Electronic Supplementary Material (ESI) for Environmental Science: Nano.

Supporting Information

Interface engineering of W_2C/W_2N co-catalyst on g-C_3N_4 nanosheets for boosted H_2 evolution and 4-nitrophenol removal

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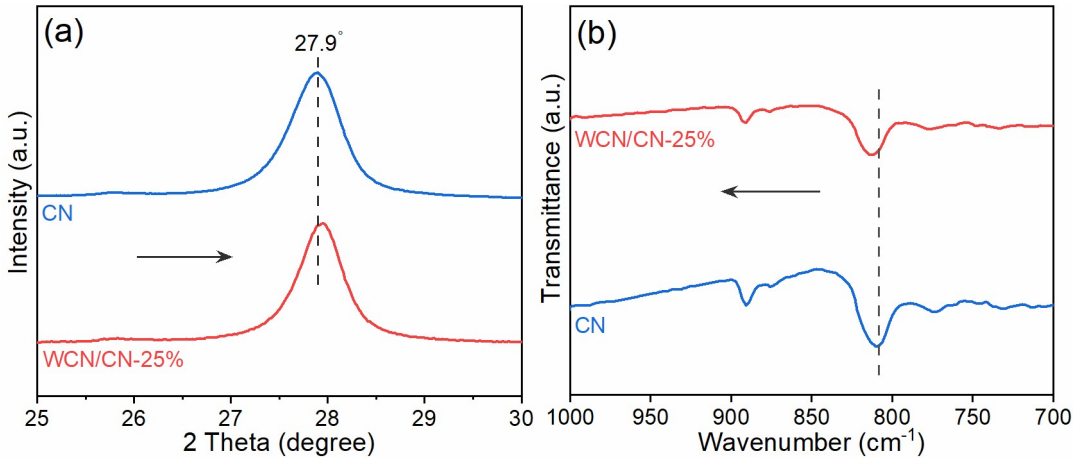

Fig. S1. (a) Enlarged XRD patterns of CN and WCN/CN-25% (25 to 30 degrees) (b) Enlarged FTIR spectra of CN and WCN/CN-25% (700 to 1000 cm^{-1}).

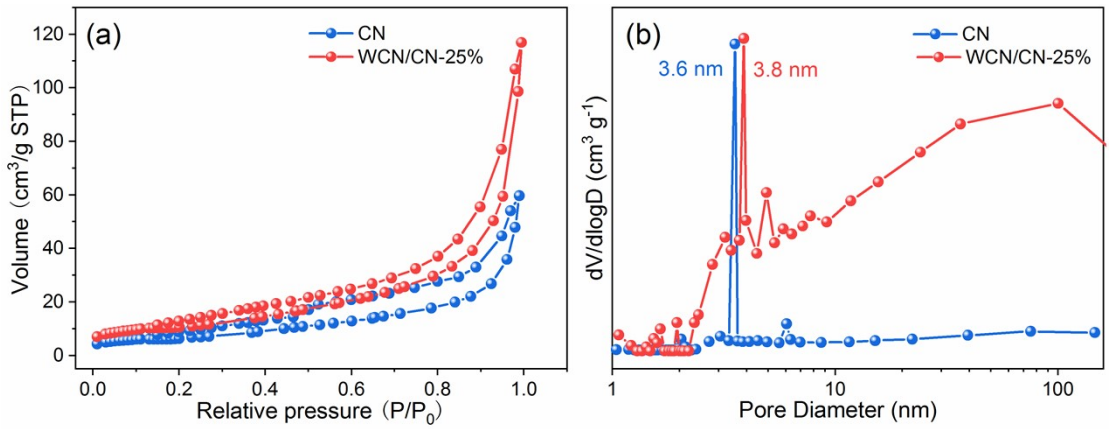

Fig. S2. (a) Enlarged XRD patterns of CN and WCN/CN-25% (25 to 30 degrees) (b) Enlarged FTIR spectra of CN and WCN/CN-25% (700 to 1000 cm-1).

Table S1. BET surface areas, pore volumes and the average pore sizes of samples.

Sample	S_{BET} (m^2/g)	V_{Total} (cm^3/g)	D_{pore} (nm)
CN	21.7	0.09	3.6
WCN/CN-25%	36.6	0.18	3.8

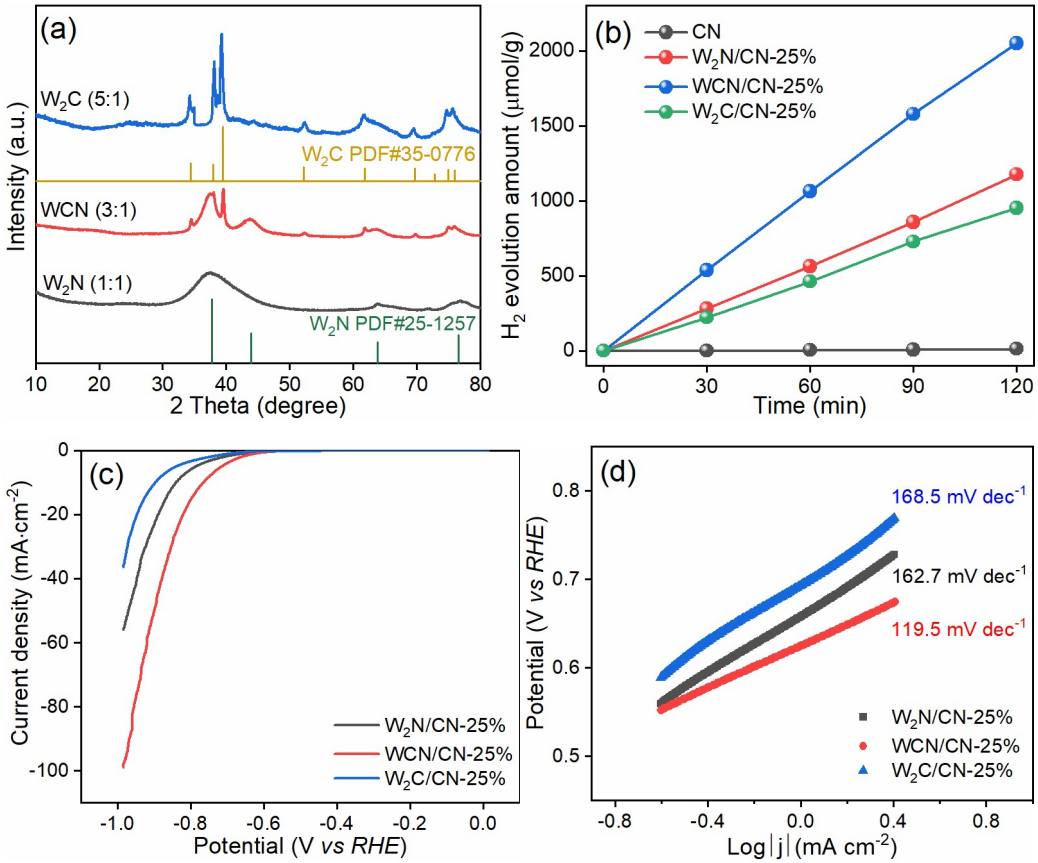

Fig. S3. (a) XRD patterns of W_2N, W_2C and WCN (b) Time-dependent hydrogen generation plots (c) HER plots (d) The corresponding Tafel plots of W_2N/CN-25%, WCN/CN-25% and W_2C/CN-25%(0.5 M H_2SO_4).

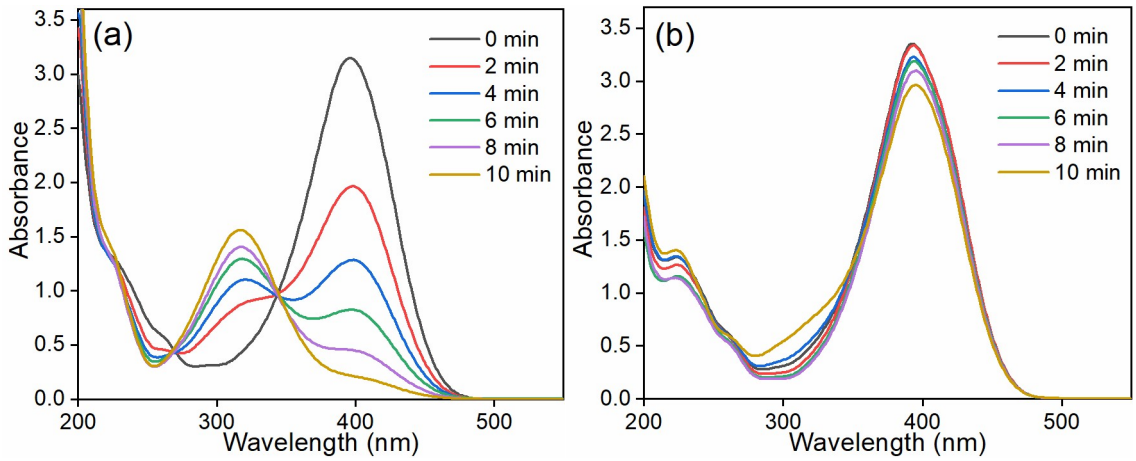

Fig. S4. Time-dependent UV-Vis absorption spectra of 4-NP with the presence of $NaBH_4$ over (a)WCN/CN-25% (b) CN under visible light irradiation.

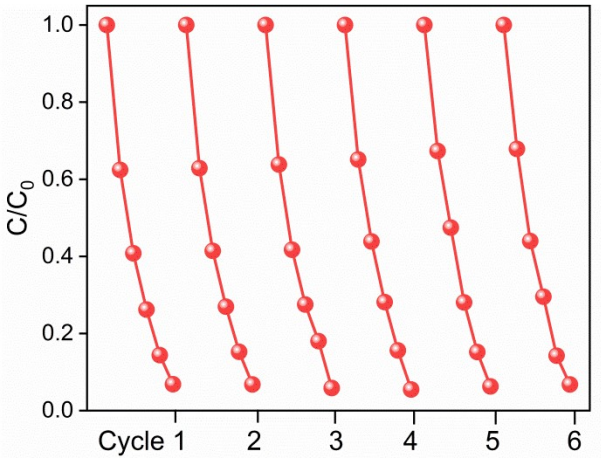

Fig. S5. Recycling stability of WCN/CN-25% for the photo-assisted 4-NP removal reaction.

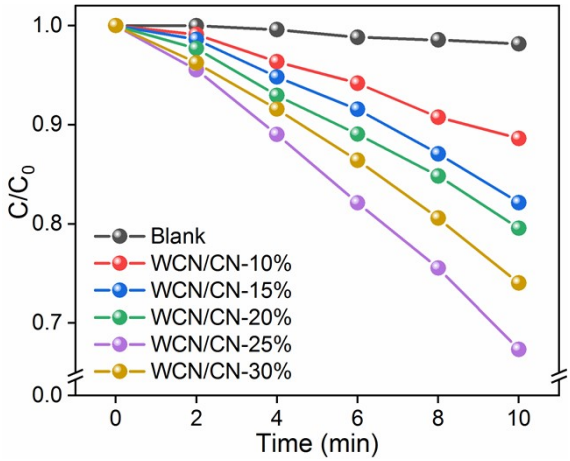

Fig. S6. Photodegradation plots of 4-NP over WCN/CN with different loading amount.

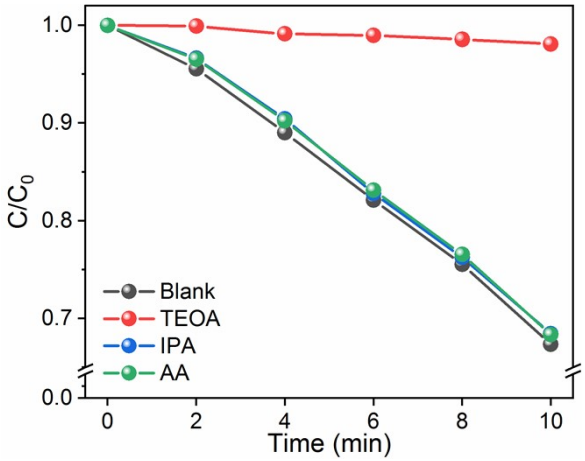

Fig. S7. Active species trapping experiment of WCN/CN-25% (light, no $NaBH_4$).

Table S2. The AQE of WCN/CN-25%.

λ (nm)	H_2 evolution amount (μmol)	P*S (mW)	AQE (%)
420	12.48	23.9	8.26

$$AQE\% = \frac{Ne}{Np} = \frac{2 * M * N_A * h * c}{P * S * t * \lambda} * 100\% = 8.26\% \quad (1)$$

Where, N_e, N_p, M, N_A, h, c, P, S, t and λ represents the amount of reaction electrons, the incident photons, the amount of generated H_2 molecule, the Avogadro constant, the Planck constant, the speed of light, the photo intensity, the irradiation area, the irradiation time and the wavelength of the light, respectively.

Table S3. PL lifetime parameters of CN and WCN/CN-25%.

Sample	τ_1 (ns)	B_1 (%)	τ_2 (ns)	B_2 (%)	τ_3 (ns)	B_3 (%)	τ (ns)
CN	6.23	40.12	28.24	27.13	1.23	32.75	22.00
WCN/CN-25%	3.89	36.75	22.72	23.06	0.54	40.18	18.11

$$\tau = \frac{B1\tau_1^2 + B2\tau_2^2 + B3\tau_3^2}{B1\tau_1 + B2\tau_2 + B3\tau_3} \quad (2)$$