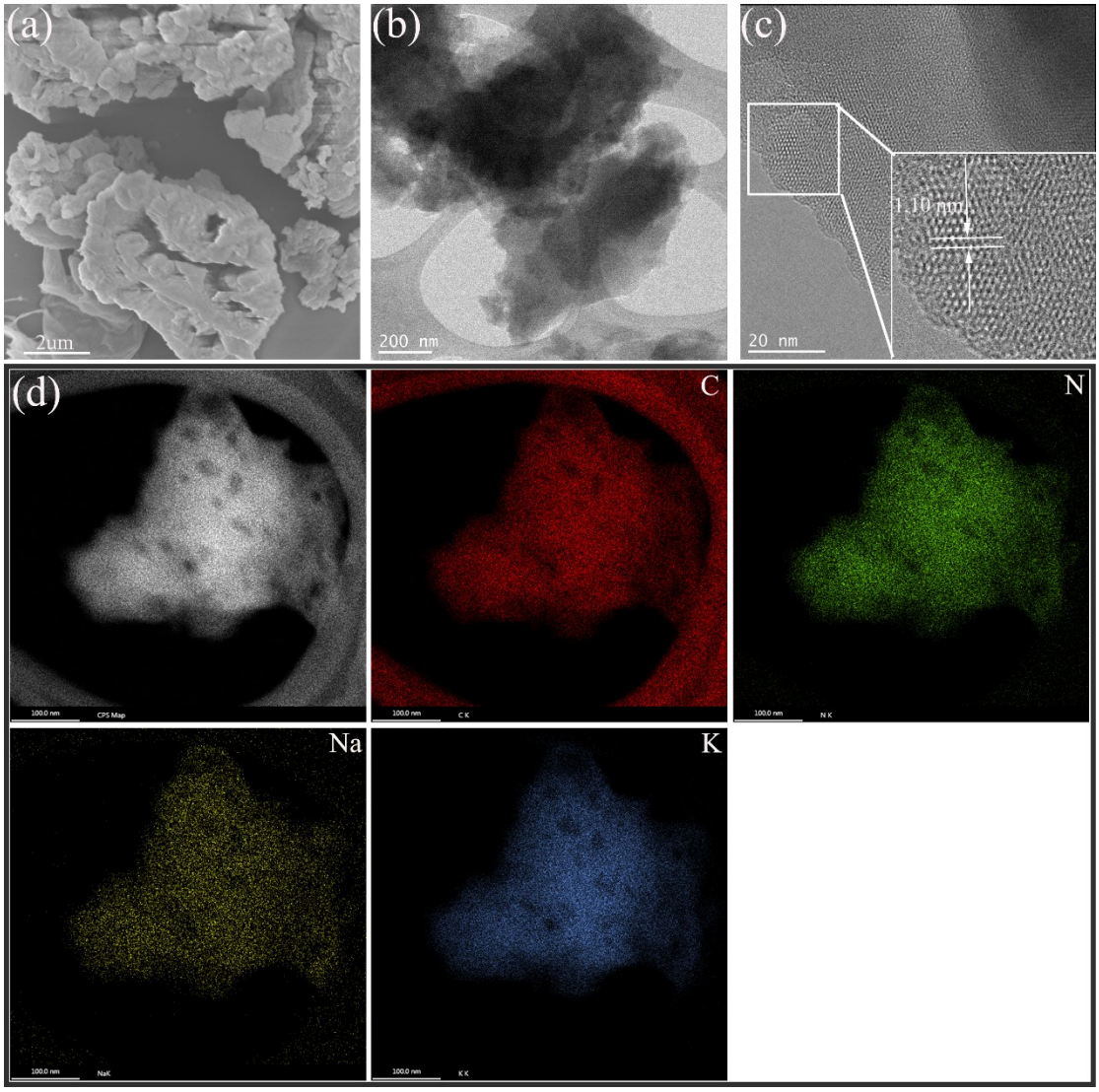


Figure S5. (a) SEM and (b-c) TEM images of CCNU, (d) EDX images of C, N, Na and K elements.

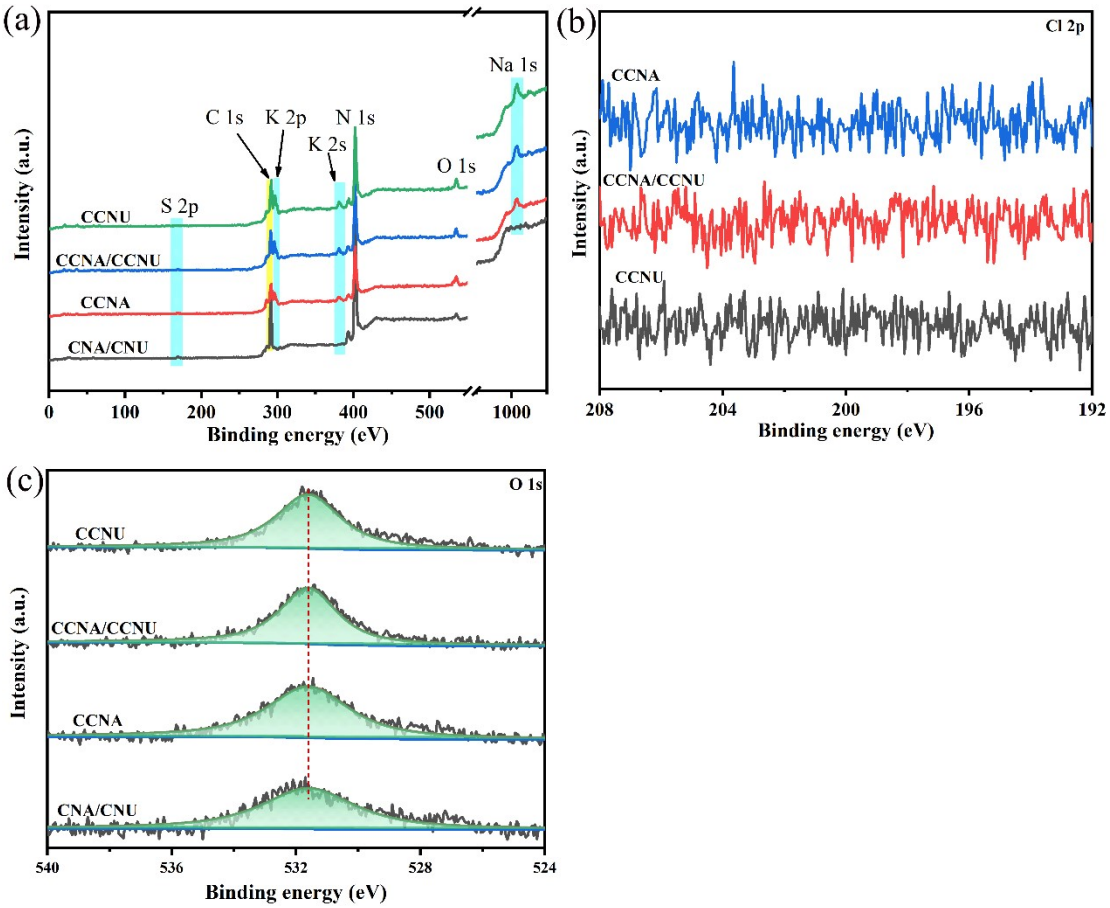


Figure S6. XPS survey spectra (a), high resolution XPS spectra of (b) Cl 2p and (c) O 1s regions of the as-prepared photocatalysts.

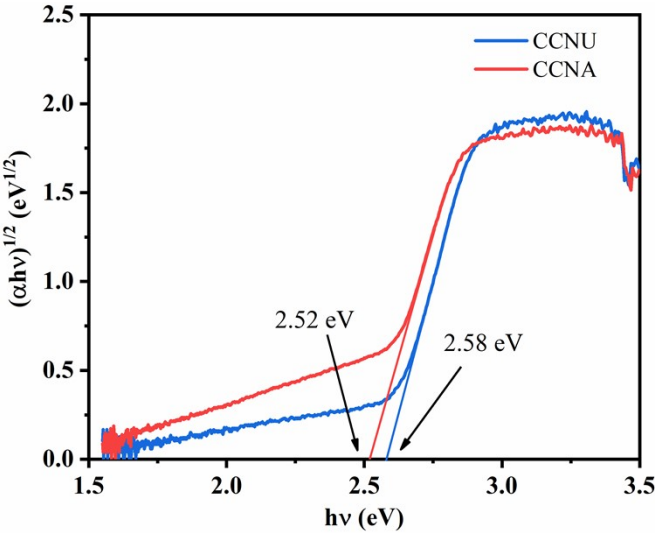


Figure S7. The plots of $(\alpha h\nu)^{1/2}$ versus the photon energy (hν) of CCNA and CCNU.

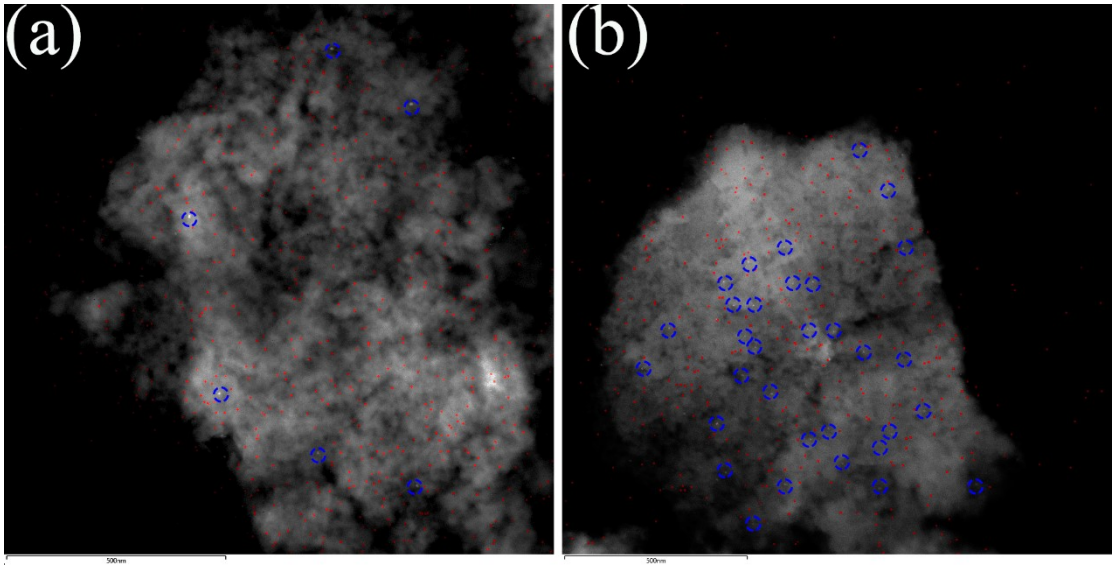


Figure S8. The distribution of S and Pt nanoparticles after photodepositing 0.3 wt% Pt on CCNA/CCNU (red dots: S; bright dots: Pt nanoparticles).

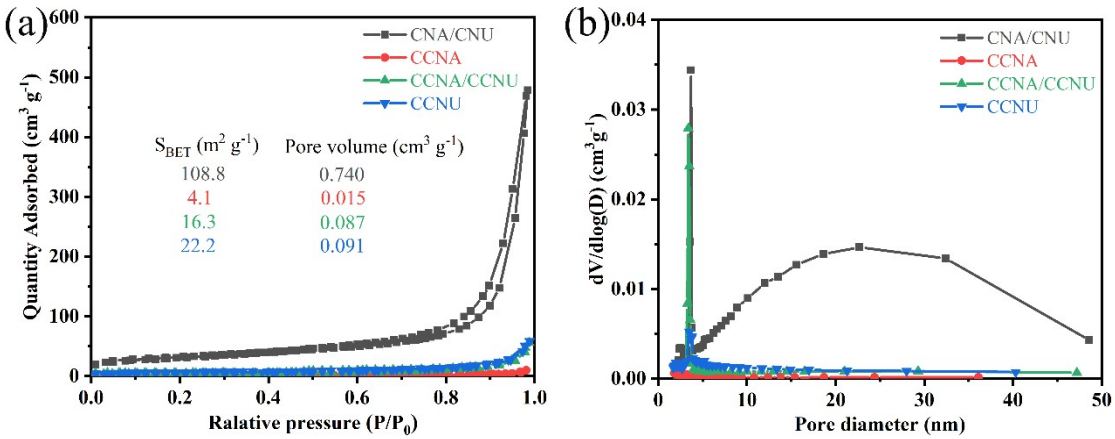


Figure S9. (a) N_2 adsorption-desorption isotherms and (b) the corresponding pore-size distributions of the as-prepared photocatalysts.

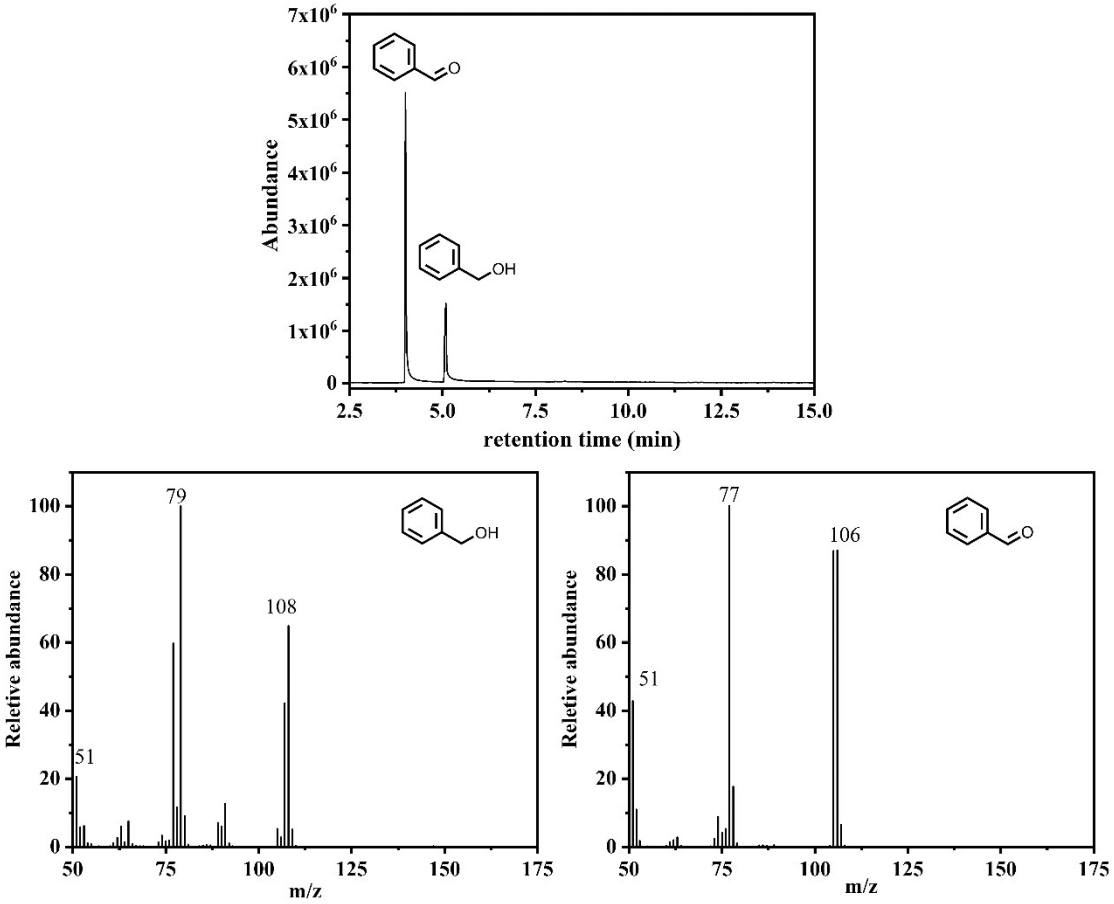


Figure S10. GC-MS data of benzyl alcohol and corresponding product.

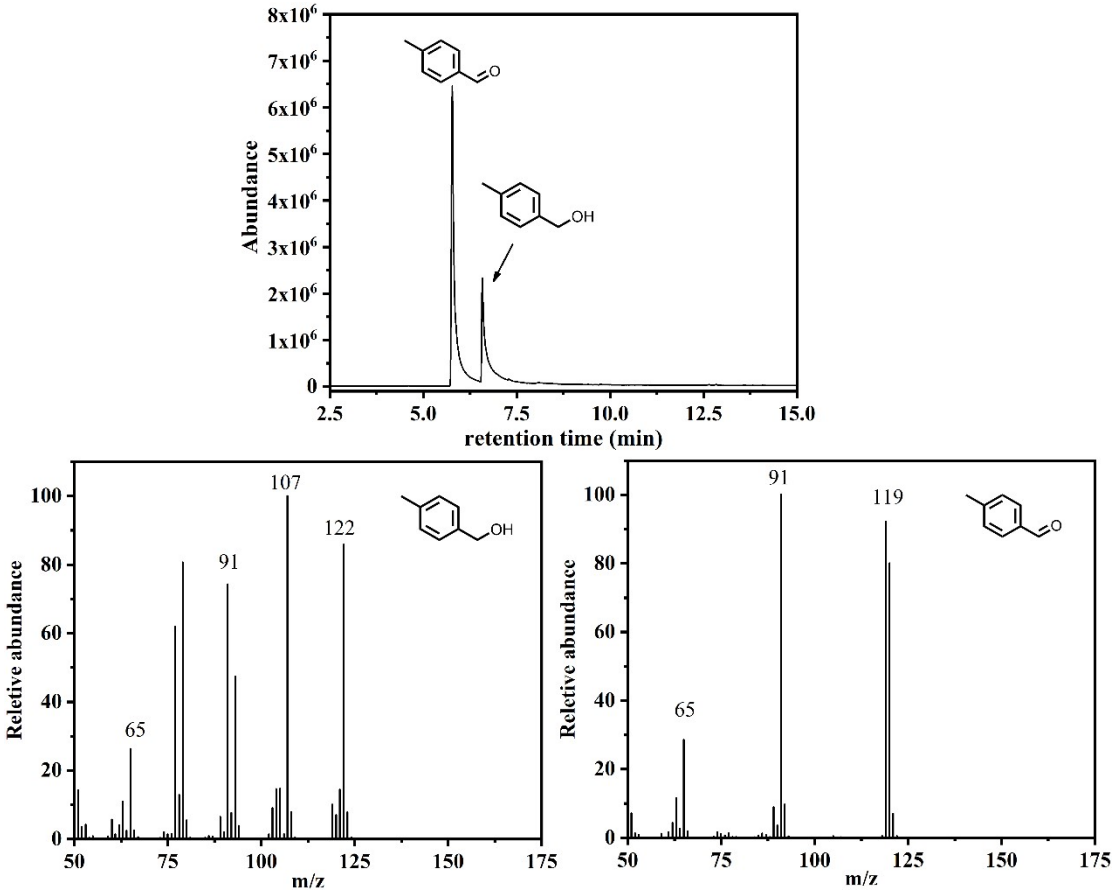


Figure S11. GC-MS data of 4-methyl benzyl alcohol and corresponding product.

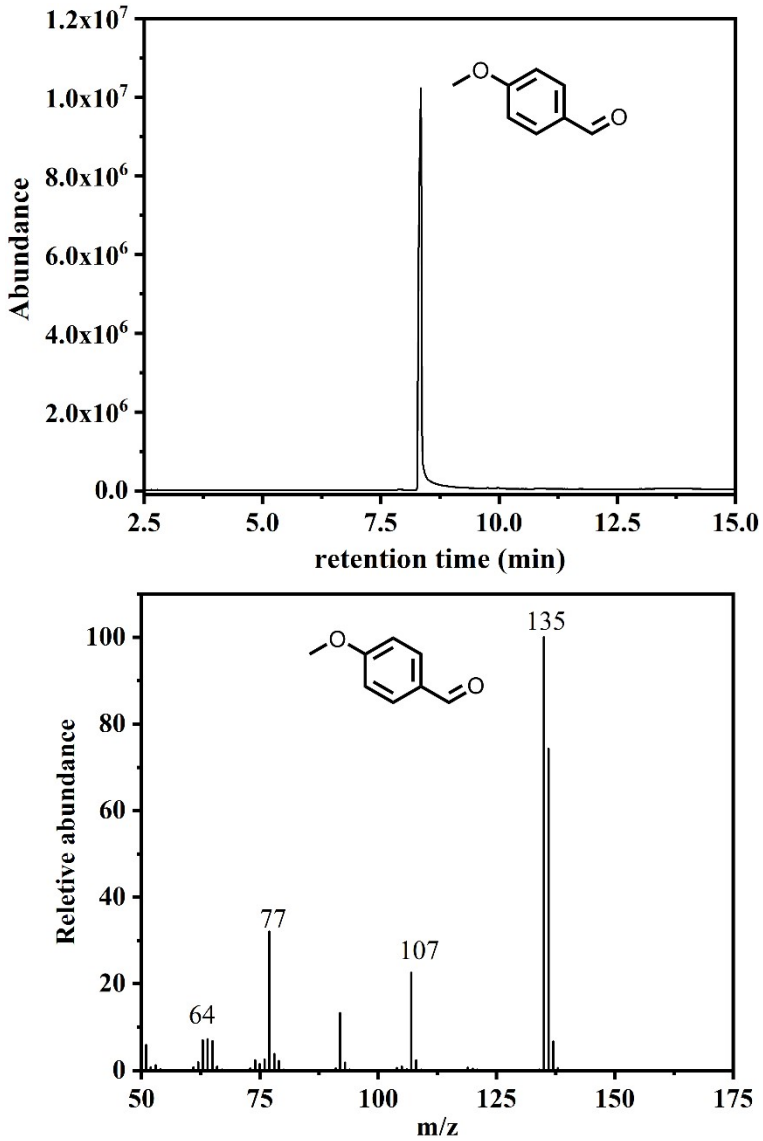


Figure S12. GC-MS data of 4-methoxybenzyl alcohol and corresponding product.

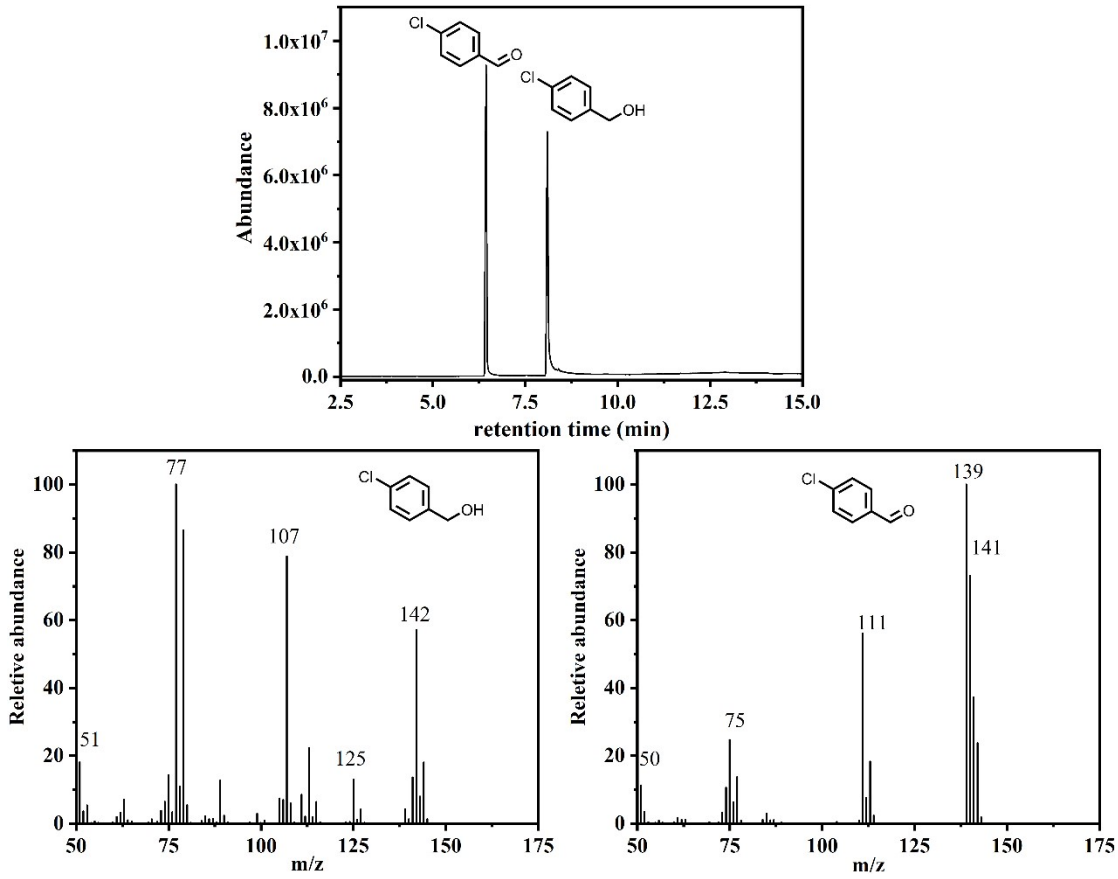


Figure S13. GC-MS data of 4-chlorobenzyl alcohol and corresponding product.

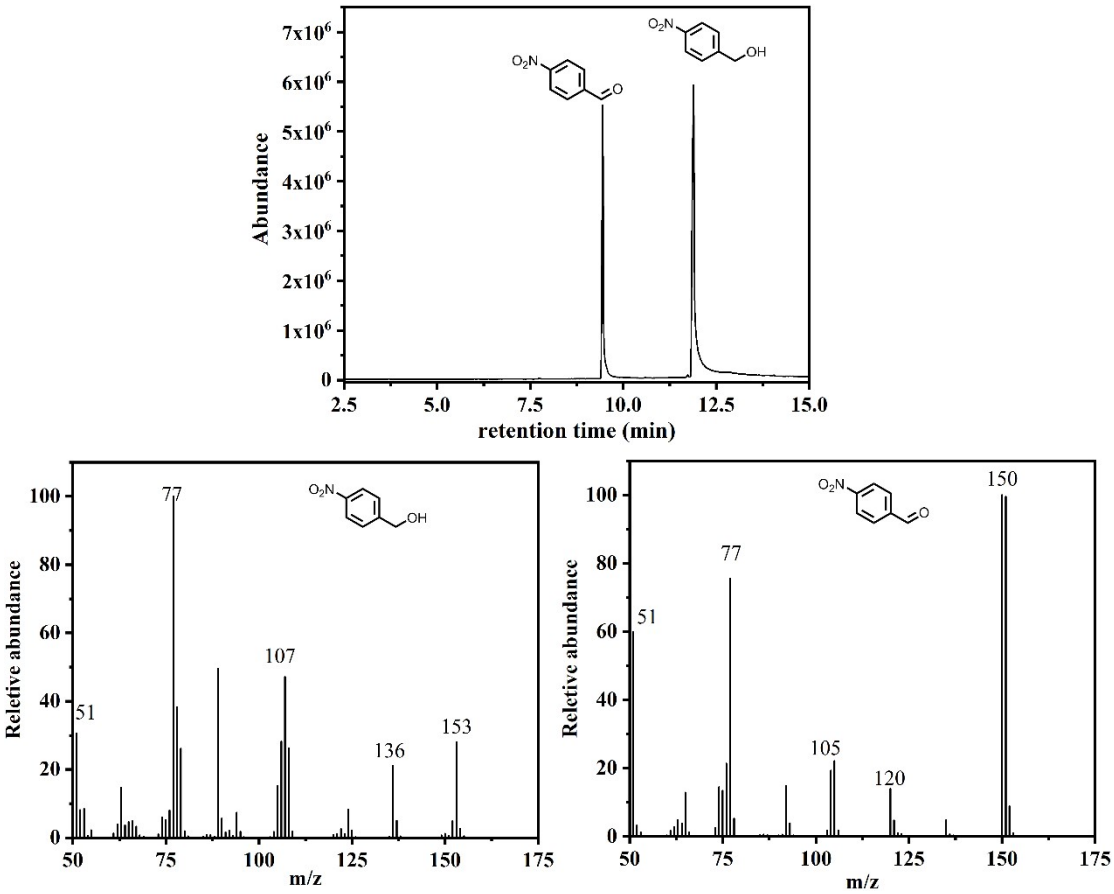
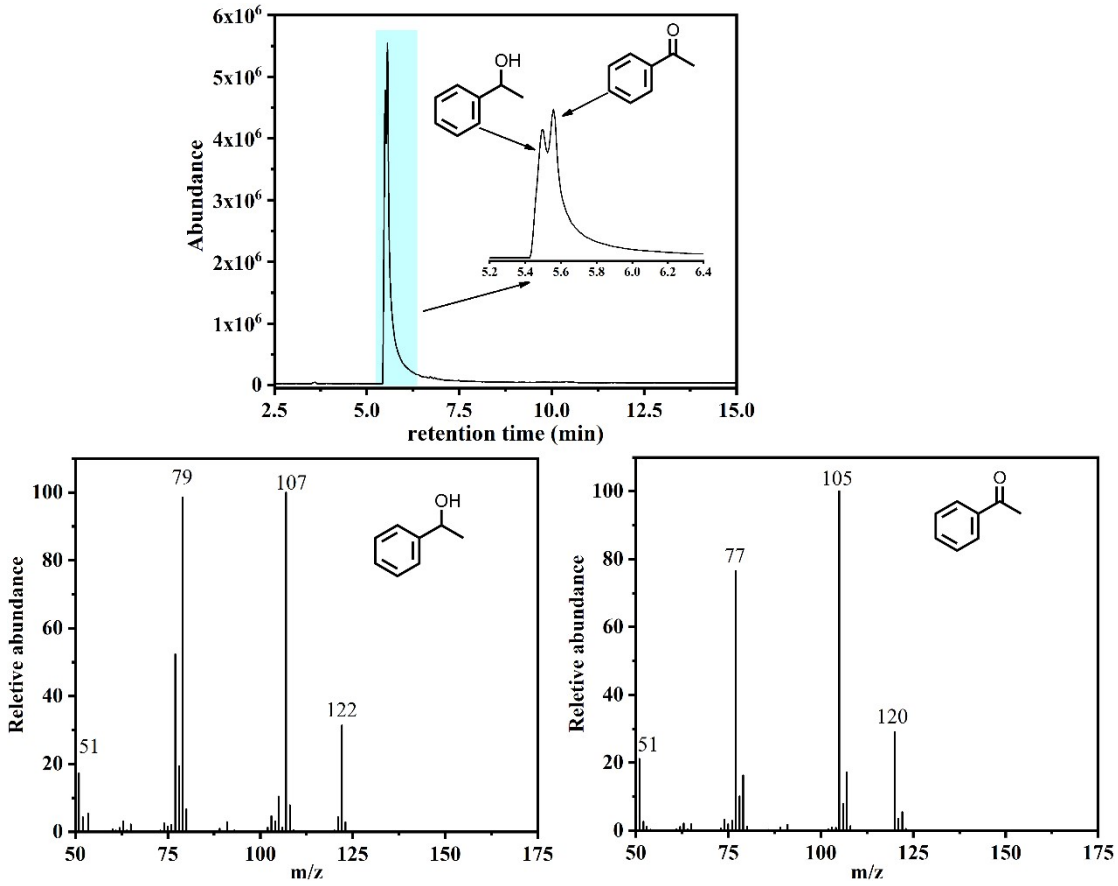


Figure S14. GC-MS data of 4-nitrobenzyl alcohol and corresponding product.



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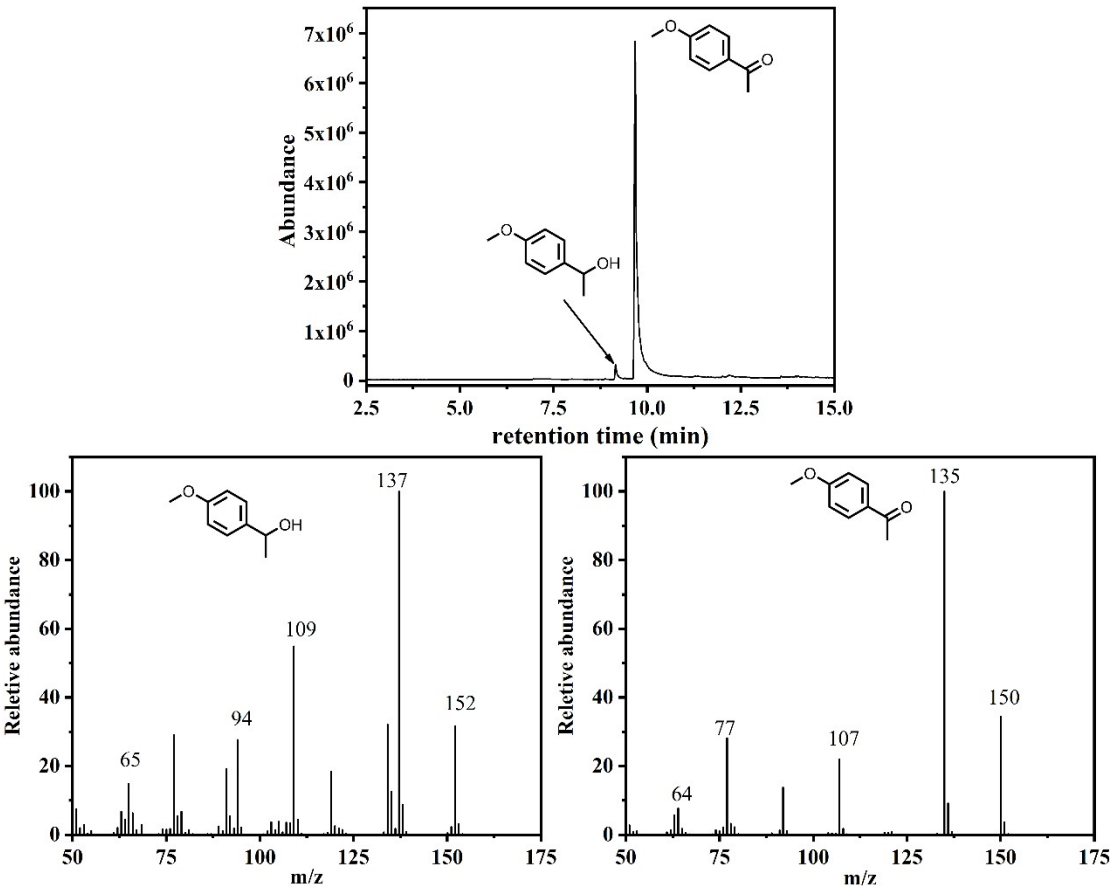

Figure S16. GC-MS data of 1-(4-methoxyphenyl)ethanol and corresponding product.

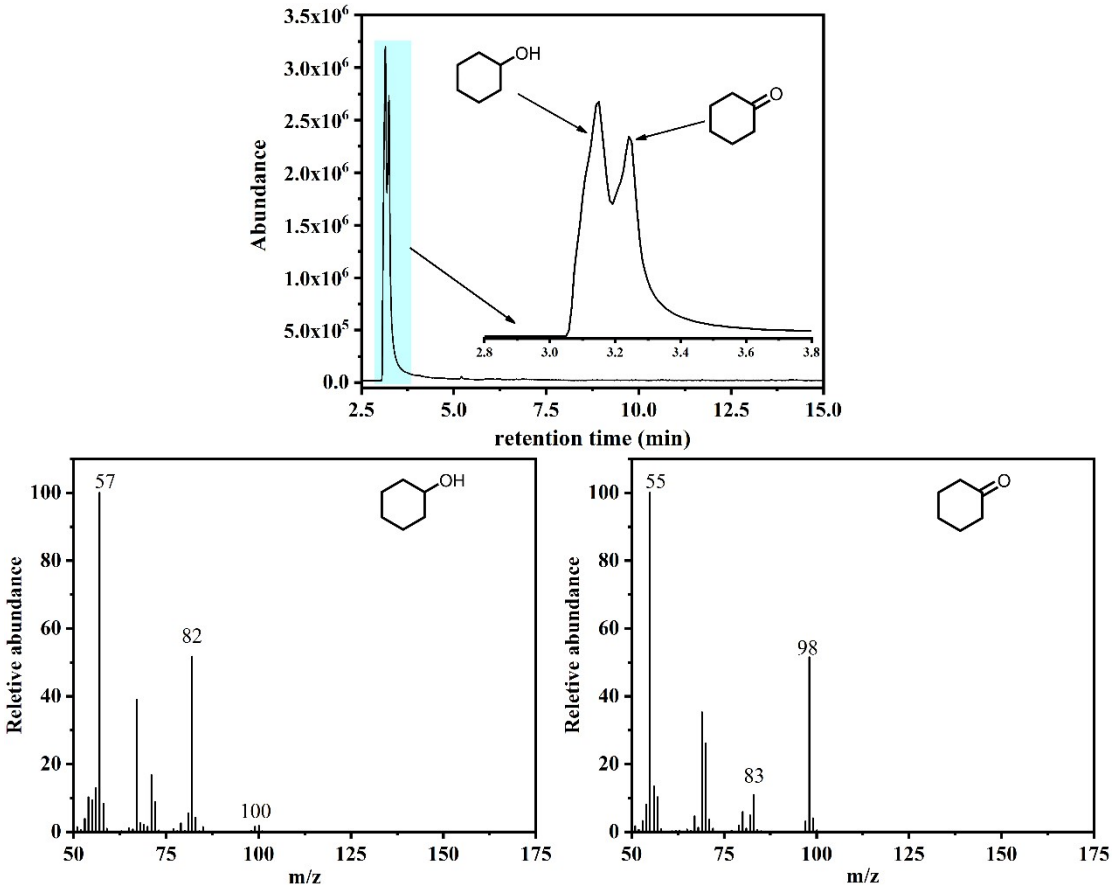

Figure S17. GC-MS data of cyclohexanol and corresponding product.

Table S1. The organic element analysis for various samples

Sample	C (wt %)	N (wt %)	H (wt %)	C/N atomic ratio
CNA/CNU	33.74	57.08	1.94	0.69
CCNA	26.94	43.26	2.14	0.73
CCNA/CCNU	26.23	41.83	2.00	0.73
CCNU	25.99	41.82	1.89	0.73

Table S2. Summary of the selective photocatalytic oxidation of benzyl alcohol over graphitic carbon nitride based catalysts.

Photocatalyst	Oxidant	Light source	T (°C)	t (h)	Y (%)	Enhanced factor[a]	Ref.
CCNA(0.9)	O_2 (1 bar)	Xe lamp (300 W, λ>420 nm)	35	9	68	1.9	[1]
C_3N_4 nanosheet	O_2 (1 bar)	Xe lamp (300 W, λ>420 nm)	25	4	9	2.6	[2]
CCN	O_2 (1 bar)	Xe lamp (300 W, λ>420 nm)	60	4	48	6.5	[3]
BCN-500	O_2 (1 bar)	400 nm LED light	60	4	69	2.0	[4]
CN aerogel	O_2 (1 bar)	Xe lamp (300 W, λ>420 nm)	r. t.[b]	8	70	5.1	[5]
mpg-C_3N_4	O_2 (8 bar)	Xe lamp (300 W, λ>420 nm)	100	3	57	–	[6]
$W_{18}O_{49}$/CN	O_2 (1 bar)	500 W Xe lamp	25	1	40	2.1	[7]
$BiVO_4$/g-C_3N_4	O_2 (1 bar)	250 W Hg lamp	25	16	63	2.8	[8]
mpg-C_3N_4/NHPI	O_2 (1 bar)	W lamp (250 W, λ>420 nm)	25	28	43	2.2	[9]
NiPc-FePc/BCN	O_2 (1 bar)	Xe lamp (300 W, λ>420 nm)	30	6	39	4.8	[10]
CCNA/CCNU	Air (1 bar)	9.5 W LED	28	5	85	17.0	This work

[a] Compared with their pristine graphitic carbon nitride.

[b] r. t.= room temperature.

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