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Chemical Synthesis

Supplementary Materials

One-pot synthesis of carbon dots/hydrochar and visible-light-driven photocatalysts for aerobic oxidative coupling of benzylic amines

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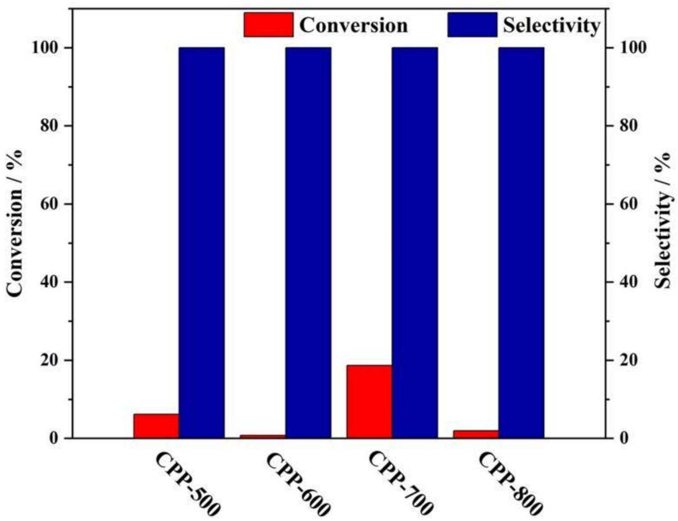
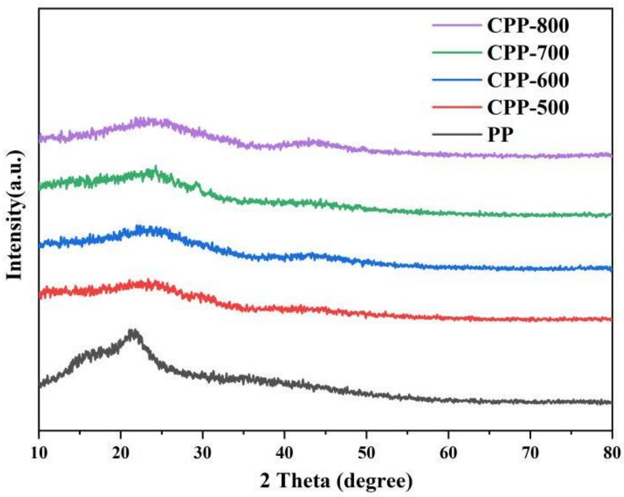
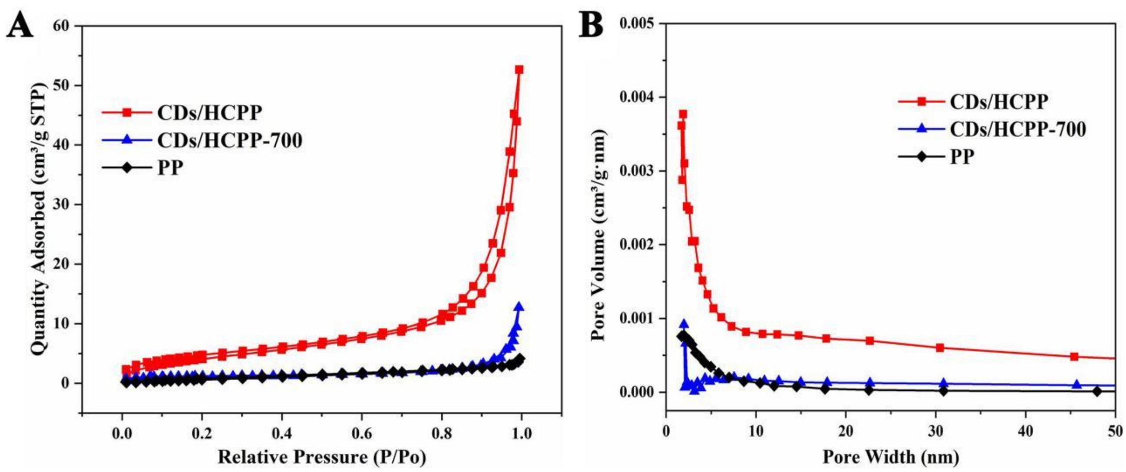
Supplementary Figures



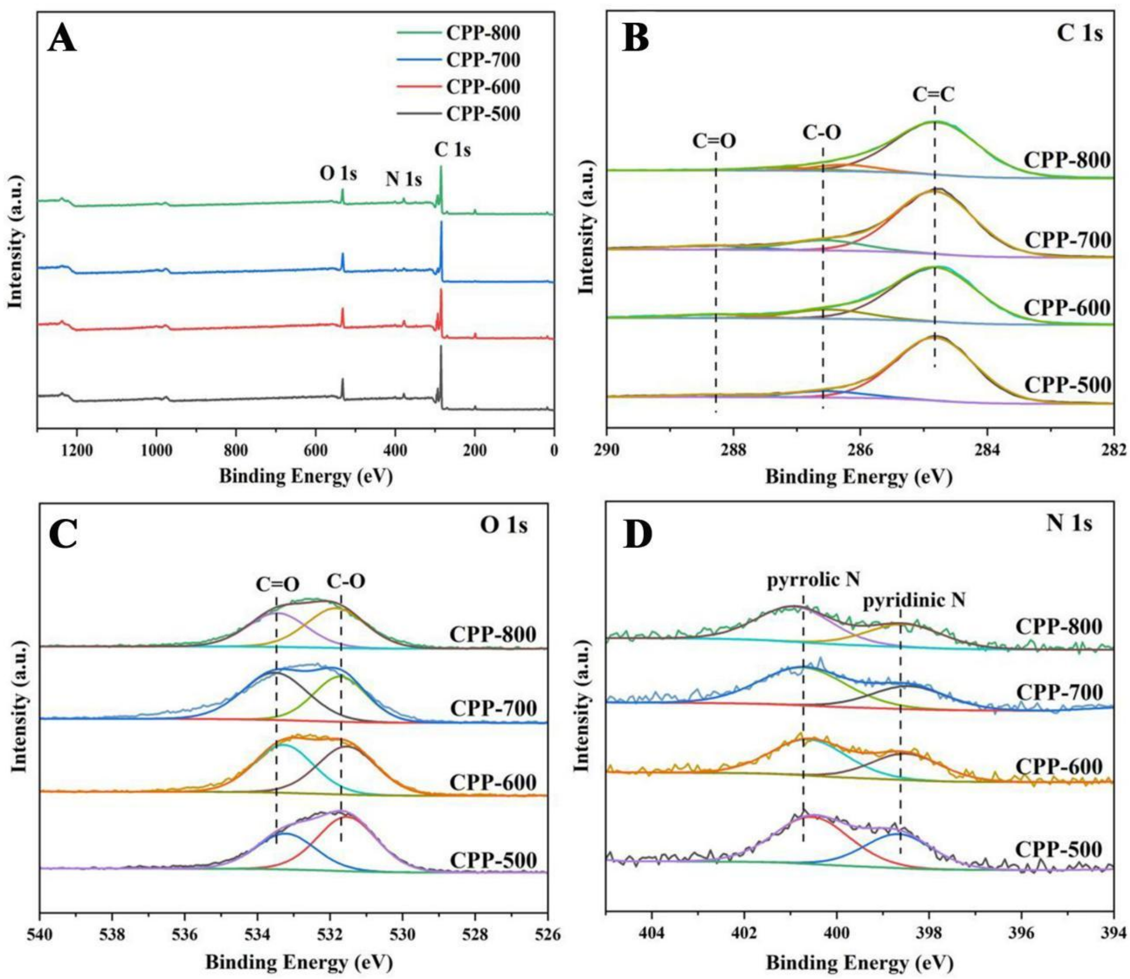
Supplementary Figure 1A. The photocatalytic oxidative coupling of benzylamine performance of CPP-x (x = 500, 600, 700, 800).



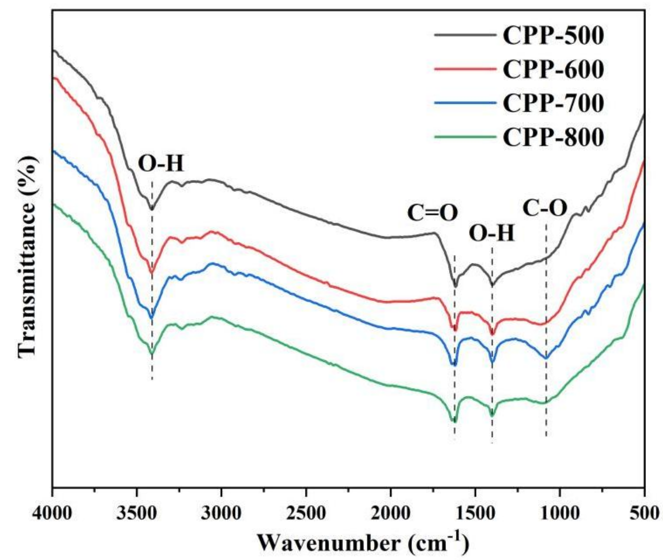
Supplementary Figure 1B. The XRD patterns of a. carbonized pomelo peel CPP-x (x = 500, 600, 700, 800).



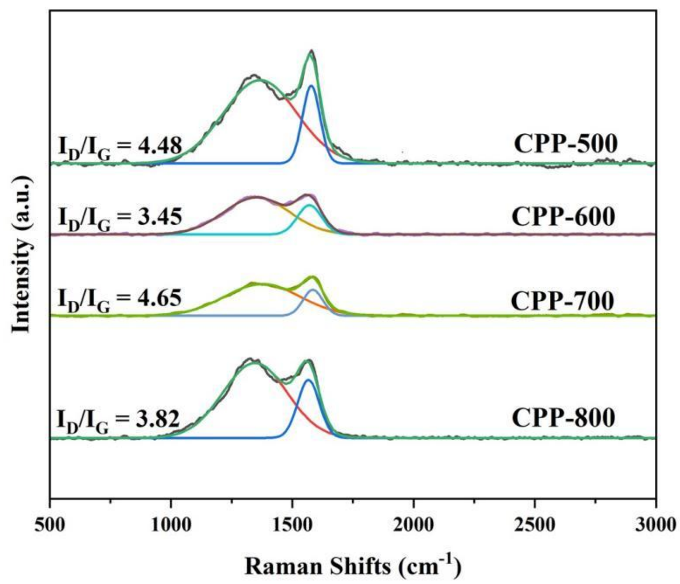
Supplementary Figure 2. (A) N_2 sorption isotherms and (B) pore size distribution of PP, CDs/HCPP, and CDs/HCPP-700.



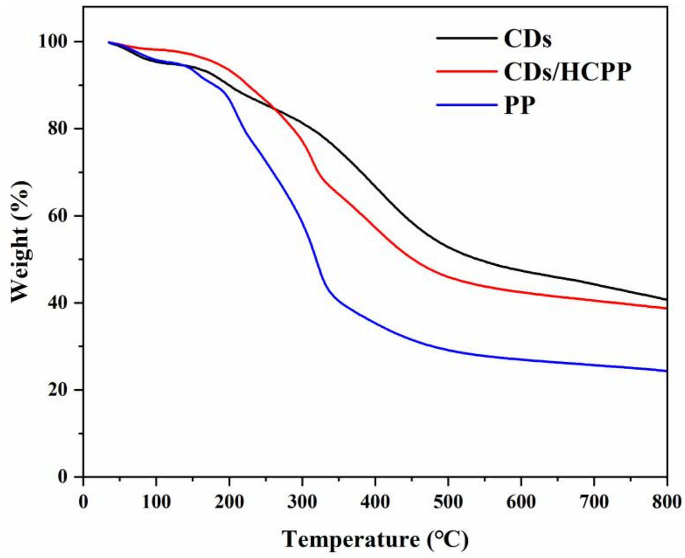
Supplementary Figure 3. The XPS spectra of as-prepared materials (A) survey; (B) C 1s; (C) O 1s; (D) N 1s.



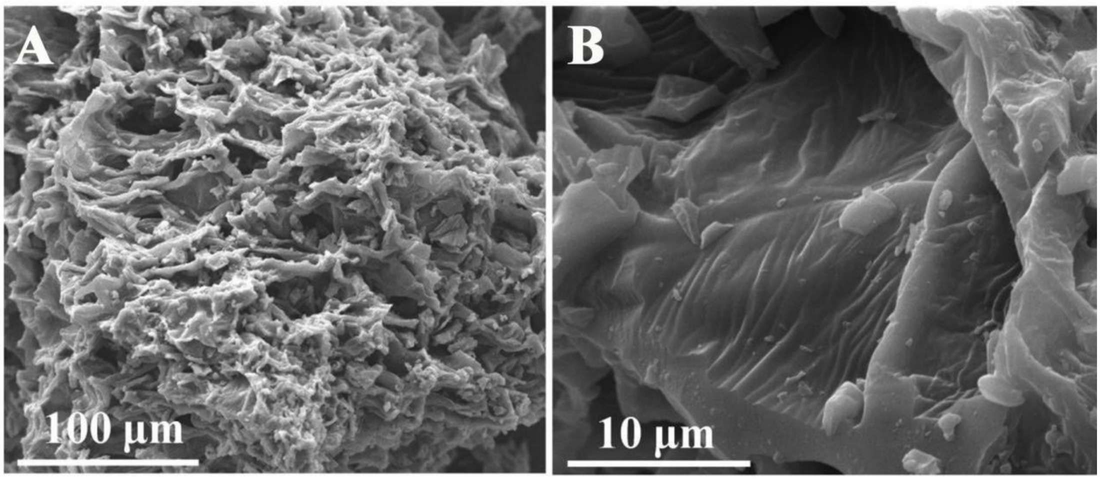
Supplementary Figure 4. The FT-IR images of a. CPP-x (x = 500, 600, 700, 800).



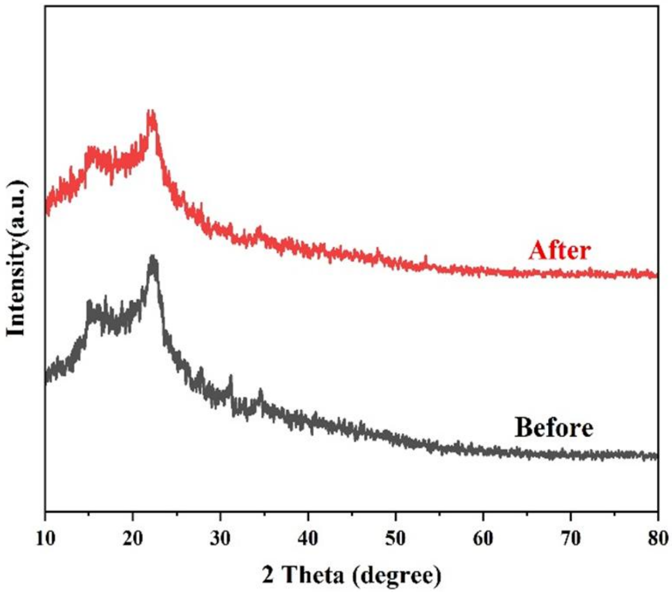
Supplementary Figure 5. Raman spectra of CPP-x (x = 500, 600, 700, 800).



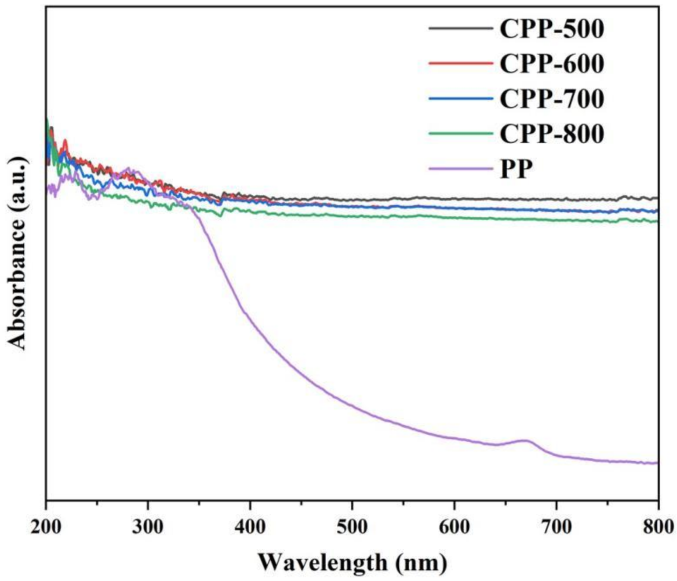
Supplementary Figure 6. TGA curves under N_2 for PP, CDs, and CDs/HCPP.



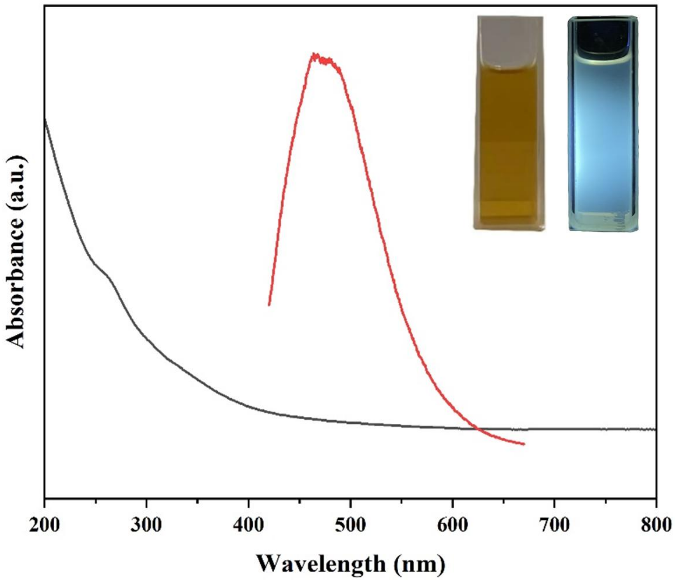
Supplementary Figure 7. SEM images of CPP-700.



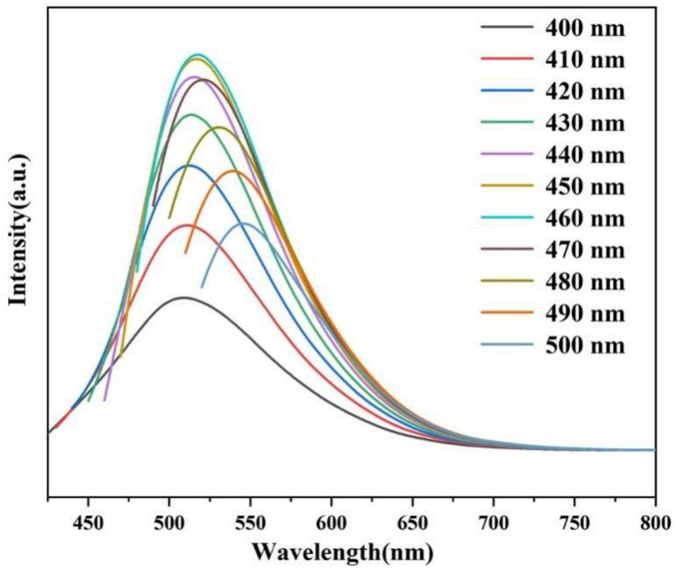
Supplementary Figure 8. XRD patterns of CDs/HCPP before and after reaction.



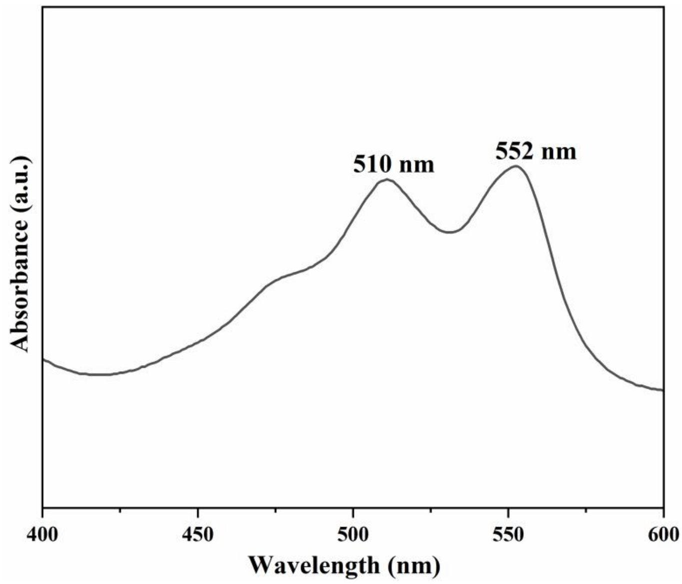
Supplementary Figure 9. The UV-vis diffuse reflectance spectra of CPP-x (x = 500, 600, 700, 800)



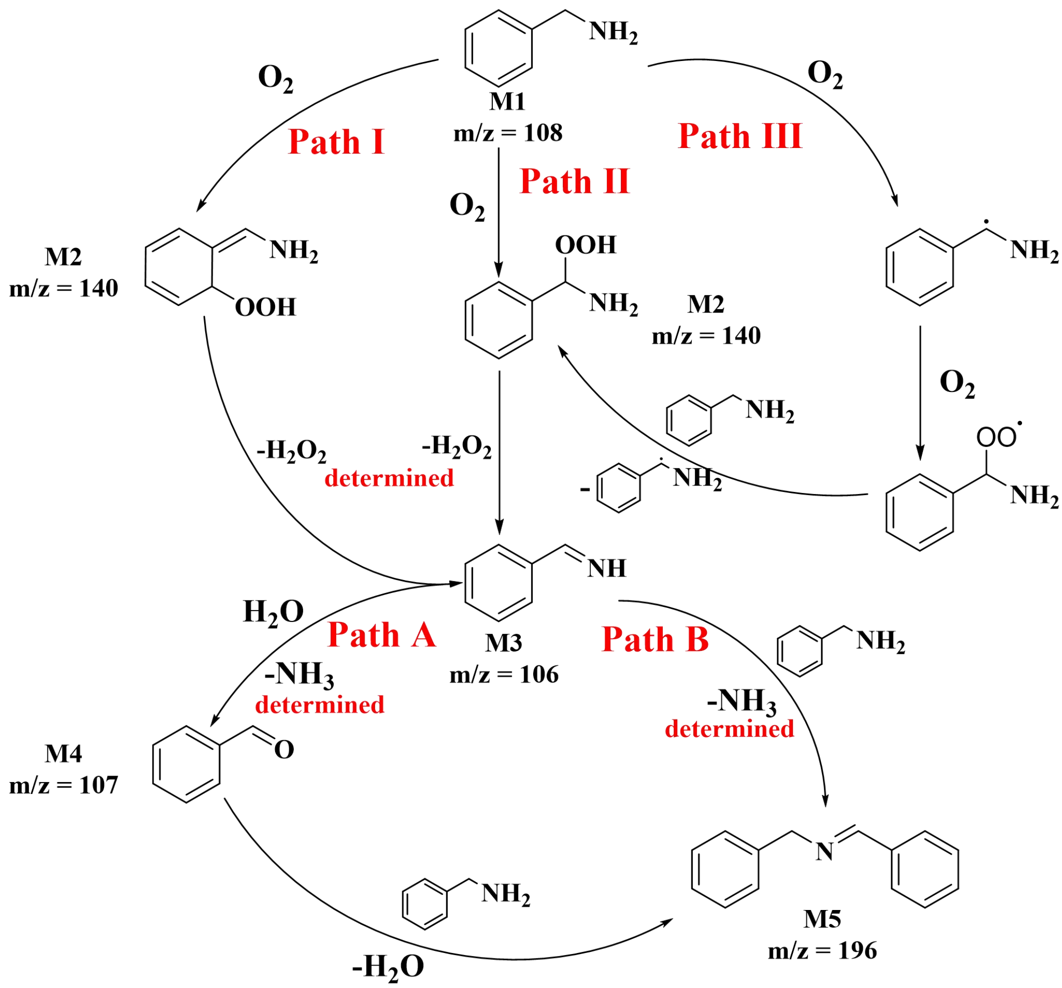
Supplementary Figure 10. PL emission and UV-vis absorption spectra of CDs/HCPP dispersed in water.



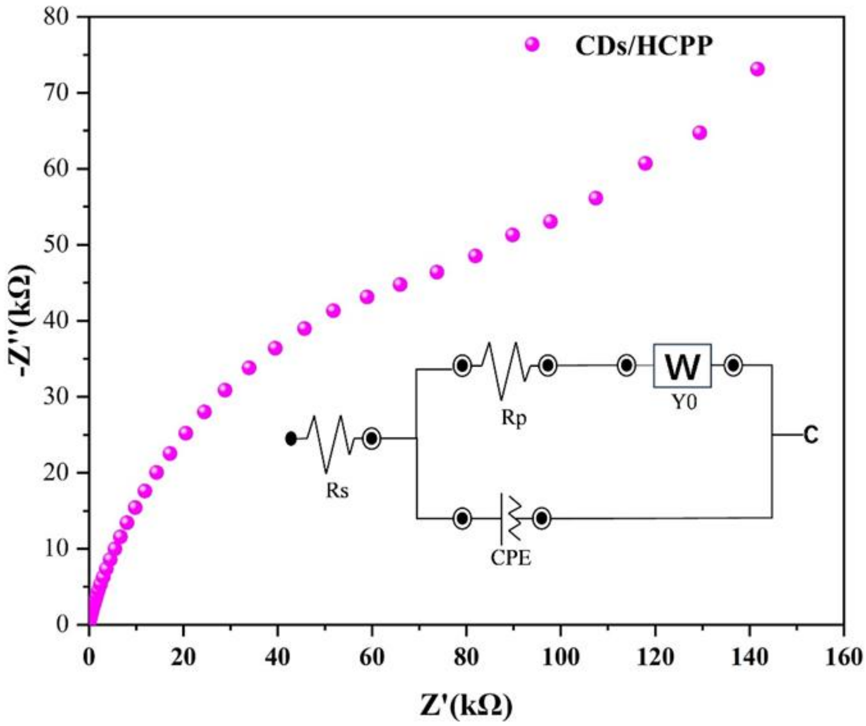
Supplementary Figure 11. PL spectra of CDs at different excitation wavelengths varying from 400 to 500 nm.



Supplementary Figure 12. Detection of H_2O_2 in the filtrate of photocatalytic aerobic oxidative coupling of benzylamine over CDs/HCPP, based on a DPD/POD method.



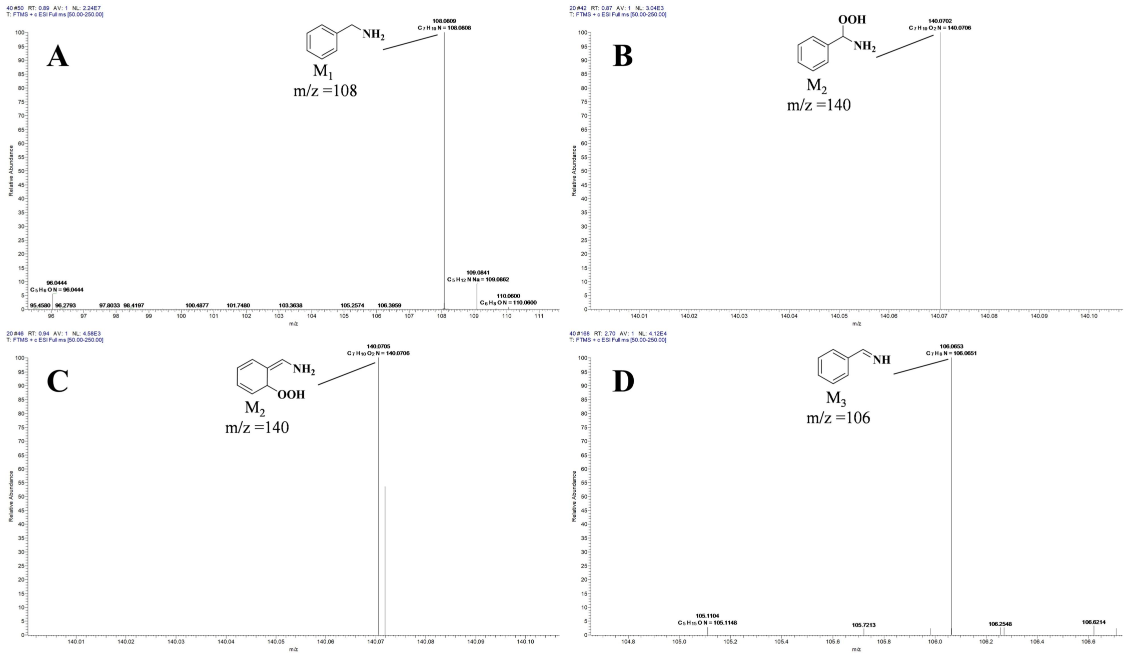
Supplementary Figure 13. The possible reaction route of PCDs/HCPP on photocatalytic oxidative coupling of benzylamine.



Supplementary Figure 14. The equivalent electrical circuits applicable to fit the EIS data. The equivalent electrical circuits applicable to fit the EIS data are shown in Supplementary Figure 14. The different electrical elements, i.e., Rs and Rct shown in this model represent the electrolyte resistance and charge transfer resistance respectively. Y0 and n represent CPE (constant phase element) parameters.

The Nyquist diameter of the electrode deposited with the CDs/HCPP

Sample	Rct	Rs	CPE	
			Y0	N
CDs/HCPP	10,918 Ω	148.66 Ω	1.9643*10^{-6} S	0.84626



Supplementary Figure 15. (A-D) MS figures.

Supplementary Tables

Supplementary Table 1. Binding energies of the C 1s, O 1s and N 1s regions of CDs, CDs/HCPP and CDs/HCPP-700

Sample	C 1s	Specie	C%	O1s	specie	O%	N 1s	Specie	N%
	284.8	C=C	77.6	531.5	C-O	55.5	399.9	Pyridinic N	84.3
CDs	286.6	C−O	17.2	532.8	C=O	44.5	401.9	Graphitic N	15.7
	288.5	C=O	5.2						
	284.7	C=C	67.7	531.1	C-O	17.3	399.8	Pyridinic N	76.4
CDs/HCPP	286.4	C−O	25.4	532.7	C=O	82.7	401.9	Graphitic N	23.6
	288.1	C=O	6.9						
	284.7	C=C	75.2	531.8	C-O	46.2	398.5	Iminic N	35.0
CDs/HCPP-700	286.2	C−O	17.6	533.6	C=O	53.8	400.7	Pyrrolic N	65.0
	288.5	C=O	7.2						

Supplementary Table 2. Organic element content of as-prepared materials

Sample	C (%)	H (%)	N (%)	O (%)	Ash (%)
PP	41.65	6.21	2.37	49.06	0.71
CDs	53.00	5.93	2.45	38.62	0
CDs/HCPP	54.04	5.84	3.29	34.16	2.67
CDs/HCPP-700	72.67	2.23	3.48	17.37	4.25

Supplementary Table 3. The comparison of photocatalytic oxidation of amines between this work and recently reported similar catalytic systems

Entry	Catalysts	Condition	Con./%	Sele./%	Yield./%	Ref.
1	Hydrochar from bamboo	35 W tungsten-bromine lamp λ > 420 nm, 29 °C, 0.1 Mpa O2, 32 h	97.1	99.5		1
2	O-CDs	300W Xe lamp, λ > 420 nm 90 °C, 0.1 Mpa O_2,12 h	-	-	98	2
3	Cu2O / CDs	20 W LED，λ > 400 nm 50 °C, 0.1 Mpa O_2, 8 h	97	98	95	3
4	C70 fullerene	34 W LED，λ = 470 nm 35 °C, 0.1 Mpa O_2, 24 h	-	-	98	4
5	mpg-C3N4	300W Xe lamp, λ > 400 nm, 80 °C, 0.5 Mpa O_2, 3.5 h	90	99	89	5
6	CDs/HCPP	10W LED, 460 < λ < 465 nm 26 °C, air, 6 h	-	-	99	This work

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