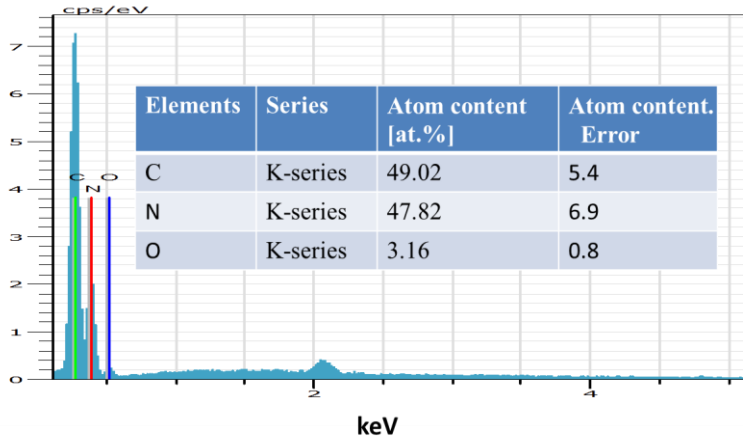
Supporting Information

Metal-free enhanced photocatalytic activation of dioxygen by g-C_3N_4 doped with abundant oxygen-containing functional groups for selective N-deethylation of rhodamine B

Jia Huang [1,*], Gang Nie[1], Yaobin Ding [2,*]

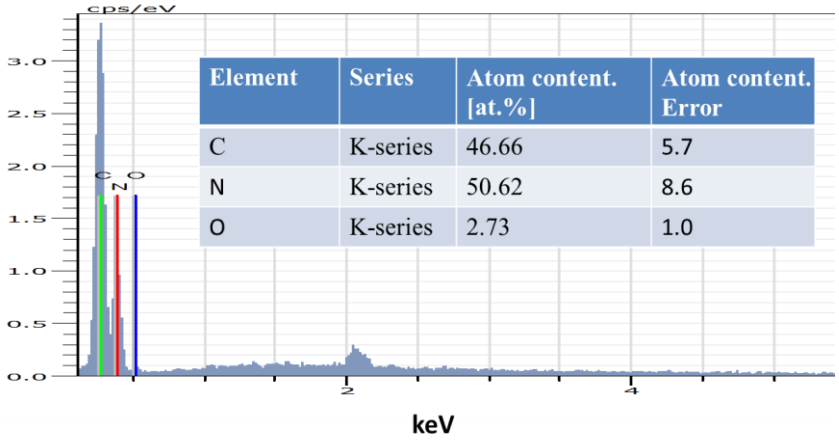
[1] School of Resources and Environmental Sciences, Wuhan University, Wuhan 430079, PR China
[2] College of Resources and Environmental Science, South-Central University for Nationalities, Wuhan, P.R. China

* Correspondence: jiahuang@whu.edu.cn (J. Huang); yaobinding@mail.scuec.edu.cn (Y. Ding).



Elements	Series	Atom content [at.%]	Atom content. Error
C	K-series	49.02	5.4
N	K-series	47.82	6.9
O	K-series	3.16	0.8

Fig. S1 EDS and elemental composition of O-g-C_3N_4.



Element	Series	Atom content. [at.%]	Atom content. Error
C	K-series	46.66	5.7
N	K-series	50.62	8.6
O	K-series	2.73	1.0

Fig. S2 EDS and elemental composition of g-C_3N_4.

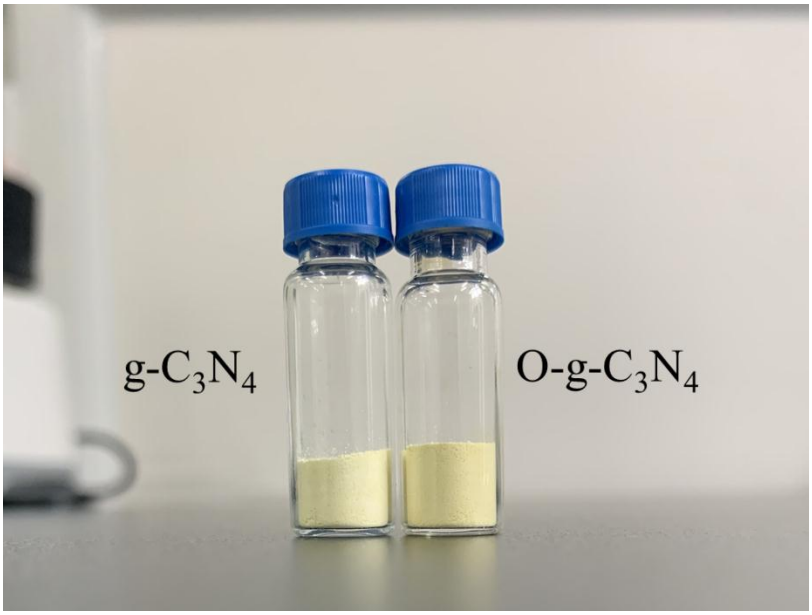


Fig. S3 Photos of g-C_3N_4 and O-g-C_3N_4.

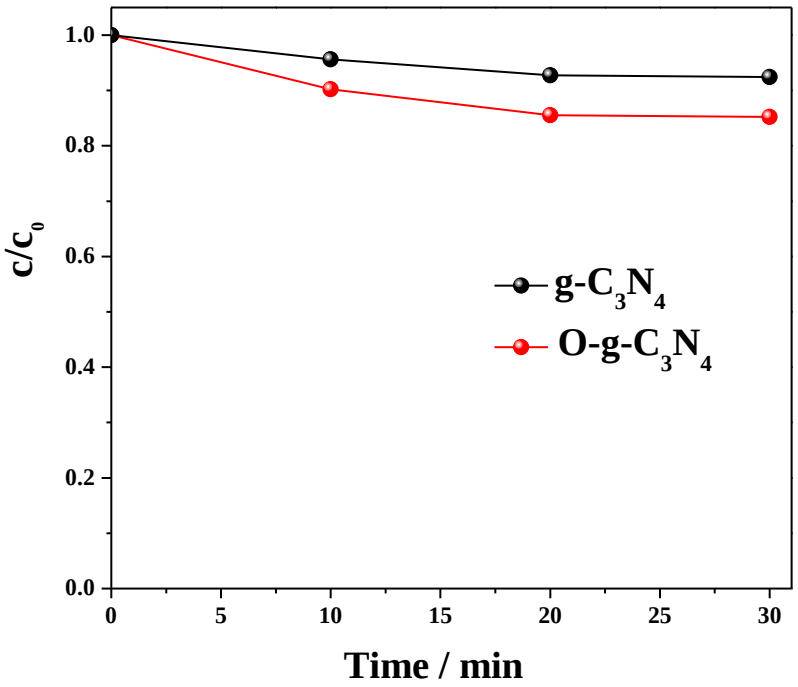


Fig. S4 RhB adsorption on surface of g-C_3N_4 and O-g-C_3N_4.

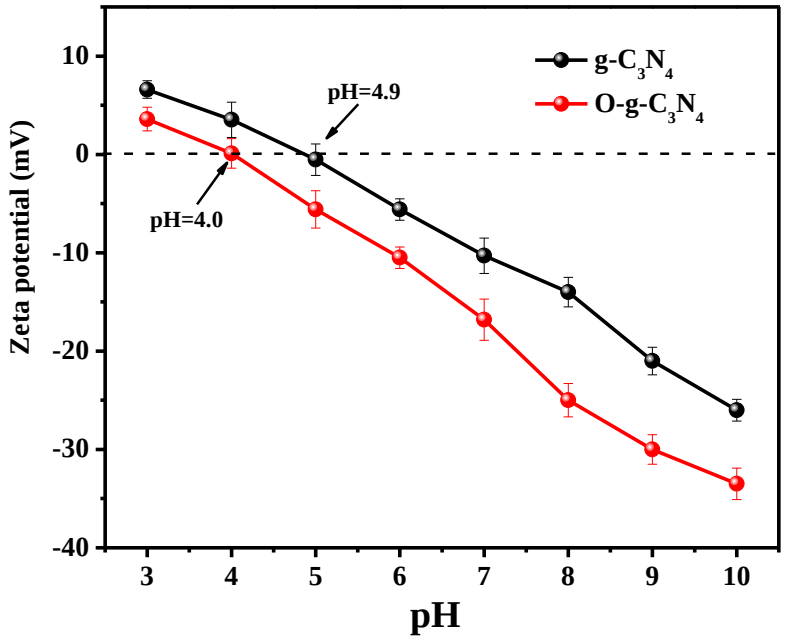


Fig. S5 Zeta potential of g-C_3N_4 and O-g-C_3N_4.

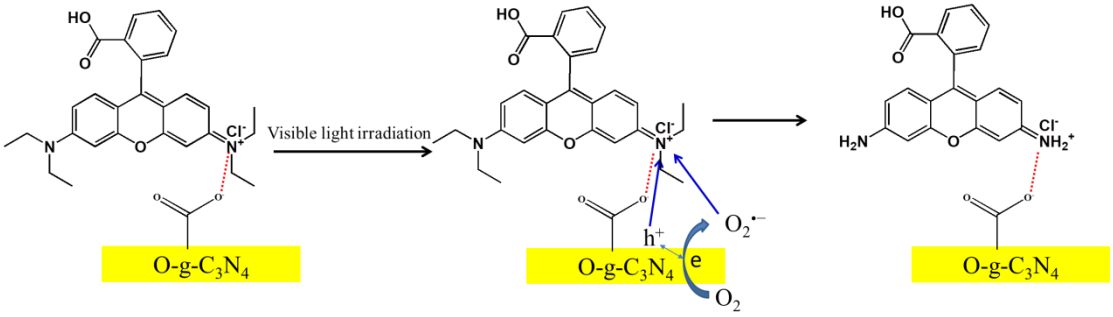


Fig. S6 Model for adsorption and stepwise N-deethylation process of RhB on O-g-C_3N_4 surface under visible light irradiation.

Table S1 Comparison on the doped g-C_3N_4 for RhB degradation.

Catalyst	Preparation method	RhB degradation	Reference
Oxygen doping	g-C_3N_4+PMS	0.079 min^{-1} enhanced by 24.7 times	This work
Carbon doped	pyrolysis of melamine	0.036 min^{-1}	[1]
Fe-doped	g-C_3N_4+Fe^{3+}	0.13 min^{-1} enhanced by 7 times	[2]
Nitrogen-deficient	pyrolysis of (melamine+acetic acid)	0.022 min^{-1} enhanced by 2.3 times	[3]
Fe - Doped	pyrolysis of (melamine+NH_4Cl+$FeCl_3$)	enhanced by 1.4 times	[4]
Eu(III)-doped	pyrolysis of (Eu_2O_3 + melamine)	6.03 times	[5]
Mn doped	pyrolysis of ($MnCl_2$+ melamine)	0.013 min^{-1} enhanced by 30%	[6]
P doped	pyrolysis of (g-C_3N_4 +P)	0.066 min^{-1} enhanced by 5.9 times	[7]
P-doped	pyrolysis of (guanidiniumhydrochloride + hexachlorocyclotriphosphazene)	enhanced by 3 times	[8]

References

[1] Dong, G., Zhao, K., Zhang, L. Carbon self-doping induced high electronic conductivity and photoreactivity of g-C_3N_4. *Chemical communications* 2012, 48, 6178-6180.

[2] Tonda, S., Kumar, S., Kandula, S., Shanker, V. Fe-doped and-mediated graphitic carbon nitride nanosheets for enhanced photocatalytic performance under natural sunlight. *Journal of Materials Chemistry A* 2014, 2, 6772-6780.

[3] Xu, C. Q., Li, K., Zhang, W. D. Enhancing visible light photocatalytic activity of nitrogen-deficient g-C_3N_4 via thermal polymerization of acetic acid-treated melamine. *Journal of colloid and interface science* 2017, 495, 27-36.

[4] Gao, J., Wang, Y., Zhou, S., Lin, W., Kong, Y. A facile one - step synthesis of Fe-doped g-C_3N_4 nanosheets and their improved visible - light photocatalytic performance. *ChemCatChem* 2017, 9, 1708-1715.

[5] Wang, M., Guo, P., Zhang, Y., Lv, C., Liu, T., Chai, T., Xie, Y., Zhu, T. Synthesis of hollow lantern-like Eu (III)-doped g-C_3N_4 with enhanced visible light photocatalytic perfomance for organic degradation. *Journal of hazardous materials* 2018, 349, 224-233.

[6] Wang, J. C., Cui, C. X., Li, Y., Liu, L., Zhang, Y. P., Shi, W. Porous Mn doped g-C_3N_4 photocatalysts for enhanced synergetic degradation under visible-light illumination. *Journal of hazardous materials* 2017, 339, 43-53.

[7] Feng, J., Zhang, D., Zhou, H., Pi, M., Wang, X., Chen, S. Coupling P nanostructures with P-doped g-C_3N_4 as efficient visible light photocatalysts for H2

evolution and RhB degradation. *ACS Sustainable Chemistry & Engineering* 2018, 6, 6342-6349.
[8] Zhou, Y., Zhang, L., Liu, J., Fan, X., Wang, B., Wang, M., Ren, W., Wang, J., Li, M., Shi, J. Brand new P-doped gC_3N_4: enhanced photocatalytic activity for H_2 evolution and Rhodamine B degradation under visible light. *Journal of Materials Chemistry A* 2015,3, 3862-3867.