Supporting Information for

Boron- and nitrogen-doped photoluminescent polymer carbon nanoparticles as nanosensor for imaging detection of Cu2+ and

biothiols in living cell

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Fig. S1 DLS curve of the BNPCNPs.



Fig. S2 The FT-IR spectrum of the BNPCNPs.

Zeta Potential Distribution



Fig. S3 Zeta potential of BNPCNPs in 0.05 M Na_2HPO_4 - NaH_2PO_4 (pH=7) buffer solution.



Fig. S4 Selectivity of the BNPCNPs-based detection system. The concentration of Cu^{2+} was 80 μ M and those of the other ions were 400 μ M.



Fig. S5 (A) Evolution of the fluorescence intensity over pH, recorded after the addition of 80 μ M Cu²⁺ to BNPCNPs solution with different pH values; B) Effects of the reaction time on the fluroscence intensity of BNPCNPs after the addition of 80 μ M to BNPCNPs solution with different reaction time.



Fig. S6 The FL emission spectra of free BNPCNPs-Cu²⁺ and BNPCNPs in the presence biothiols.



Fig. S7 Plot of the enhanced FL signals $[(FL-FL_0)/FL_0]$ versus Hcy and GSH concentration. Inset: low-concentration linear region.

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Florescence Probe	Linear range (µM)	Detect limt (nM)	Ref.
RBQ1	0-4	36.5	19
Graphene/DNAzymes	0-0.25	2	21
RBA	0-15	85	22
TPI-AD	0-20	14.4	23
NIR-Cu	1-5	29	24
BNPCNPs	0.003-80	1.5	Our method

Table. S1 Comparison of the linear range and detect limit for Cu²⁺ using different fluorescent probes.

Samples	Metal ion	Added (µM)	Measured (µM)	Recovery (%)	RSD (n=3,%)
1	Cu ²⁺	20	20.15	100.75	5.78
2	Cu ²⁺	20	21.24	106.2	4.95
3	Cu ²⁺	20	19.07	95.35	5.26

Table. S2 Analytical results for the determination of Cu^{2+} in lake samples using the proposed BNPCNPs probe.

Samples	Biothiols	Added (µM)	Measured (µM)	Recovery (%)	RSD (n=3,%)
1	Lcy	5	5.22	104.44	5.16
	Нсу	5	4.92	98.4	6.52
	GSH	5	5.37	107.4	7.13
2	Lcy	10	9.82	98.2	5.54
	Нсу	10	10.28	102.8	4.98
	GSH	10	9.79	97.9	6.13

Table. S3 The detection of Lcy, Hcy and GSH in serum samples based on the fluorescence restoration of the BNPCNPs $-Cu^{2+}$ based system by addition of biothiols