

Supplementary Material

Iron and nitrogen co-doped graphene quantum dots as highly active peroxidase for sensitive detection of L-cysteine

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Fig. S1 The photographs of Fe,N-QQDs solution diluted by a factors 10 after storage at room temperature for one month.

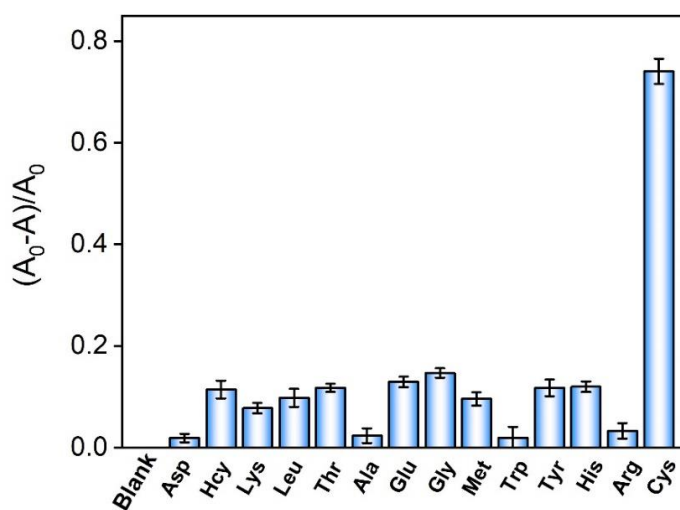


Fig. S2 The absorbance change ratio of Fe,N-QQDs+H₂O₂+TMB after different kinds of amino acids (50 μM) was added and reacted for 10 min.

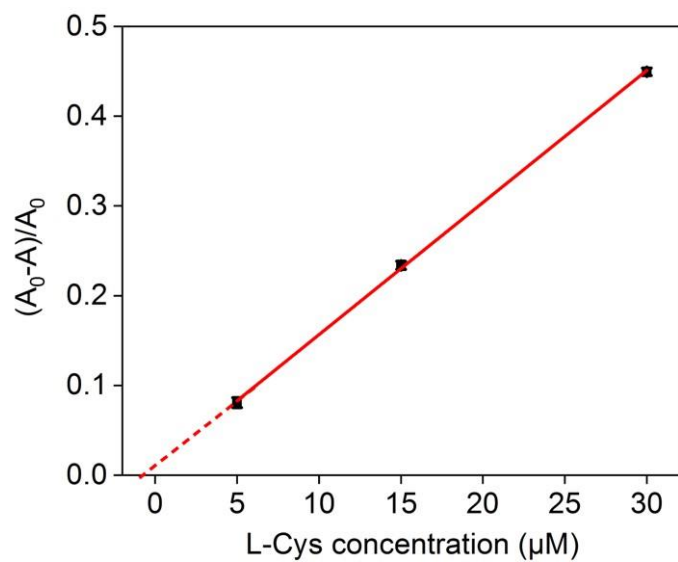


Fig. S3 Linear calibration plot for L-Cys detection in amino acid tablets solution based on the peroxidase of Fe,N-GQDs.

Table S1 The apparent Michaelis-Menten constants (K_m) and maximum reaction rates (V_{max}) of different catalysts

Catalyst	Substrate		Substrate		Reference
	TMB		H ₂ O ₂		
	K_m	V_{max}	K_m	V_{max}	
	(mM)	(10 ⁻⁸ M/s)	(mM)	(10 ⁻⁸ M/s)	
HRP	0.434	10	2.39	4.36	[1]
SWNT-NH ₂ @hemin	0.528	10.08	26.012	22.558	[2]
PEI-rGO-Hemin-BSA	1.8	8.451	2.13	2.339	[3]
MA-Hem/Au-Ag	2.39	1.42	2.7	14.1	[4]
Hemin-porous g-C ₃ N ₄ hybrid nanosheets	0.119	11.6	0.682	2	[5]
His-GQD/hemin	0.133	9.7	3.8	10.55	[6]
Fe,N-GQDs	0.1351	15.99	1.905	12.09	This work

Table S2 Comparison of the performance for detection of L-Cys using different carbon-based materials

Sensing method	Material	Detection limit	Linear range	Reference
		(μM)	(μM)	
Colorimetry	Ag ⁺ -CDs	0.82	1-60	[7]
Colorimetry	g-C ₃ N ₄	0.2	1-20	[8]
Colorimetry	FeCo carbon nanofibers	0.15	1-20	[9]
Electrochemistry	N-doped rGO modified with Y ₂ O ₃	0.8	1.3-720	[10]
	Carbon electrode modified with carbon dots		0.3-3.6	
Electrochemistry	Lucigenin-carbon dots	8.8	10-100	[12]
Fluorometry	N-CDs	0.35	0-100	[13]
Fluorometry	N-acetyl-L-cysteine- capped AuNPs-CDs	0.16	1.0-110	[14]
Fluorometry	AuNCs-CDs	0.96	1-100	[15]
Fluorometry	N,S-CQDs	0.54	10-200	[16]
Colorimetry	Fe,N-GQDs	0.14	0.5-50	This work

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