Gold Nanoparticles and Corresponding Filter Membrane as Chemosensors and Adsorbents for Dual Signal Amplification Detection and Fast Removal of Mercury (II)

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Figure S1. The Mass spectrum of reduction rhodamine B (rRhB), ESI-MS: $m/z = 445.22 [M+H^+]$.



Figure S2. The conversion of RhB with red color to rRhB with colorless owed to the strong catalytic properties of gold amalgam. After rRhB solution being exposed to air for about 2 hours, the rRhB transformed into RhB.



Figure S3. The Mass spectrum of the oxidation production of reduction rhodamine B (RhB), ESI-MS: $m/z = 443.20 [M+H^+]$.



Figure S4. The particle size distribution of Au NPs with average diameter of 13.2 ± 0.3 nm.



Figure S5. The whole XPS spectrum of gold amalgam.





Figure S7. The effect of reaction temperature for the reaction of gold amalgam catalyzed rhodamine B.



Figure S8. (A) The preparation of reversible colorimetric and fluorescence filter paper sensor (Au NPs, RhB-FP), and its application in detection of Hg²⁺. (B) The SEM of FP, (C) Au NPs-FP, (D) The EDX line scanning of Au NPs-FP. Inset: the color and fluorescence image change along with the cycles.



Figure S9. Solid UV-vis spectra of the (1) FP, (2) RhB, (3) Au NPs, (4) RhB-FP, (5) Au NPs-FP, (6) Au NPs, RhB-FP.

Table S1		
Cycles	FP	Au NPs-FP
	R(%)	R(%)
1	19.6	99.3
2	18.4	97.8
3	17.0	97.2
4	15.8	96.1
5	13	95.7
6	9	94.8
7	7.3	94.1
8	5.7	93.4
9	4.3	92.5
10	2.1	92.1