

Supporting Information

Unravelling the Doping Effect of Potassium Ions on Structural Modulation and Photocatalytic Activity of Graphitic Carbon Nitride

Chengyu Peng, Rong Lu* and Anchi Yu*

Department of Chemistry, Renmin University of China, Beijing 100872, P. R. China

Additional tables and figures

Additional tables

Table S1 Position and the FWHM of (002) peak for all samples.

Sample	Peak position (°)	FWHM (°)
GCN	27.4	1.6
GCN-K _{0.75} -500	27.4	1.9
GCN-K _{0.25} -530	27.5	1.9
GCN-K _{0.75} -530	27.5	2.1
GCN-K _{2.25} -530	27.5	2.3
GCN-K _{0.75} -540	27.5	3.6
GCN-K ₀ -550	27.5	1.3
GCN-K _{0.75} -550	28.0	4.5
GCN-K _{0.25} -560	27.5	3.2
GCN-K _{0.75} -560	28.2	0.7
GCN-K _{1.00} -560	28.2	0.7
GCN-K _{1.50} -560	28.2	0.7
GCN-K _{2.25} -560	28.2	1.2

Table S2 K⁺ contents of GCN-K_{0.75}-560 and GCN-K_{0.75}-560-HCl according to SEM-EDS.

Sample	K(at. %)
GCN-K _{0.75} -560	8.25 ± 1.00
GCN-K _{0.75} -560-HCl	0.37 ± 0.05

Table S3 Chemical compositions (XPS) for GCN, GCN-K_{0.75}-530 and GCN-K_{0.75}-560.

Sample	C 1s (at.%)	N 1s (at.%)	O 1s (at.%)	K 2p (at.%)	Cl 2p (at.%)
GCN	45.65	51.27	3.08	--	--
GCN-K _{0.75} -530	43.31	48.89	3.82	3.87	0.1
GCN-K _{0.75} -560	44.57	43.55	5.84	5.88	0.16

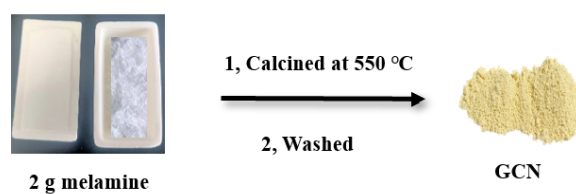
Table S4 The fitting parameters of the fluorescence decay with bi-exponential function for GCN, GCN-K_{0.75}-530 and GCN-K_{0.75}-560.

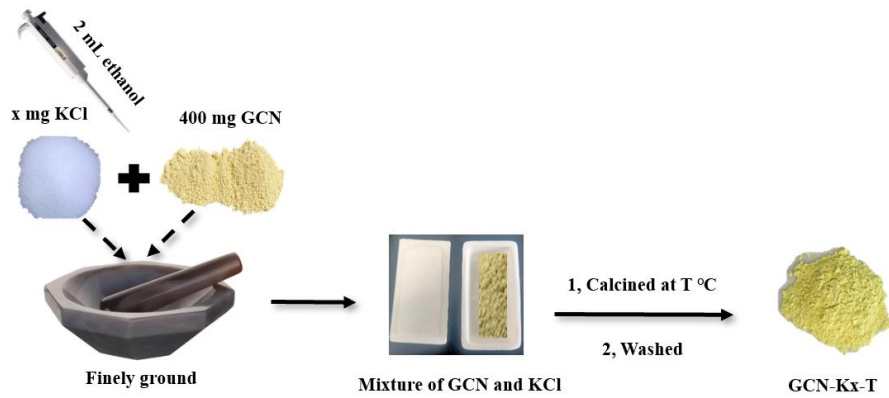
λ_{ex} (nm)	Sample	a_1	τ_1 (ns)	a_2	τ_2 (ns)	$\langle\tau\rangle$ (ns)
	GCN	0.84	1.39	0.16	9.02	2.61
375	GCN-K _{0.75} -530	0.75	0.47	0.25	2.52	0.98
	GCN-K _{0.75} -560	0.87	0.22	0.13	1.31	0.36

Table S5 H₂ evolution rates for the samples.

Sample	H ₂ evolution rate ($\lambda > 420$ nm) $\mu\text{mol/h/20mg}$
GCN	1.0
GCN-K _{0.25} -530	1.5
GCN-K _{0.75} -530	4.4
GCN-K _{2.25} -530	2.9
GCN-K _{0.25} -560	2.1
GCN-K _{0.75} -560	14.3
GCN-K _{2.25} -560	8.7

Additional figures and schemes:





Scheme S1 Schematic illustration of the preparation of GCN and K⁺-doped sample (GCN-K_x-T).

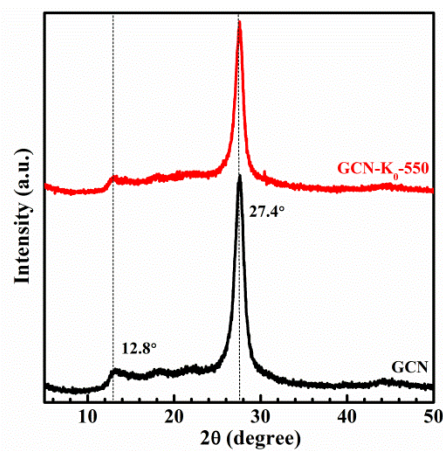


Fig. S1 XRD patterns of GCN and GCN-K₀-550.

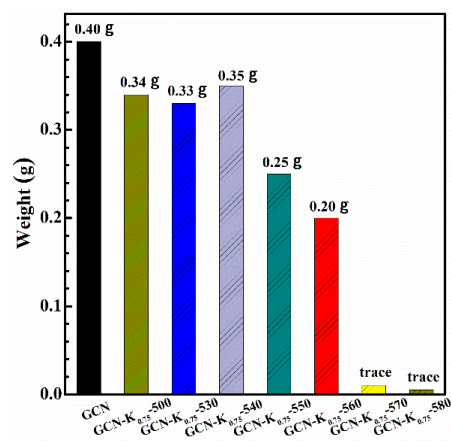


Fig. S2 Mass yields of K⁺-doped GCNs (weight ratio of KCl/GCN=0.75, GCN: 400 mg) at different calcination temperatures.

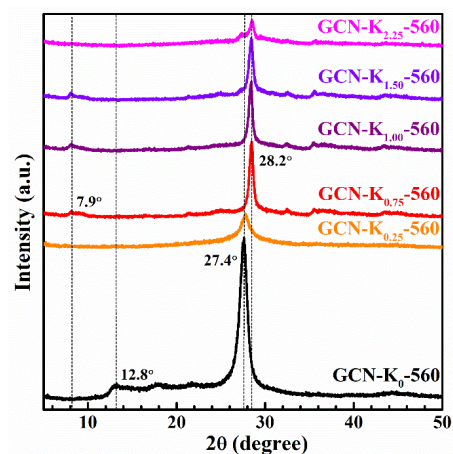


Fig. S3 XRD patterns of GCN and K^+ -doped GCNs with different weight ratios of KCl to GCN at 560 °C.

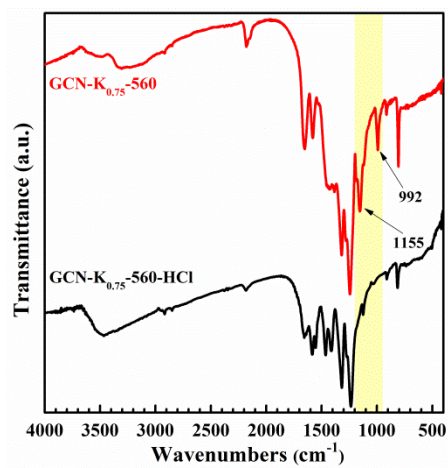


Fig. S4 FTIR spectra of GCN- $K_{0.75}$ -560 and HCl (0.1 M) treated sample GCN- $K_{0.75}$ -560-HCl.

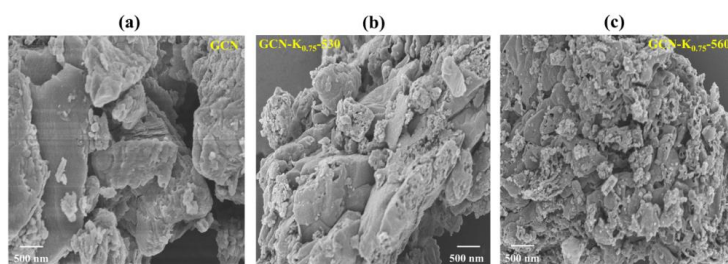


Fig. S5 SEM images of GCN (a), GCN- $K_{0.75}$ -560 (b) and GCN- $K_{0.75}$ -560 (c).

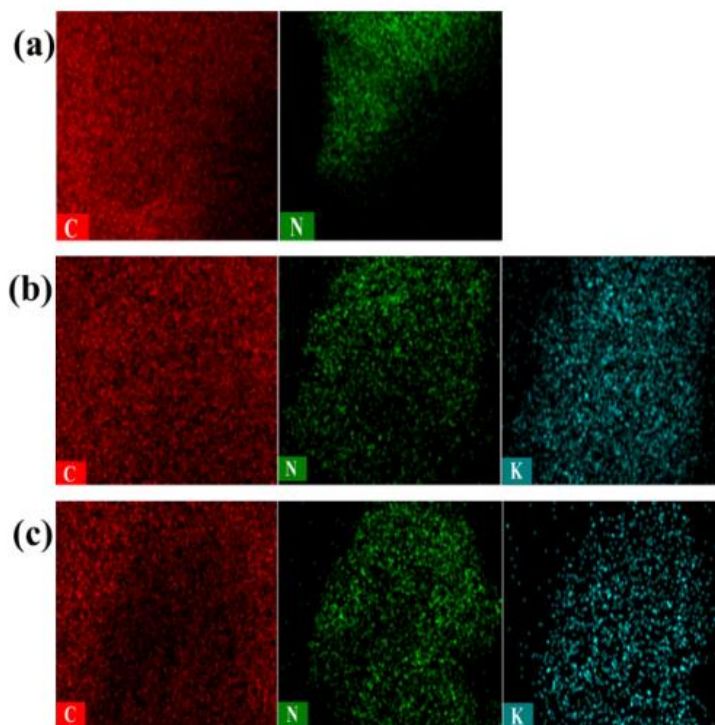


Fig. S6 Element mapping images of GCN (a), GCN-K_{0.75}-530 (b) and GCN-K_{0.75}-560 (c).

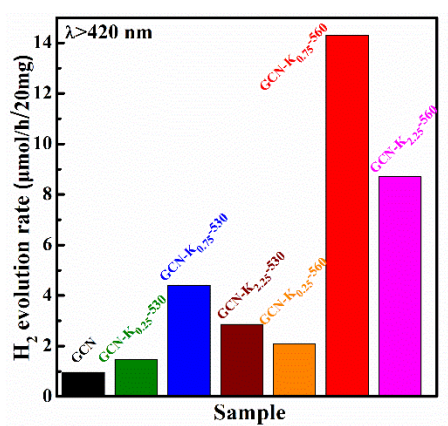


Fig. S7 Comparison of the photocatalytic H₂ evolution rates of the different photocatalysts.

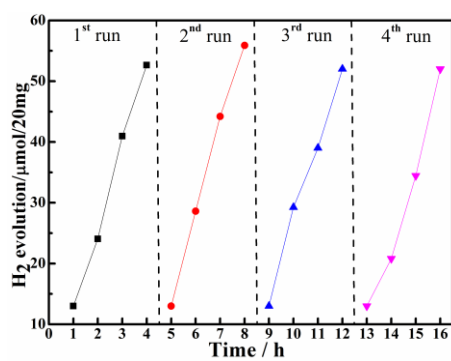


Fig. S8 Stability test of H₂ evolution for GCN-K_{0.75}-560 under visible light (>420 nm) irradiation.

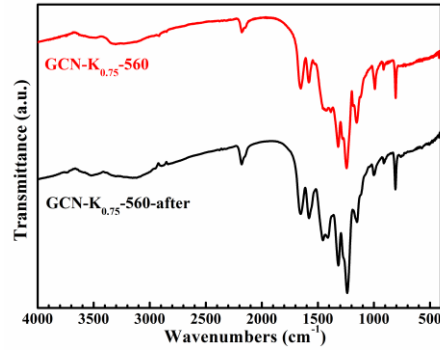


Fig. S9 FTIR spectra of GCN-K_{0.75}-560 before and after photocatalytic H₂ evolution.

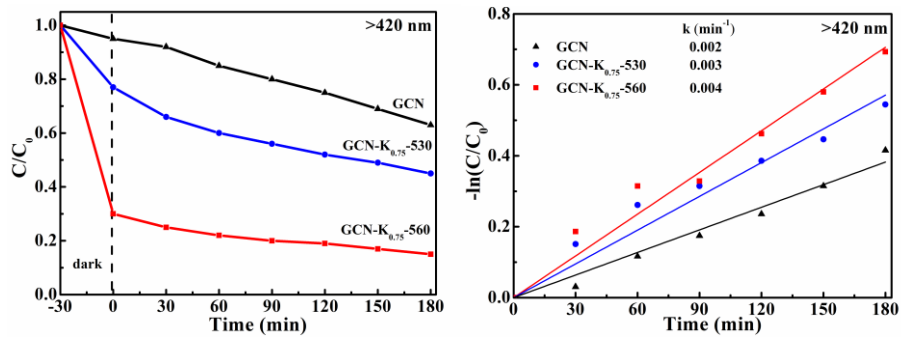


Fig. S10 (left) Photocatalytic degradation of MB in the absence and presence of catalyst under visible light (>420 nm) irradiation; (right) Plot of $-\ln(C/C_0)$ against reaction time and photodegradation rates (inset).

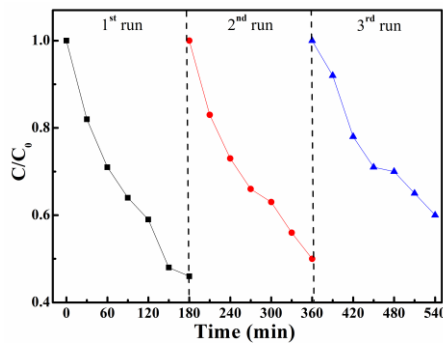


Fig. S11 Stability test of photocatalytic degradation of MB over GCN-K_{0.75}-560 under visible light (>420 nm) irradiation.