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Facile solvothermally method assisted g-C_3N_4 post-grafting with aromatic amine dyes for highly photocatalytic hydrogen evolution

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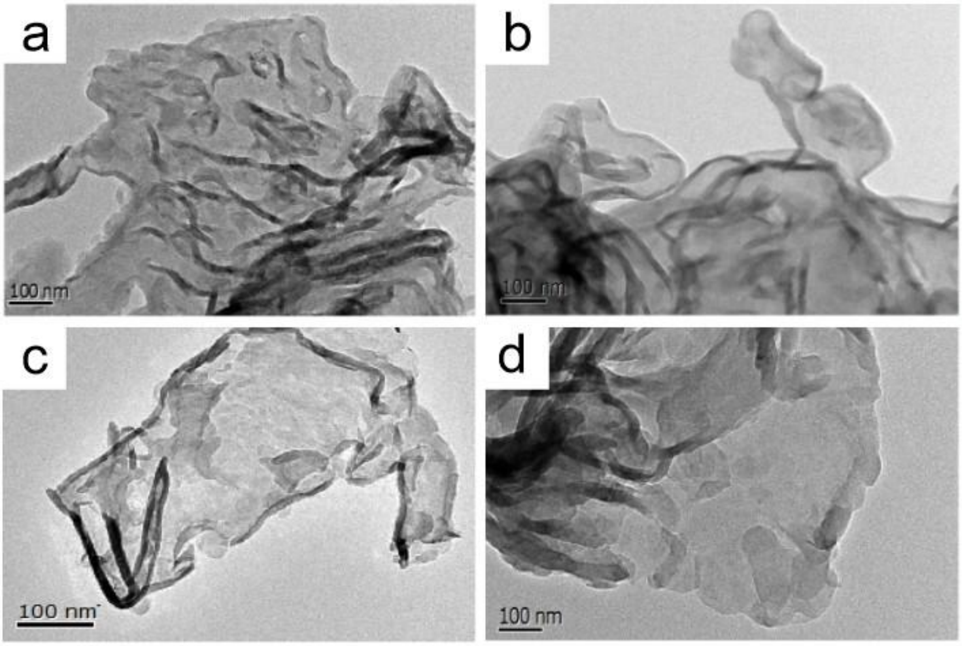

Fig. S1 The TEM images of samples (a) g-C_3N_4, (b) g-C_3N_4/TPA-CNCHO, (c) g-C_3N_4/PTZ-CNCHO, (d) g-C_3N_4/CZ-CNCHO.

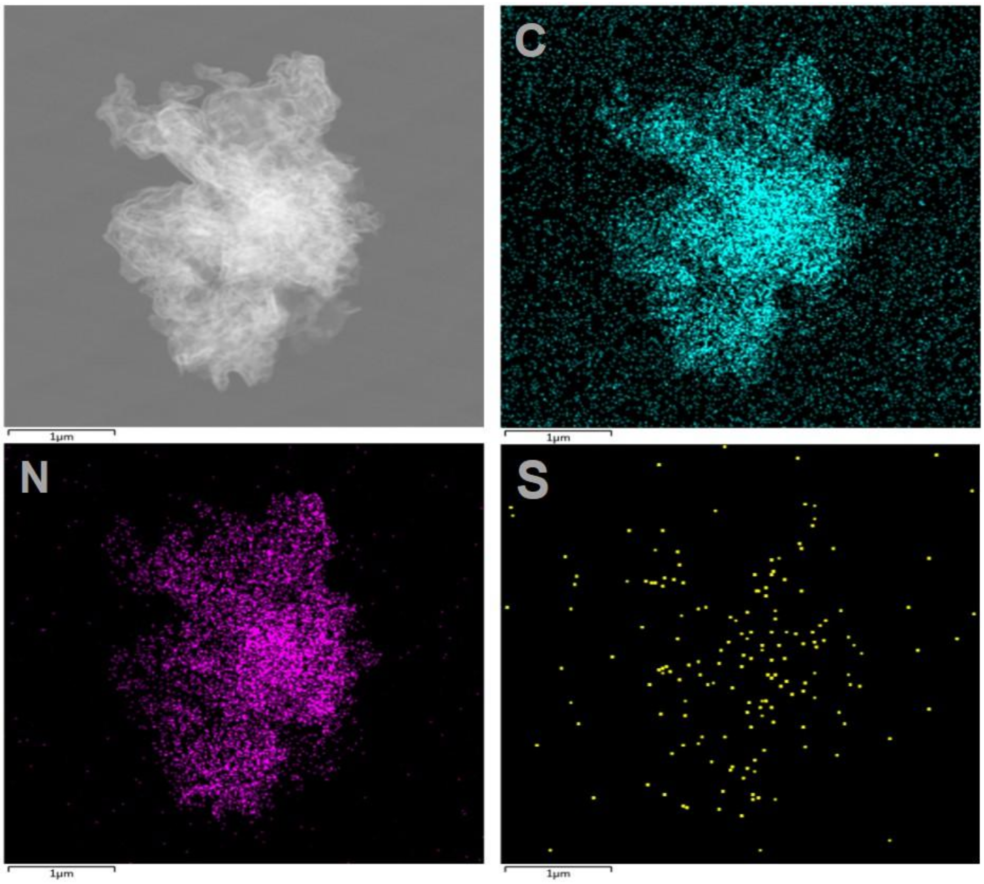

Fig. S2 The element map of g-C_3N_4/TPA-CNCHO (C (green), N (purple), S (yellow)).

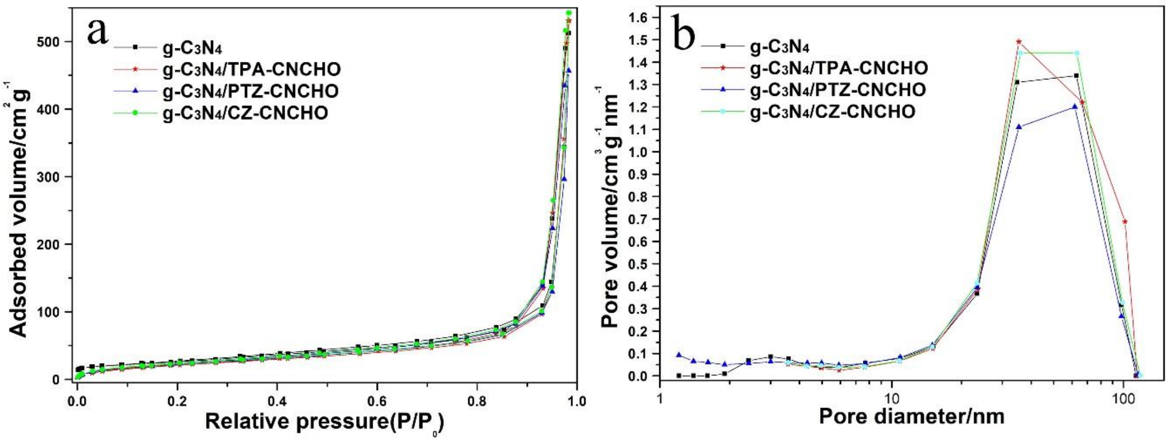

Fig. S3 The N_2 adsorption desorption isotherms and pore size distribution of samples (a) g-C_3N_4, (b) g-C_3N_4/TPA-CNCHO, (c) g-C_3N_4/PTZ-CNCHO and (d) g-C_3N_4/CZ-CNCHO.

Table S1. The surface area and pore diameter of g-C_3N_4, g-C_3N_4/TPA-CNCHO, g-C_3N_4-PTZ-CNCHO and g-C_3N_4-CZ-CNCHO.

Sample	S_{BET}(m^2/g)	Pore diameter$_{-max}$ (nm)
g-C_3N_4	95.0	34.9
g-C_3N_4-TPA-CNCHO	82.5	35.4
g-C_3N_4-PTZ-CNCHO	86.6	36.1
g-C_3N_4-CZ-CNCHO	88.1	35.9

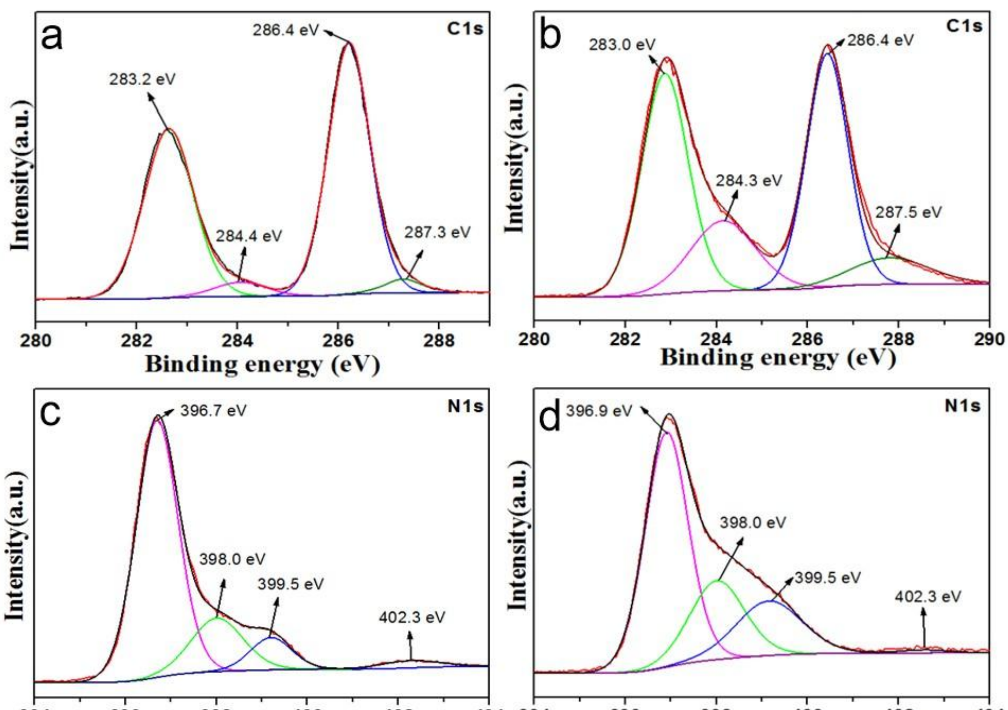

Fig. S4 XPS spectra of C1s of g-C_3N_4 (a) and g-C_3N_4/PTZ-CNCHO (b), N1s of g-C_3N_4 (c) and N1s of g-C_3N_4/PTZ-CNCHO (d)

Fig. S5 Optical photos of relevant samples.

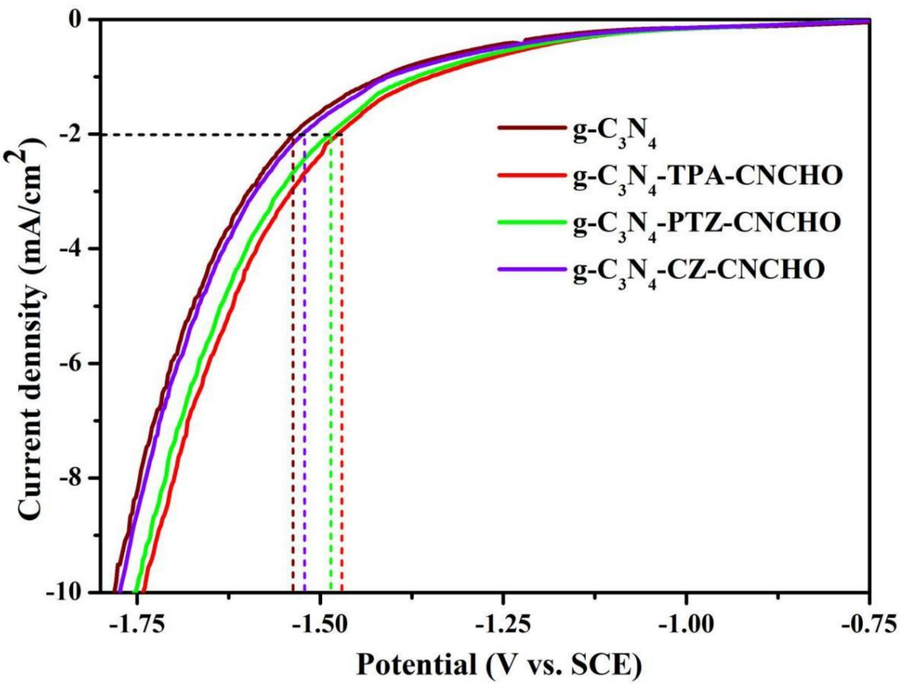

Fig. S6 LSV curves of $g-C_3N_4$, $g-C_3N_4$/TPA-CNCHO, $g-C_3N_4$/PTZ-CNCHO and $g-C_3N_4$/CZ-CNCHO.

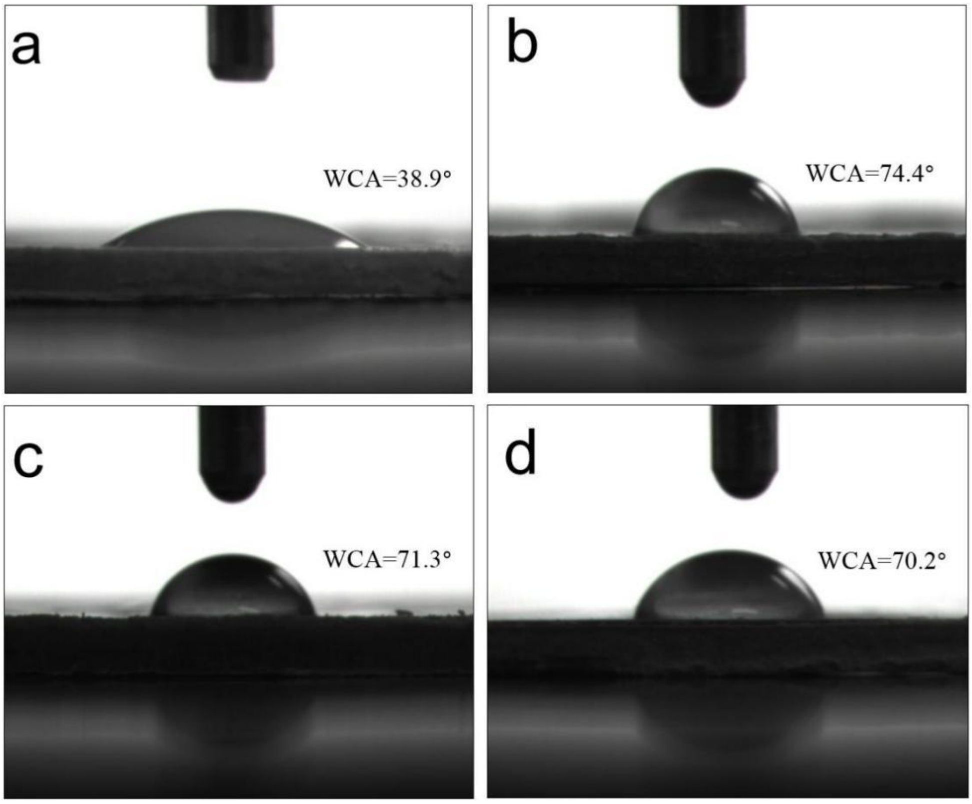

Fig. S7 The WCA of $g-C_3N_4$ (a), $g-C_3N_4$/TPA-CNCHO (b), $g-C_3N_4$/PTZ-CNCHO (c) and $g-C_3N_4$/CZ-CNCHO (d).

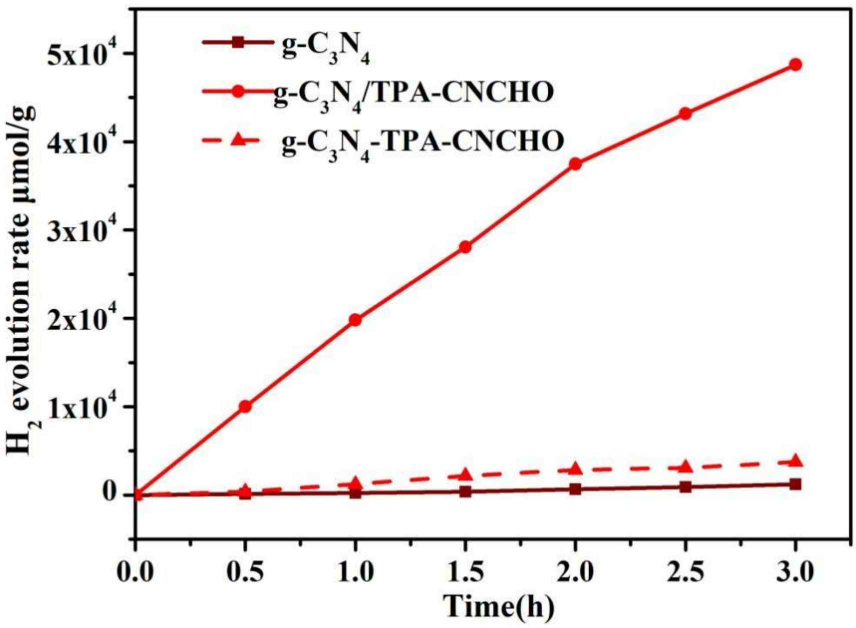

Fig. S8 The photocatalytic hydrogen evolution rate of $g-C_3N_4$, $g-C_3N_4$/TPA-CNCHO and $g-C_3N_4$-TPA-CNCHO.

Table S2. The comparison of other dye grafted photocatalyst via Schiff's base reaction for photocatalytic H_2 production or other use.

Photocatalyst	Modification method	Modification conditions	Photocatalytic Reaction conditions	H_2 production activity (n times of g-C_3N_4)	Other photocatalytic activity	Ref.
melamine / p-benzaldehyde	copolymerization	insert gas PPL lined autoclave 250°C,6h	triethanolamine (TEOA) λ≥420 nm	58.1 mmol·h^{-1} (n=2)	none	S1
Urea/ p-benzaldehyde		550°C，2h，5°C/min	TEOA 420 nm<λ<780nm	226 μmol·h^{-1} (n=2)	none	S2
g-C_3N_4/ p-benzaldehyde	Schiff's base reaction (solid medium)	250°C，5h，5°C/min	TEOA λ≥420 nm	92.4 μmol·h^{-1} (n=4.1)	none	S3
g-C_3N_4/ Feqpy-BA	Schiff's base reaction (liquid medium)	blue LED light 24°C	TEOA λ=460 nm	none	The number of CO_2 conversion is 2554 and the selectivity is 95%.	S4
g-C_3N_4/ TPA-CNCHO g-C_3N_4/ PTZ-CNCHO g-C_3N_4/ CZ-CNCHO	Schiff's base reaction (liquid medium)	insert gas，DDM 240°C，15h	AA λ≥400 nm	16232.7 μmol·h^{-1}·g^{-1} (n=40) 13266.9 μmol·h^{-1}·g^{-1} (n=33) 11822.8 μmol·h^{-1}·g^{-1} (n=29)	none	this work

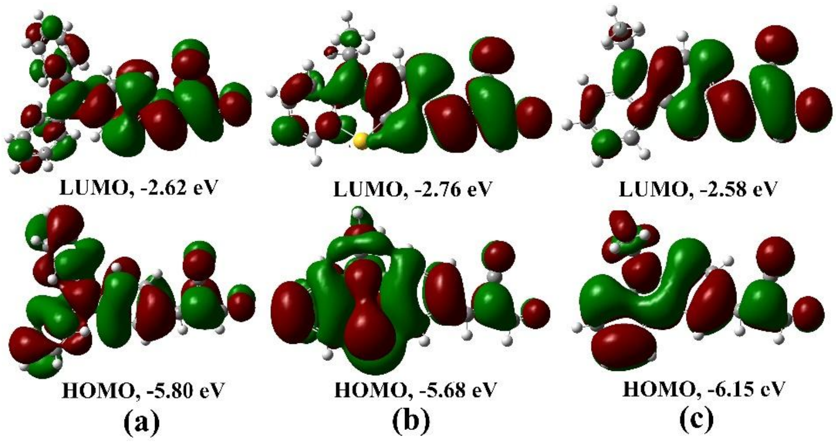

Fig. S9 DFT calculated geometry structures and electron densities of LUMOs and HOMOs of (a) TPA-CNCHO, (b) PTZ-CNCHO and (c) CZ-CNCHO at B3LYP/6-31G(d) level.

References

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