

Copper nanoparticle/carbon quantum dots hybrid as green photocatalyst for high efficiency oxidation of cyclohexane

Supporting Information

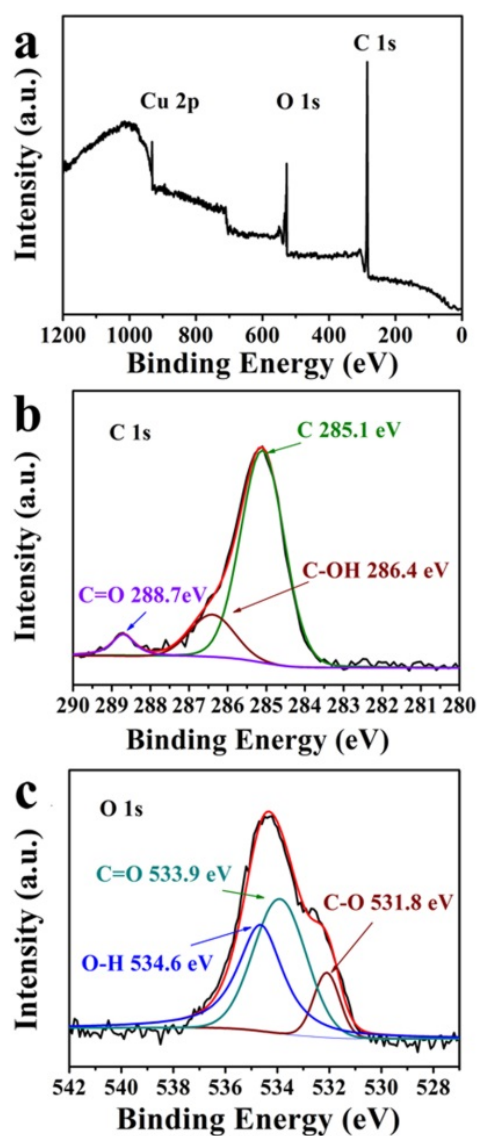


Fig. S1 (a) XPS full spectrum of Cu/CQDs hybrids. (b and c) High-resolution C 1s and O 1s XPS spectra of Cu/CQDs hybrids.

Table S1. Photocatalytic oxidation of cyclohexane with Cu/CQDs as catalyst under visible light.

Reaction time (h)	Conversion (%)	Selectivity (%)	
		cyclohexanone	$\sum_{\text{sel}}C_6$
6	14.8	83.1	98.9
12	26.1	82.7	97.4
24	37.9	81.5	96.8
36	44.4	79.1	96.3
48	50.2	78.3	95.7

Table S2. Photocatalytic oxidation of cyclohexane with Cu/CQDs as catalyst under dark.

Reaction time (h)	Conversion (%)	Selectivity (%)	
		cyclohexanone	$\sum_{\text{sel}}C_6$
6	2.0	80.6	98.6
12	3.1	79.0	98.0
24	4.2	77.1	97.5
36	4.7	75.2	96.7
48	4.9	73.3	96.2

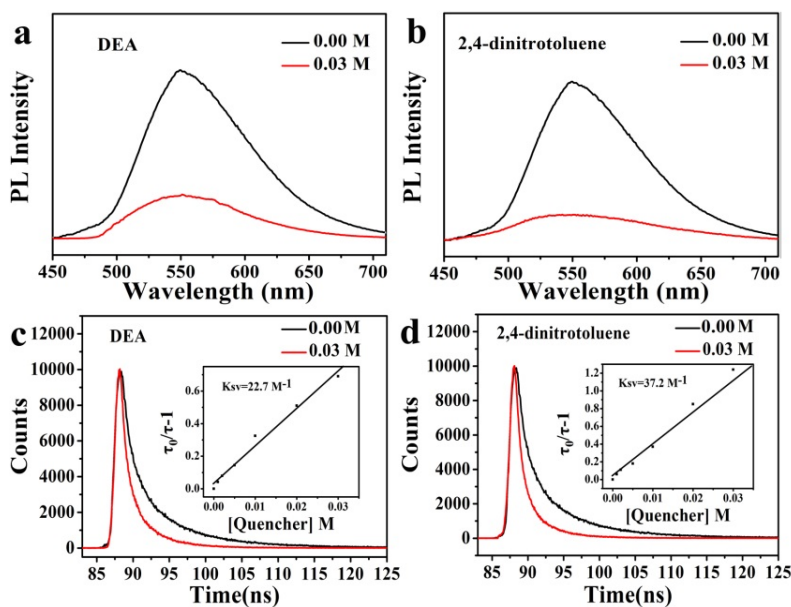


Fig. S2 (a and b) PL spectra of CQDs with (red trace) and without (black trace) the quenchers DEA and 2,4-dinitrotoluene (485 nm excitation, monitored with 550 nm narrow bandpass filter), respectively. (c and d) Luminescence decays of CQDs with DEA and 2,4-dinitrotoluene, respectively. Insets are Stern-Volmer quenching plots of CQDs by (c) DEA and (d) 2,4-dinitrotoluene with the linear regression of 22.7 and 37.2 M^{-1} , respectively.

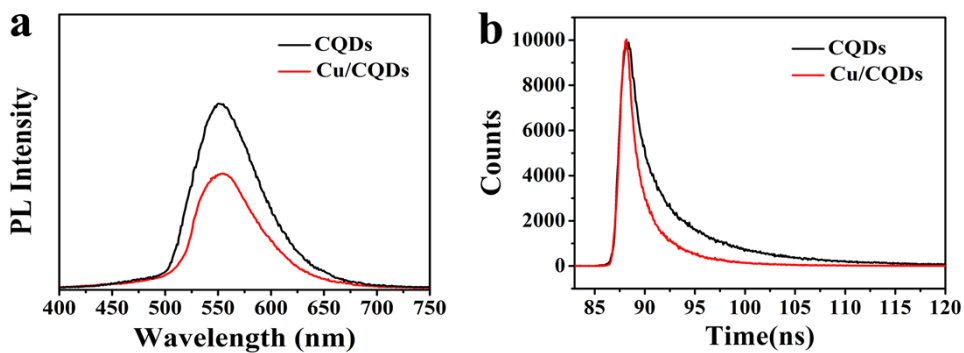


Fig. S3 (a) PL spectra (485 nm excitation) and (b) Luminescence decays (485 nm excitation, monitored with 550 nm narrow bandpass filter) of CQDs (black line) and Cu/CQDs (red line).

Table S3. Photocatalytic oxidation of cyclohexane with Cu/graphene as catalyst under visible light.

Cycle times	Conversion (%)	Selectivity (%)	
		Cyclohexanone	$\sum_{sel} C_6$
1	32.3	69.5	90.5
2	18.4	67.2	88.4
3	13.2	65.0	83.8