Electronic Supplementary Material (ESI) for RSC Advances.

T-Hg^{2+}-T metallo-base pair-mediated dual amplification fluorescent strategy for the selective and sensitive detection of Hg^{2+}

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Table S1 Sequences of oligonucleotides used in this work.

Name	Sequence (from 5' to 3')
H-DNA3	CAT CTC TTC TCC GAG CCG GTC GAA ATA GTG GGT AAT GAA GAG ATG GTT TCG
A-DNA3	CGT TTC CAT CTC TTC AAA AAG
H-DNA4	CAT CTC TTC TCC GAG CCG GTC GAA ATA GTG GGT AAT GAA GAG ATG GTT TCG G
A-DNA4	CCG TTT CCA TCT CTT CAA AAA G
H-DNA5	CAT CTC TTC TCC GAG CCG GTC GAA ATA GTG GGT AAT GAA GAG ATG GTT TCG GG
A-DNA5	CCC GTT TCC ATC TCT TCA AAA AG
H-DNA6	CAT CTC TTC TCC GAG CCG GTC GAA ATA GTG GGT AAT GAA GAG ATG GTT TCG GGG
A-DNA6	CCC CGT TTC CAT CTC TTC AAA AAG
H-DNA7	CAT CTC TTC TCC GAG CCG GTC GAA ATA GTG GGT AAT GAA GAG ATG GTT TCG GGG G
A-DNA7	CCC CCG TTT CCA TCT CTT CAA AAA G
H-DNA8	CAT CTC TTC TCC GAG CCG GTC GAA ATA GTG GGT AAT GAA GAG ATG GTT TCG GGG GG
A-DNA8	CCC CCC GTT TCC ATC TCT TCA AAA AG
MB	FAM-CCA CCA CAC TGA AAT TGA CCC ACT ATrA GGA AGA GAT GTT ACG AGG CGG TGG TGG-Dacyl

[a] The rose domains in H-DNA are DNAzyme sequences. The gold domains and the blue domains in both H-DNA and A-DNA are T-rich sequences and complementary sequences, respectively. And the coffee domains in A-DNA are protection sequences. The red rA of the MB denotes adenosine ribonucleotide at that position. The underlined sequences in H-DNA and MB present

the stem of the structures.

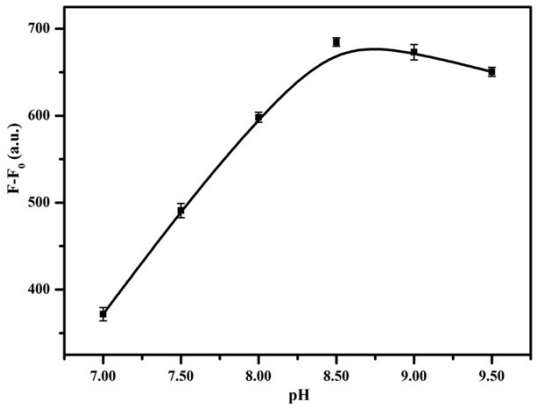

Fig. S1. The effect of the pH values of the TM buffer on Fluorescence Increase. Conditions : $C_{Mg^{2+}}$ = 5.0 × 10^{-3} mol·L^{-1}, $C_{A\text{-}DNA}$ = 1.0 × 10^{-7} mol·L^{-1}, $C_{H\text{-}DNA}$ = 1.2 × 10^{-7} mol·L^{-1}, C_{MB} = 1.8 × 10^{-7} mol·L^{-1}, Exo III = 50 U. T-Hg^{2+}-T reaction : 60 min, Target cycle : 120 min, DNAzyme cycle : 30 min.

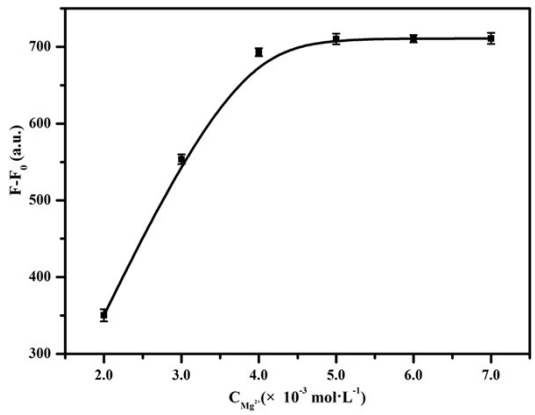

Fig. S2. The effect of the ion strengths of the TM buffer on Fluorescence Increase. Conditions : pH = 8.50, $C_{A\text{-}DNA}$ = 1.0 × 10^{-7} mol·L^{-1}, $C_{H\text{-}DNA}$ = 1.2 × 10^{-7} mol·L^{-1}, C_{MB} = 1.8 × 10^{-7} mol·L^{-1}, Exo III = 50 U. T-Hg^{2+}-T reaction : 60 min, Target cycle : 120 min, DNAzyme cycle : 30 min.

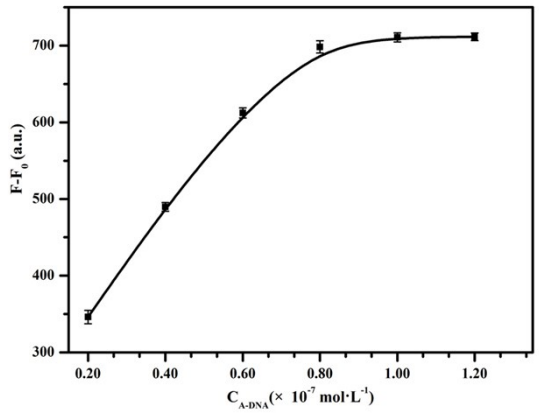

Fig. S3. The effect of the A-DNA concentrations on Fluorescence Increase. Conditions : pH = 8.50, $C_{Mg^{2+}} = 5.0 \times 10^{-3}$ mol·L^{-1}, $C_{H\text{-}DNA} = 1.2 \times 10^{-7}$ mol·L^{-1}, $C_{MB} = 1.8 \times 10^{-7}$ mol·L^{-1}, Exo III = 50 U. T-Hg^{2+}-T reaction : 60 min, Target cycle : 120 min, DNAzyme cycle : 30 min.

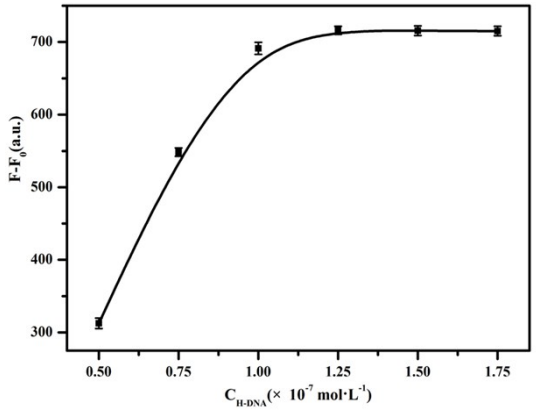

Fig. S4. The effect of the H-DNA concentrations on Fluorescence Increase. Conditions : pH = 8.50, $C_{Mg^{2+}} = 5.0 \times 10^{-3}$ mol·L^{-1}, $C_{A\text{-}DNA} = 1.0 \times 10^{-7}$ mol·L^{-1}, $C_{MB} = 1.8 \times 10^{-7}$ mol·L^{-1}, Exo III = 50 U. T-Hg^{2+}-T reaction : 60 min, Target cycle : 120 min, DNAzyme cycle : 30 min.

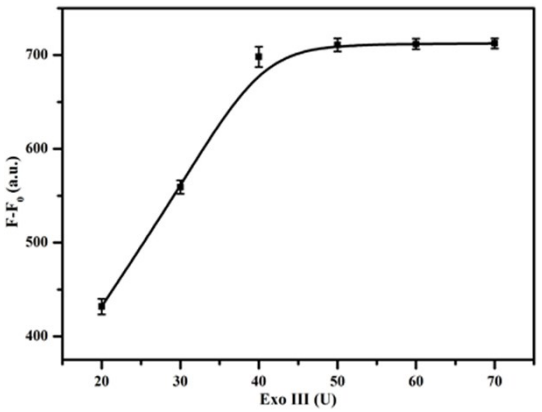

Fig. S5. The effect of the amounts of Exo III on Fluorescence Increase. Conditions : pH = 8.50, $C_{Mg^{2+}} = 5.0 \times 10^{-3}$ mol·L^{-1}, $C_{A\text{-}DNA} = 1.0 \times 10^{-7}$ mol·L^{-1}, $C_{H\text{-}DNA} = 1.2 \times 10^{-7}$ mol·L^{-1}, $C_{MB} = 1.8 \times 10^{-7}$ mol·L^{-1}. T-Hg^{2+}-T reaction : 60 min, Target cycle : 120 min, DNAzyme cycle : 30 min.

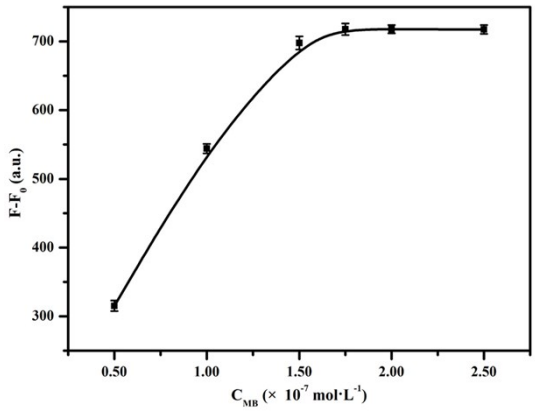

Fig. S6. The effect of the MB concentrations on Fluorescence Increase. Conditions : pH = 8.50, $C_{Mg^{2+}}$ = 5.0 × 10^{-3} mol·L^{-1}, $C_{A\text{-}DNA}$ = 1.0 × 10^{-7} mol·L^{-1}, $C_{H\text{-}DNA}$ = 1.2 × 10^{-7} mol·L^{-1}, Exo III = 50 U. T-Hg^{2+}-T reaction : 60 min, Target cycle : 120 min, DNAzyme cycle : 30 min.

Table S2. Detection of Hg^{2+} in environmental water samples using the proposed strategy and ICP-MS method[a].

Sample Name	Added (×10^{-9} mol·L^{-1})	Found Mean[b] (×10^{-9} mol·L^{-1})	Found RSD (%) (n = 3)	Found Recovery (%)	ICP-MS Mean[b] (×10^{-9} mol·L^{-1})	ICP-MS RSD (%) (n = 3)	ICP-MS Recovery (%)
Tap Water1	2.5	2.4	3.1	92	2.4	3.8	92
Tap Water2	8.0	8.1	2.3	101	8.3	2.1	104
Lake Water1	2.5	2.3	2.4	92	2.4	4.5	92
Lake Water2	8.0	7.9	1.8	99	8.2	2.5	103
River Water1	2.5	2.4	4.2	96	2.6	3.3	104
River Water2	8.0	7.8	3.7	98	7.9	2.9	99
Waste Water	0	7.0	3.5	NO[c]	7.1	4.0	NO[c]

[a] The Hg^{2+} in tap, lake and river water was not detected with the proposed strategy and ICP-MS method.

[b] All found values were obtained as an average of three repetitive determinations.

[c] The results were not obtainable.