

Supporting Information

Simultaneous Enrichment, Separation and Detection of Mercury (II) Ions Using Cloud Point Extraction and Colorimetric Sensor Based on Thermoresponsive Hyperbranched Polymer-Gold Nanocomposite

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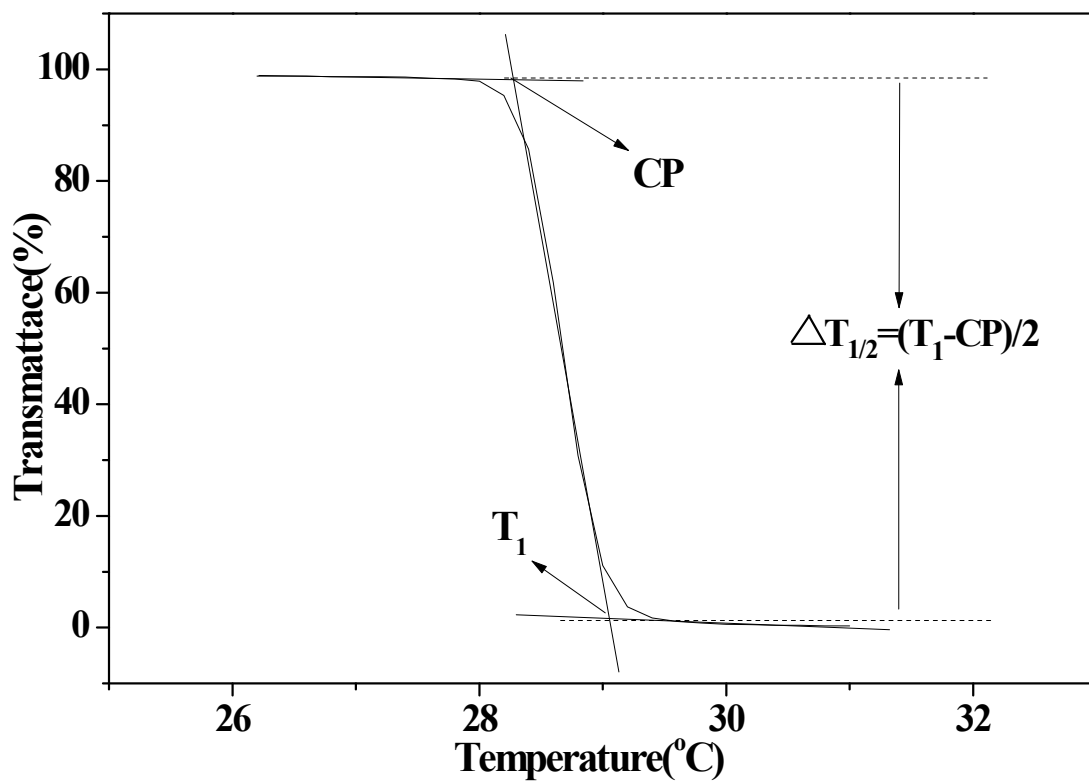


Fig. S1 The typical curve of temperature effect on the light transmittance of the aqueous solution of HPEI-IBAm.

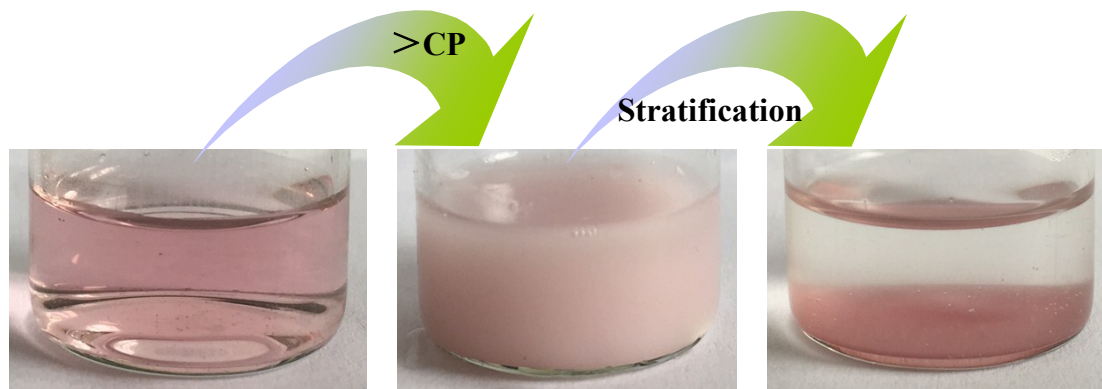


Fig. S2 The process of enriching and separating Hg²⁺ via heating and stratification.

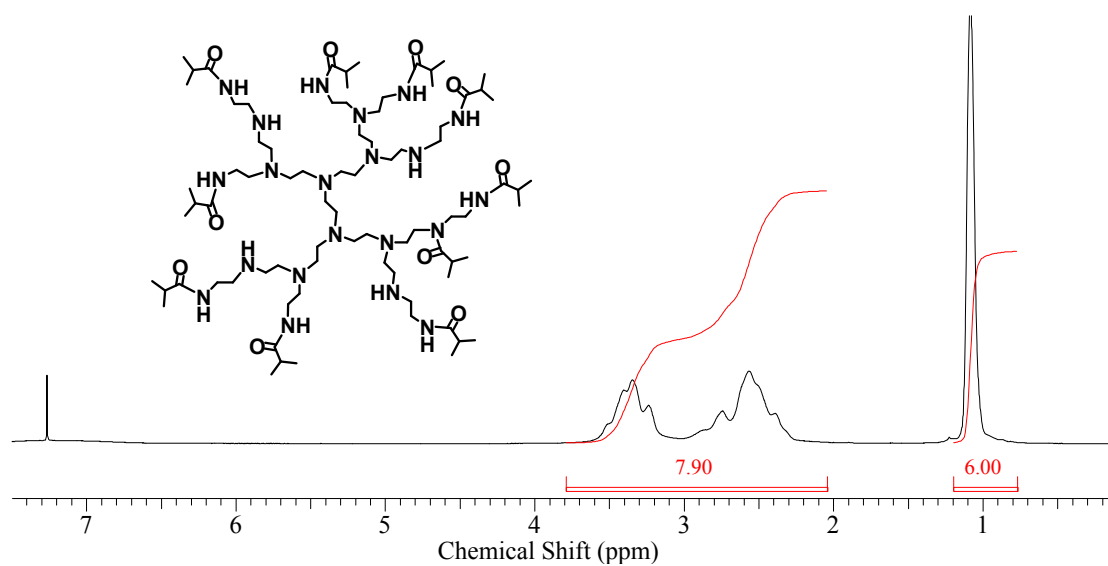


Fig. S3 ^1H NMR spectra of HPEI-IBAm.

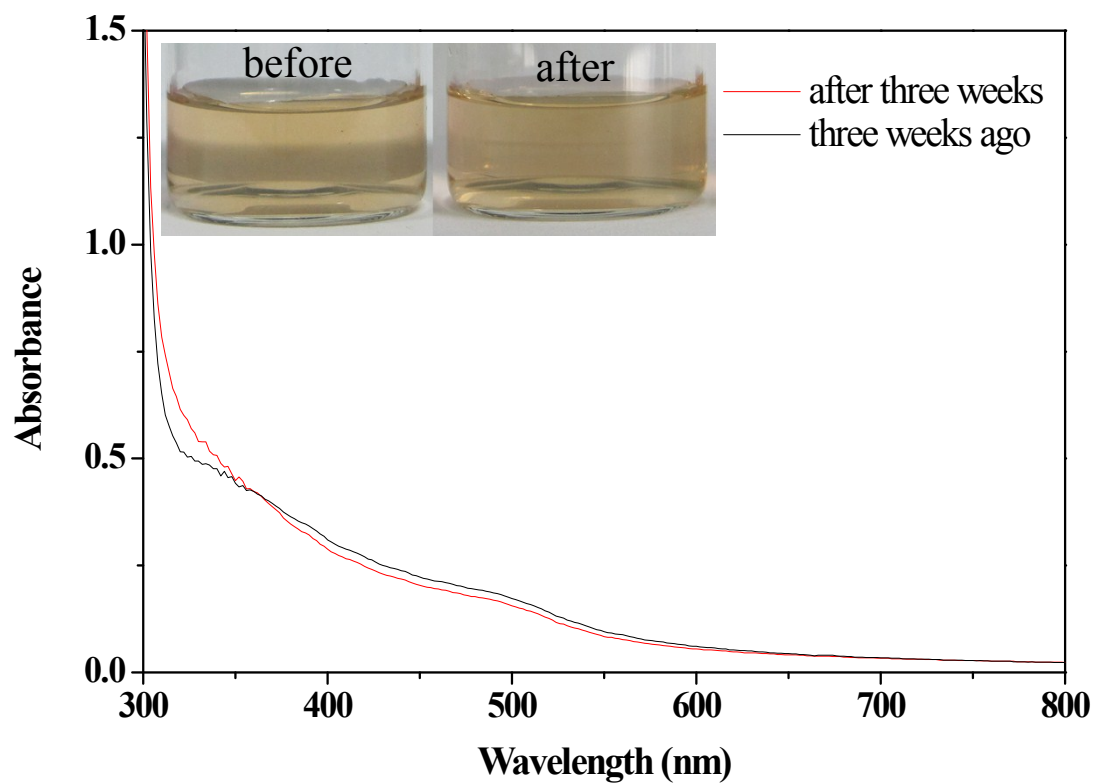


Fig. S4 The absorption spectra of Au-Hg nanoparticles in 2 minutes (black line) and three weeks (red line) after preparation; Inset shows the color change before and after three weeks. (0.6 nM HPEI-IBAm-AuNPs with 6.3 mM AA in the presence of 4.38 μM Hg^{2+})

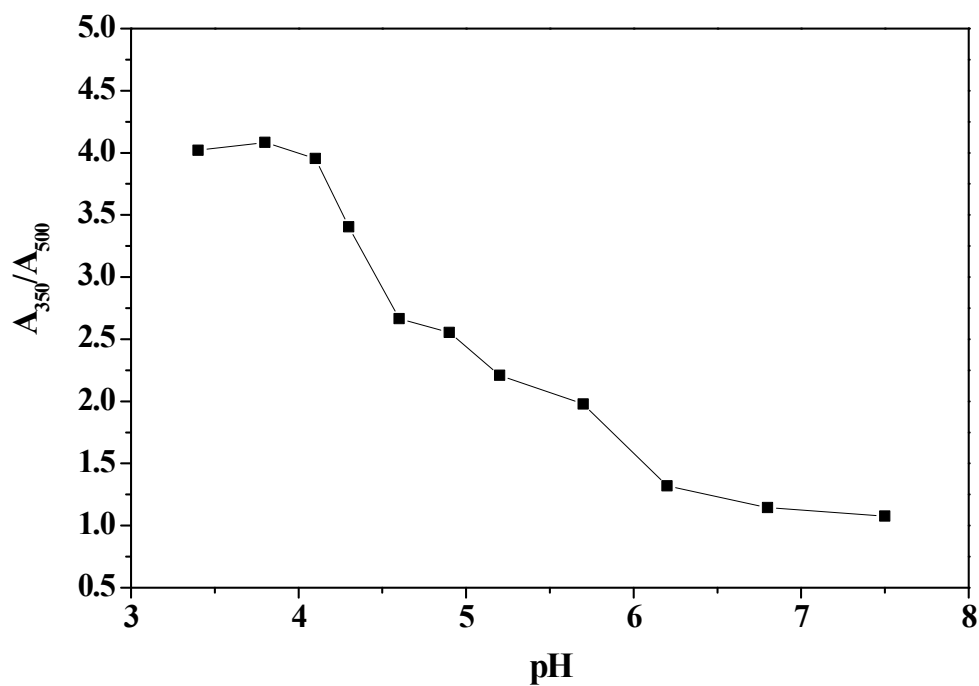


Fig. S5 Effect of the pH on the response (A_{350}/A_{500}) of 0.6 nM HPEI-IBAm-AuNPs in the presence of $4.38 \mu\text{M Hg}^{2+}$.

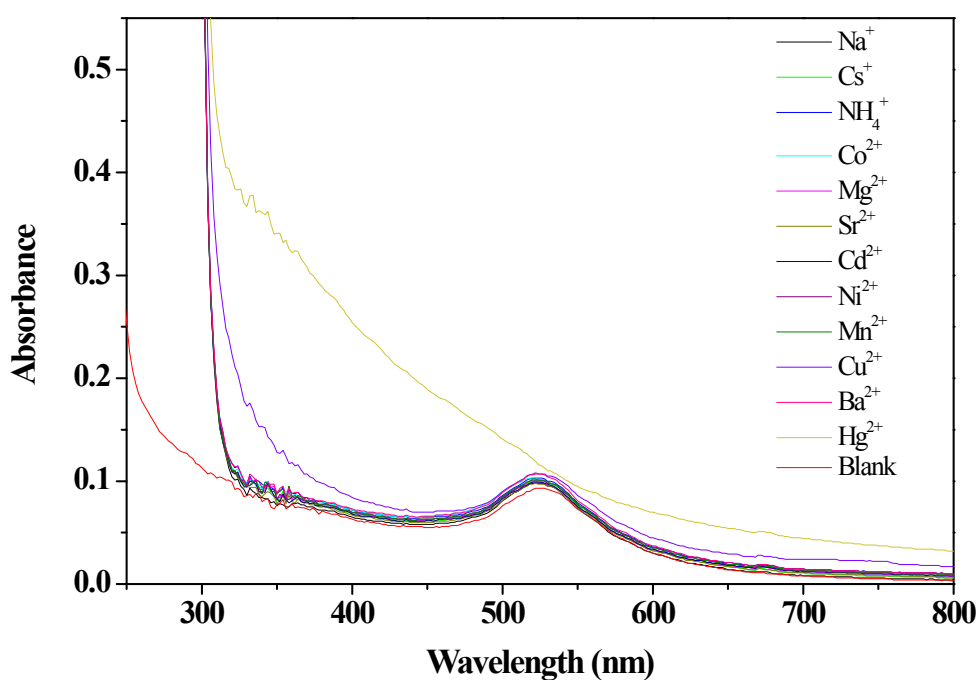


Fig. S6 Selectivity of the sensor: Absorption spectra of the colorimetric assay containing HPEI-IBAm-AuNPs (0.3 nM) and AA (20.2 mM) solutions with Hg^{2+} ($4.38 \mu\text{M}$) and several other metal ions ($43.8 \mu\text{M}$).

Table S1 Gold nanoparticle-based sensors for Hg²⁺ detection

Probe	Detection techniques	LOD(nM)	Time (min)	Ref
DNA/AuNPs	Colorimetry and absorption	100	4-10	1
Tween 20-AuNPs	Colorimetry and absorption	100	5	2
MPA-Hcys-PDCA/AuNPs	Hyper Rayleigh Scattering	25	6-7	3
Tween 20-AuNPs	Colorimetry and absorption	5	3	4
PDDA/AuNPs	Absorption	25	No mention	5
HAuCl ₄ /NH ₂ OH	Absorption	10	15-20 min	6
CTAB-coated nanogold	Colorimetry and absorption	1 μM (naked eyes) and 30 nM (UV-vis)	5	7
DTET-AuNPs	Colorimetry and absorption	100	10 min	8
Oligopeptides-AuNPs	Colorimetry and absorption	10	No mention	9
Oligonucleotide-AuNPs/DNA	Colorimetry and absorption	1	20 min	10
DNA/Nanoparticle Conjugates	Colorimetry and absorption	3 μM (naked eyes) and 1 μM (UV-vis)	5 min	11
Graphene/AuNPs	Colorimetry and absorption	16	0.5	12
O-phenylenediamine/AuNPs	Colorimetry and absorption	0.1 μM (naked eyes) and 5 nM (UV-vis)	3-40 min	13
DPy/AuNPs	Colorimetry and absorption	15	30 min	14
QA-AuNPs	Colorimetry and absorption	30	No mention	15
Hyperbranched polyethylenimine derivatives stabilized AuNPs	Colorimetry and absorption	8.8 nM (naked eyes) and 1.1 nM (UV-vis)	Less than 0.5	This work

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