Electronic Supplementary Material (ESI) for Materials Advances.

Supporting Information

g-C_3N_4/Dendritic Fibrous Nanosilica Doped with Potassium for Photocatalytic CO_2 Reduction

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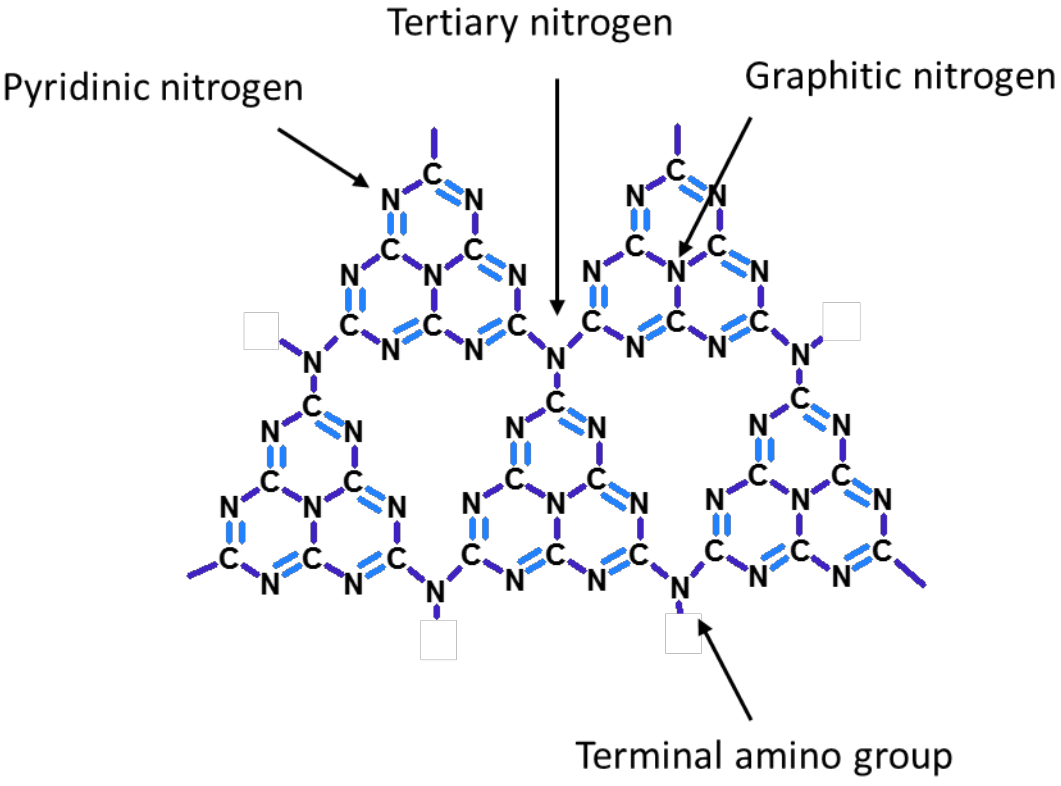

Scheme 1. Types of nitrogen present in the framework of g-C_3N_4

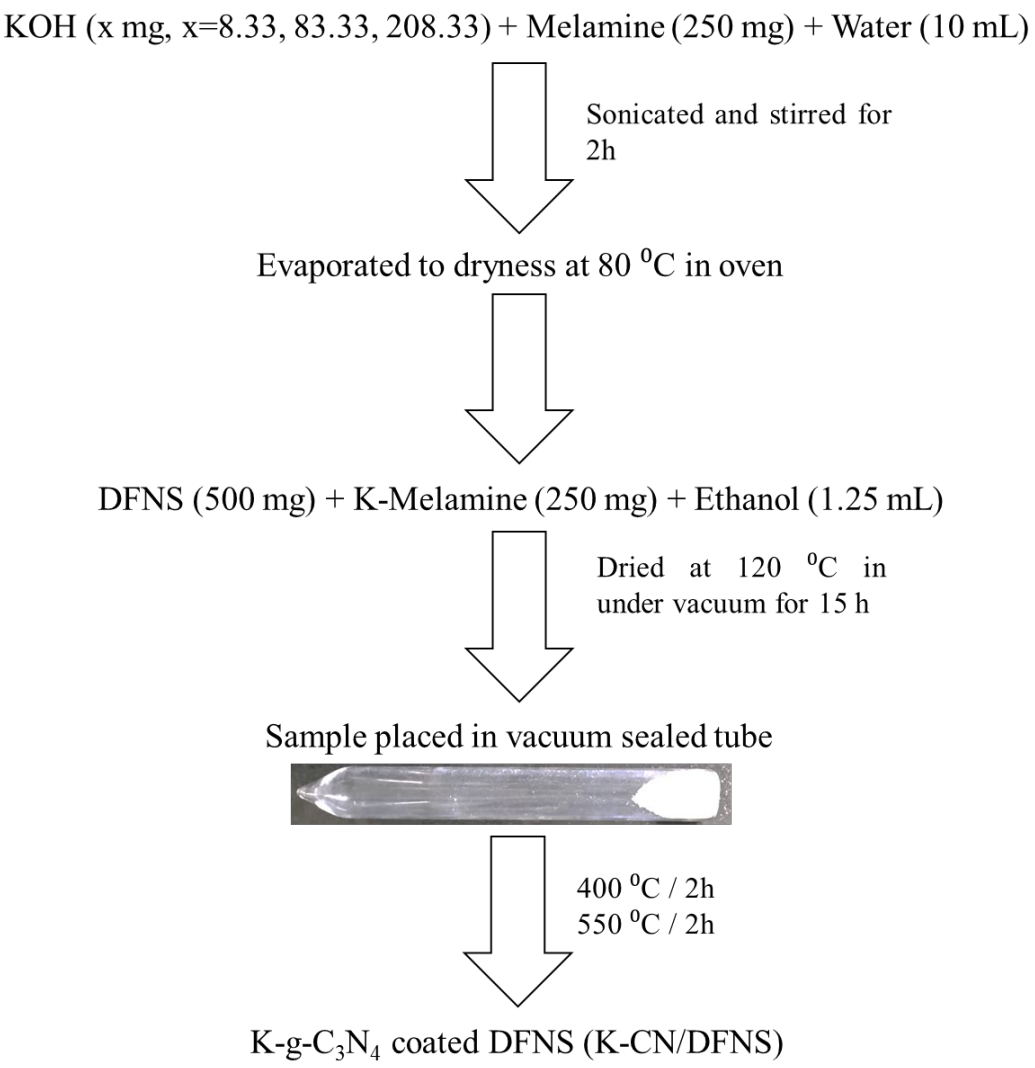

Fig. S1 Synthesis procedure for the production of K-CN/DFNS using a vacuum-sealed quartz tube

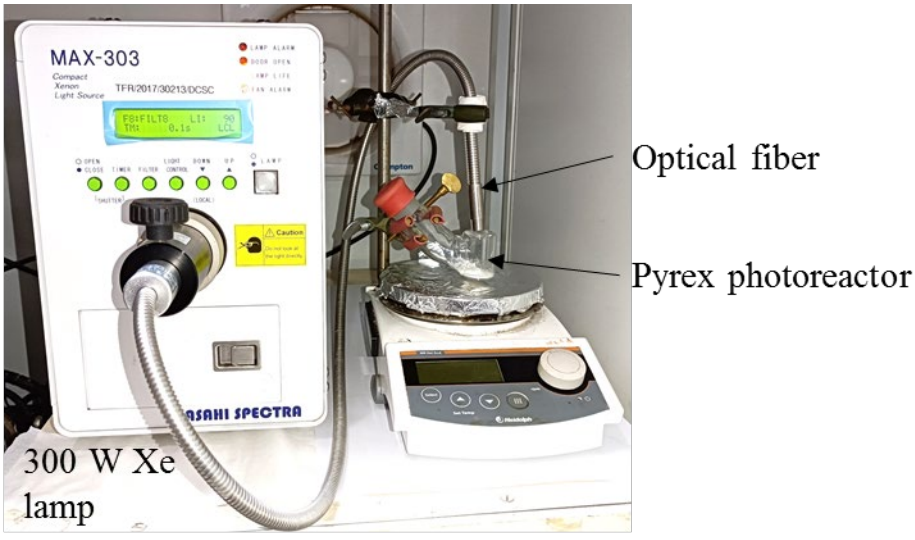

Fig. S2 Photograph of the experimental setup for the photocatalytic CO_2 conversion.

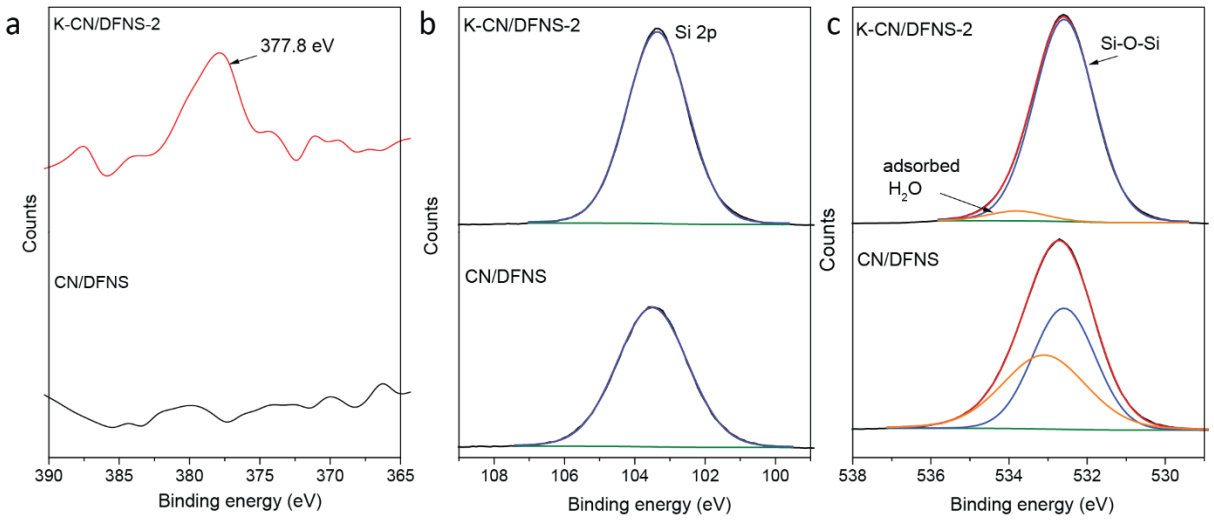

Fig. S3 High-resolution XPS spectra of a. K 1s, b. Si 2p and c. O 1s of CN/DFNS and K-CN/DFNS-2

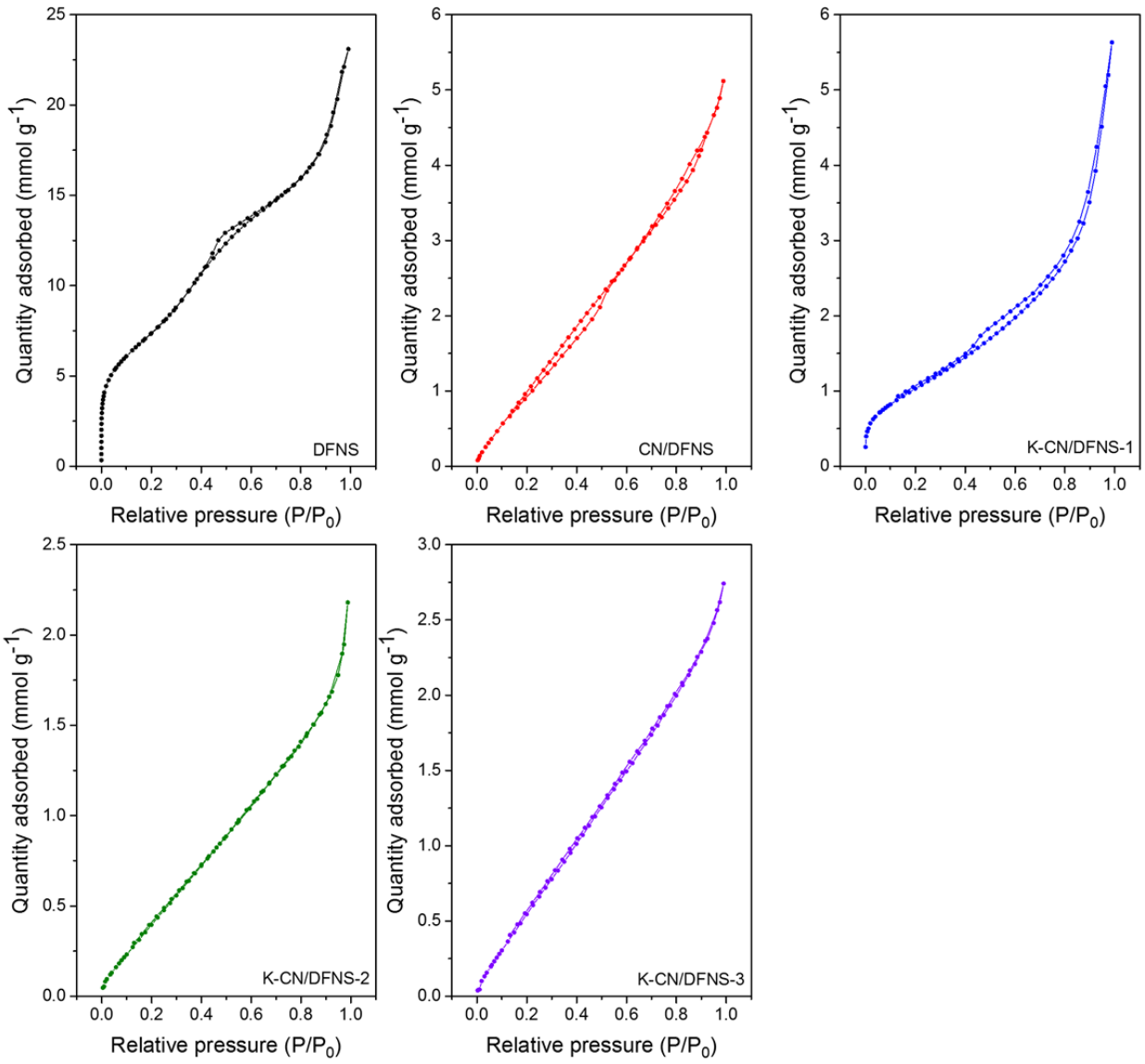

Fig. S4 N_2 sorption isotherms of DFNS, g-C_3N_4, CN/DFNS and K-CN/DFNS

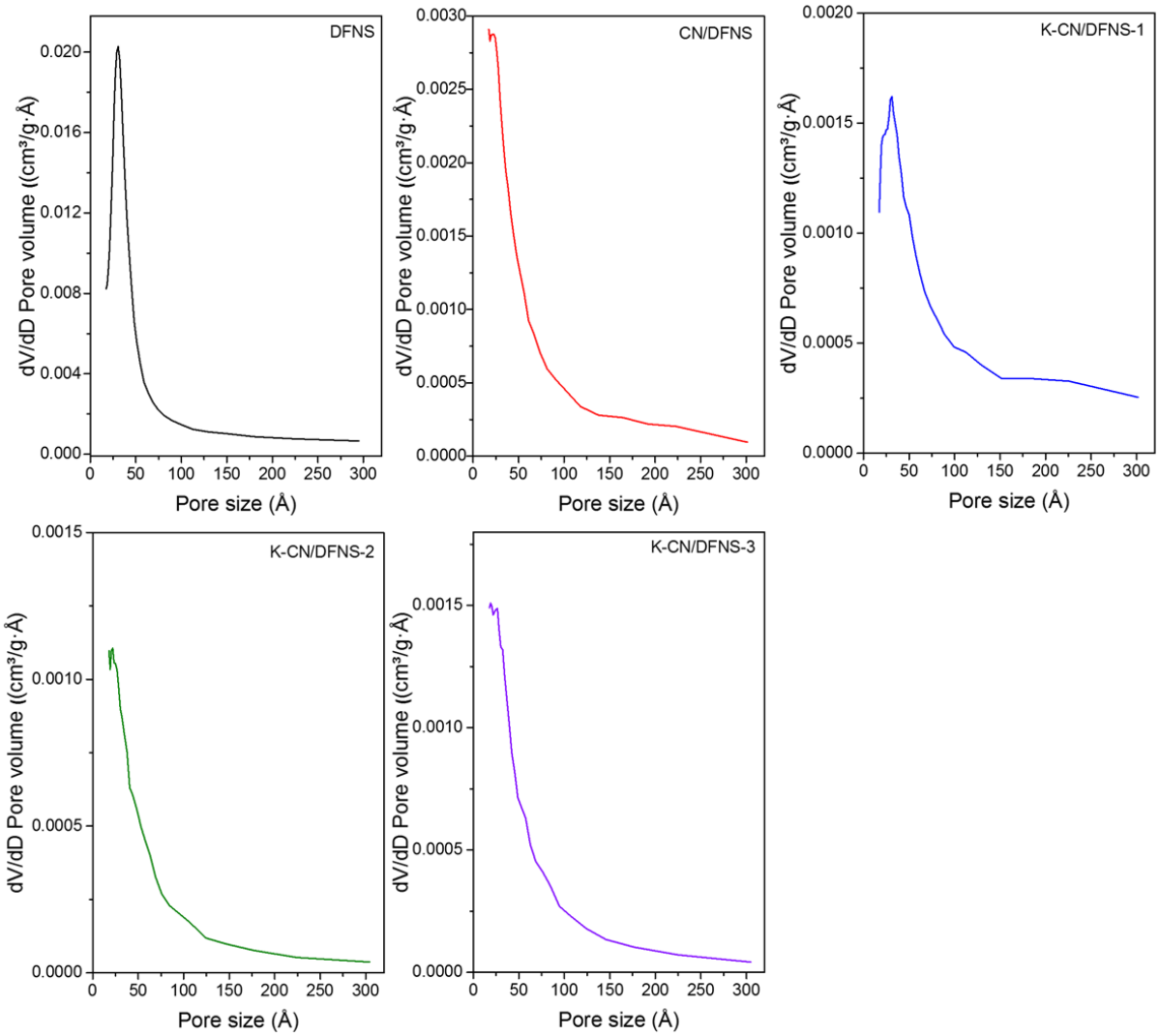

Fig. S5 BJH pore size distribution of DFNS, g-C_3N_4, CN/DFNS and K-CN/DFNS

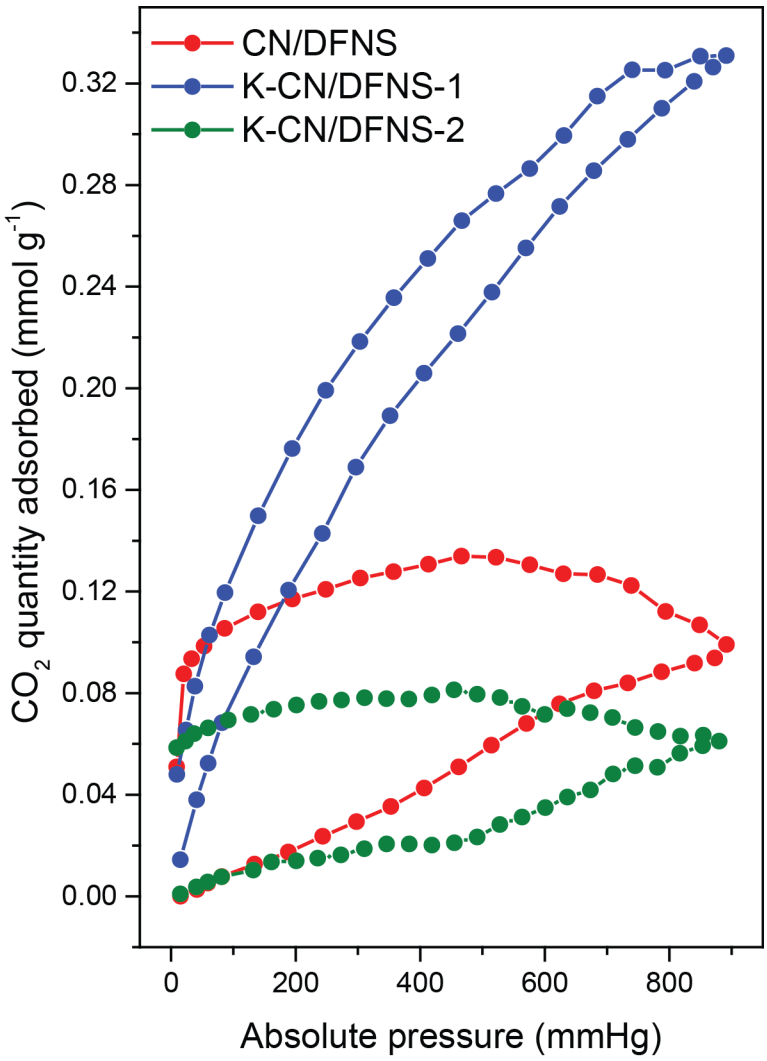

Fig. S6 CO_2 adsorption-desorption isotherm recorded at 298 K for CN/DFNS, K-CN/DFNS-1 and K-CN/DFNS-2.

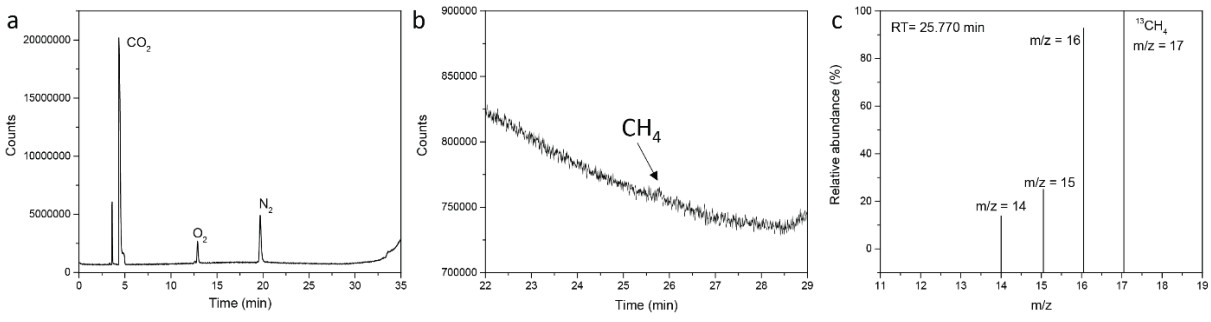

Fig. S7 a. Gas chromatogram recorded using mass spectrometer (MS) detector, b. enlarged view of chromatogram at 25.77 min and c. mass spectrum at 25.77 min.

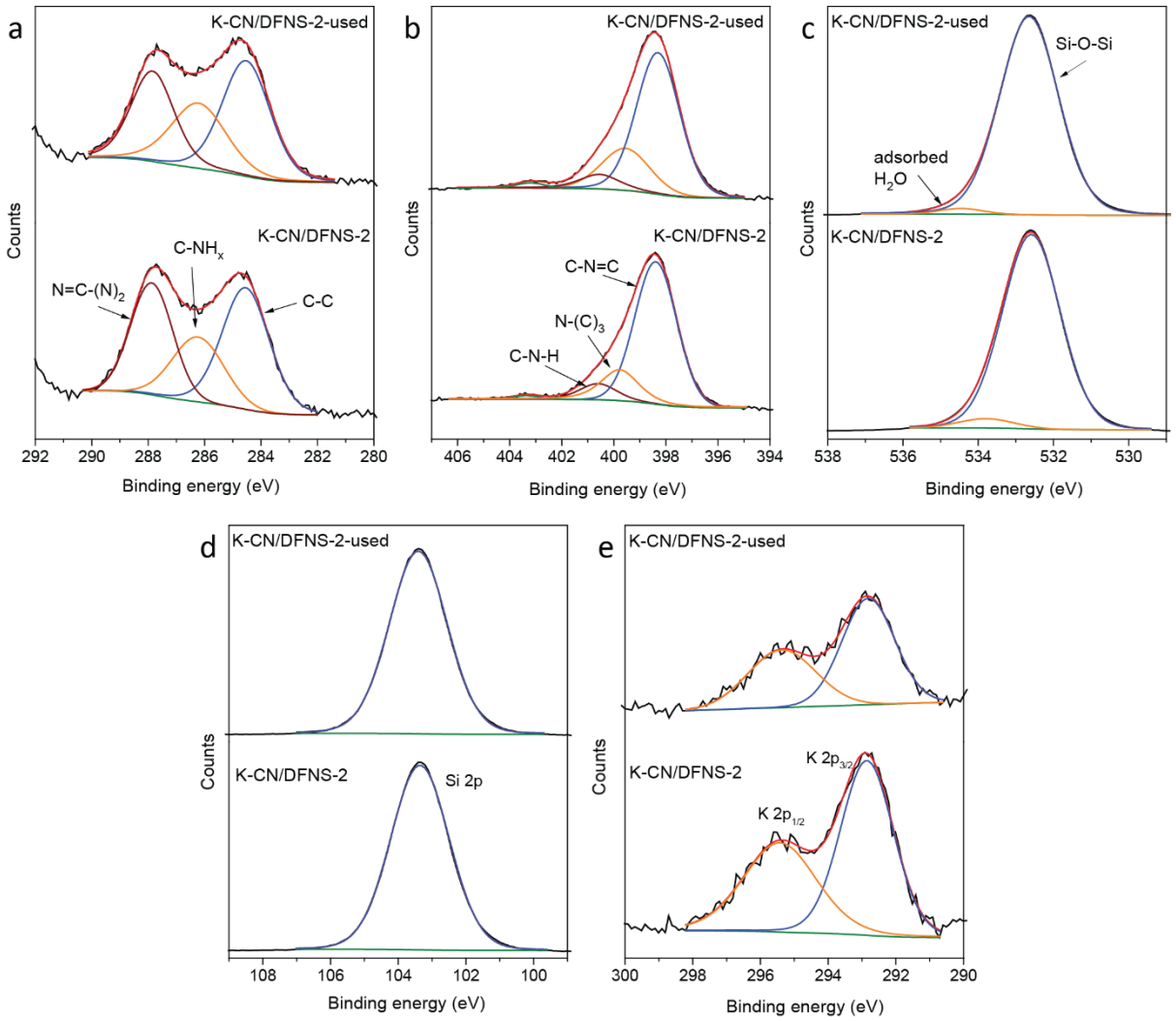

Fig. S8 High-resolution XPS spectra of a. C1s, b. N1s, c. O 1s, d. Si 2p, and e. K 2p of k-CN/DFNS and K-CN/DFNS-2 used

Table S1: Comparison of photocatalytic activity of K-CN/DFNS sample with literature

Sr. No.	Sample	Experimental Conditions	Light source	CO_2 conversion products	Reference
1	K-CN/DFNS-2 (6 wt% potassium ion)	15 mg catalyst, moist CO_2	300 W Xe lamp (385-740 nm, 318 mW cm^{-2})	CH_4: 1.7 µmol g^{-1} in 4 h	This work
2	Potassium doped g-C_3N_4 (1.85 atom% potassium)	Catalyst dispersed in 2 mL of water, CO_2	Visible light (simulated by a CEAULIGHT CEL-HXF300	CO: 8.7 µmol g^{-1} h^{-1}	Wang et al [1]

			with 420 nm cut-off filter)		
3	K-incorporated amino-rich g-C_3N_4	15 mg catalyst, water vapour, CO_2	Xe lamp (1 sun simulated sunlight)	CO: ~ 9.6 μmol g^{-1} h^{-1} CH_4: ~ 8 μmol g^{-1} h^{-1}	Sun et al [2]
4	Amine-functionalized g-C_3N_4	100 mg catalyst, CO_2 generated inside the reactor (0.084 g $NaHCO_3$ + 0.3 mL of 2 M H_2SO_4)	300 W Xe	CH_4: 0.34 CH_3OH: 0.28	Huang et al [3]
5	Sulfur doped g-C_3N_4	100 mg catalyst, CO_2 generated inside the photoreactor ($NaHCO_3$ + HCl)	300-W simulated solar Xe arc lamp	CH_3OH: 1.12 μmol g^{-1} in 3h	Wang et al [4]
6	P doped and cyano group incorporated g-C_3N_4	100 mg catalyst + 1 M $NaHCO_3$ + CO_2	300 W Xe lamp equipped with a 420 nm cut-off filter, 200 mW cm^{-2}	CO: 1.17 μmol g^{-1} in 3h	Liu et al [5]
6	Nonmetal (B, P, O and S) doped porous g-C_3N_4	50 mg catalyst dispersed in 100 mL of water, CO_2	UV lamp (100-280 nm)	CH_4: 55.1 nmol (ml of H_2O)$^{-1}$ g^{-1} h^{-1}	Arumugam et al [6]

References:

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