

碳量子点阳离子表面活性剂的多功能性

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Versatile Performances of a Cationic Surfactant Derived from Carbon Quantum Dots

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1 Morphology of CQDs measured by transmission electron microscope

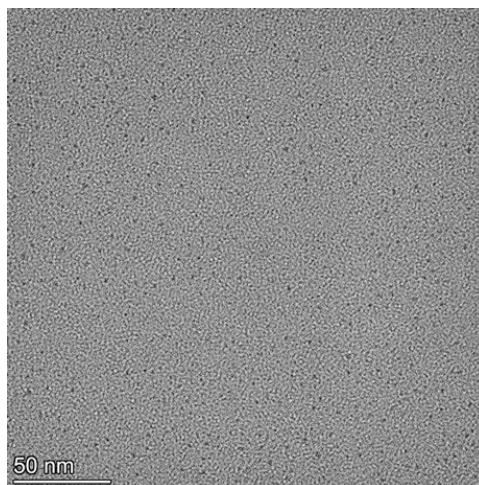


Fig. S1 TEM image of CQDs.

2 Elemental analyses on surface C, N and O of OX-CQDs and OX-CQDs-C12H25

Table S1 Atomic percentages of OX-CQDs and OX-CQDs-C12H25 obtained by XPS measurements

	Name	Start BE	Peak BE	End BE	FWHM	Atomic
OX-CQDs	C 1s	291.50	284.81	280.15	2.53	70.05%
	N 1s	404.40	398.95	394.90	1.80	20.96%
	O 1s	535.80	530.47	527.25	1.82	8.99%
OX-CQDs-C12H25	C 1s	291.76	284.83	280.41	2.40	73.73%
	N 1s	404.66	399.16	395.16	1.82	16.61%
	O 1s	536.06	532.00	527.51	2.64	9.66%

BE represents binding energy (eV); FWHM represents full width at half maxima (eV).

3 Surface tensions of solutions of OX-CQDs-C12H25 at pH = 6.0 and 8.0

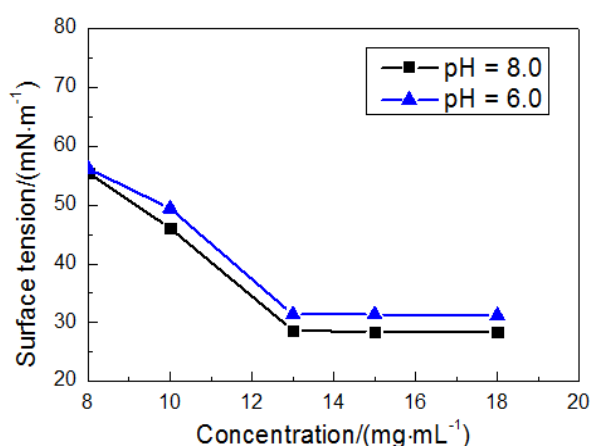


Fig. S2 Surface tensions of water in the presence of OX-CQDs-C12H25 at pH = 6.0 and pH = 8.0.

4 Curve fitting on the relationship between surface tension of the solution and the concentration

Data of Fig. 5 of OX-CQDs-C12H25 is fitted with curve of $\gamma(c) = a_1 \exp(-c/a_2) + a_3$ where $a_1 = 44.616$, $a_2 = 1.184$ and $a_3 = 26.728$ (Adj. R-Square = 0.998). Thus the derivation of $\gamma(c)$ and the corresponding surface absorption amount (I) are obtained which summarized in Table S2.

Table S2 Surface absorption amount of OX-CQDs-C12H25

Concentration/(mg·mL ⁻¹)	dy/dc	Γ /(mol·m ⁻²)
0.0	-0.03768	0.00000000
0.1	-0.03463	0.00000070
0.2	-0.03183	0.00000128
0.3	-0.02925	0.00000177
0.4	-0.02688	0.00000217
0.5	-0.0247	0.00000249
0.6	-0.0227	0.00000275
0.7	-0.02086	0.00000295
0.8	-0.01917	0.00000309
0.9	-0.01762	0.00000320
1.0	-0.01619	0.00000327
1.1	-0.01488	0.00000330
1.2	-0.01368	0.00000331

Also, data of Fig. 5 of CQDs-C12H25 can be fitted with curve of $\gamma(c) = a_1 \exp(-c/a_2) + a_3$ where $a_1 = 43.164$, $a_2 = 1.816$ and $a_3 = 29.568$ (Adj. R-Square = 0.989). Thus the derivation of $\gamma(c)$ and the surface absorption amount (Γ) are obtained which summarized in Table S3.

Table S3 Surface absorption amount of CQDs-C12H25.

Concentration/(mg·mL ⁻¹)	dy/dc	Γ /(mol·m ⁻²)
0.0	-0.02377	0.00000000
0.1	-0.02250	0.00000045
0.2	-0.02129	0.00000086
0.3	-0.02015	0.00000122
0.4	-0.01907	0.00000154
0.5	-0.01805	0.00000182
0.6	-0.01708	0.00000207
0.7	-0.01617	0.00000228
0.8	-0.01530	0.00000247
0.9	-0.01448	0.00000263
1.0	-0.01370	0.00000276
1.1	-0.01297	0.00000288
1.2	-0.01228	0.00000297
1.3	-0.01162	0.00000305
1.4	-0.0110	0.00000311
1.5	-0.01041	0.00000315
1.6	-0.009848	0.00000318
1.7	-0.009321	0.00000320
1.8	-0.008821	0.00000320