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Supporting Information for

Rapid and label-free strategy for the sensitive detection of Hg^{2+} based on target-triggered exponential strand displacement amplification

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Table S1 Comparison of this method with the previous fluorometric methods.

Material/method	Detection time	Detection limit	Limitations	Reference
DNA-templated silver nanocluster (DNA-AgNC)	9.5 hr	10 nM	Long detection time	1
Target-induced DNAzyme reaction with molecular beacon	20 min	0.2 nM	Labeling with fluorophore and quencher	2
DNA-functionalized quantum dot and gold nanoparticle	50 min	0.18 nM	• Preparation of nanomaterials • Functionalization with DNA	3
Carbon nanotube/AgNC with Exo III-assisted cyclic amplification	3 hr	33 pM	-	4
Hybridization chain reaction with graphene oxide	2.3 hr	0.3 nM	• Labeling with fluorophore • Long detection time	5
Hairpin structure-promoted primer extension reaction	30 min	40 pM	-	6
Strand displacement amplification/nicking endonuclease-assisted signal amplification with molecular beacon	2 hr	2 pM	• Labeling with fluorophore and quencher • Use of multiple enzymes	7
Real-time monitoring of EXPAR	30 min	100 pM	-	8
Hyperbranched RCA	3.5 hr	0.14 pM	Long detection time	9
Real-time monitoring of eSDA	30 min	2.95 pM	-	This work

Table S2 DNA sequences employed in this work.

Strand name[c]	DNA sequence (5' → 3')[a], [b]
TP	GCG GTC GGA AGC TCG CTA CTG AGC AGT TTT TTT TTT TTT TTT
FP-T4	AGG TCA **GGA TC**T AGC GGT TAA AAA AAA AAA ATT
FP-T8	AGG TCA **GGA TC**T AGC GGT TTT AAA AAA AAT TTT
FP-T12	AGG TCA **GGA TC**T AGC GGT TTT TTA AAA TTT TTT
FP-T16	AGG TCA **GGA TC**T AGC GGT TTT TTT TTT TTT TTT
RP	AGG TCA **GGA TC**G CGG TCG GAA GCT

[a] The sequence in RP identical to TP is highlighted in blue while the sequence in FP-T# complementary to TP is highlighted in red, where # is the number of T bases forming the mismatched T-T base pairs with TP, which are underlined.

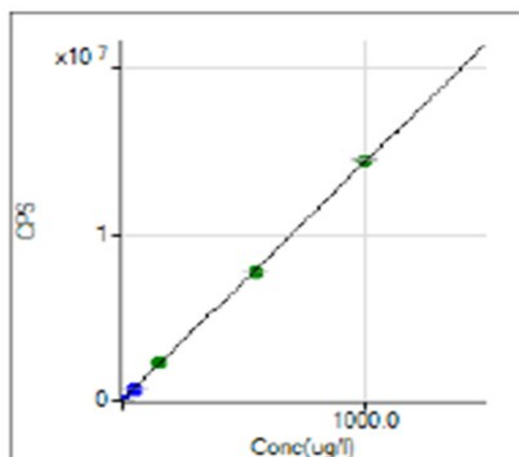
[b] The recognition sequence for nicking endonuclease is bold.

[c] TP, FP, and RP indicate template, forward primer, and reverse primer, respectively.

Table S3 Reproducibility of the Hg^{2+} detection method. SDs and RSDs (=SD/mean x 100) for T_t are listed at varying concentrations of Hg^{2+} (n=3).

Concentration of Hg^{2+} (pM)	SD	RSD (%)
0	0.58	1.95
10	0.29	1.04
40	0.29	1.14
100	0.58	2.37
400	0.29	1.27
1000	0	0
10000	3.03	3.03

Fig. S1 Measurement of the concentration of Hg^{2+} in the tap water with ICP-MS.



Calibration curve	Y = (1.433 x 10^4)X + 8.407 x 10^3
Concentration of Hg^{2+}	Not detected

Fig. S2 Target-triggered extension of FP and TP. Fluorescence intensities from SYBR green I are plotted as a function of time during the extension by DNA polymerase in the absence and presence of Hg^{2+} (100 nM). The reaction temperature is 42.5 ^{o}C and the concentrations of TP and FP-T12 (Table S2) are 100 nM and 100 nM, respectively. The nicking endonuclease (Nt.AlwI) and RP were not included.

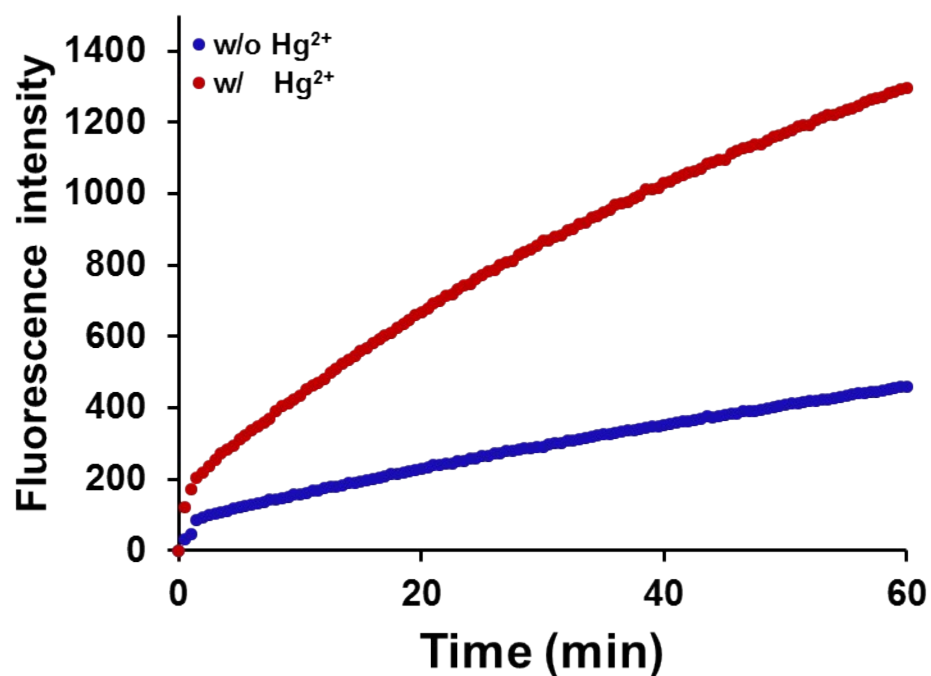
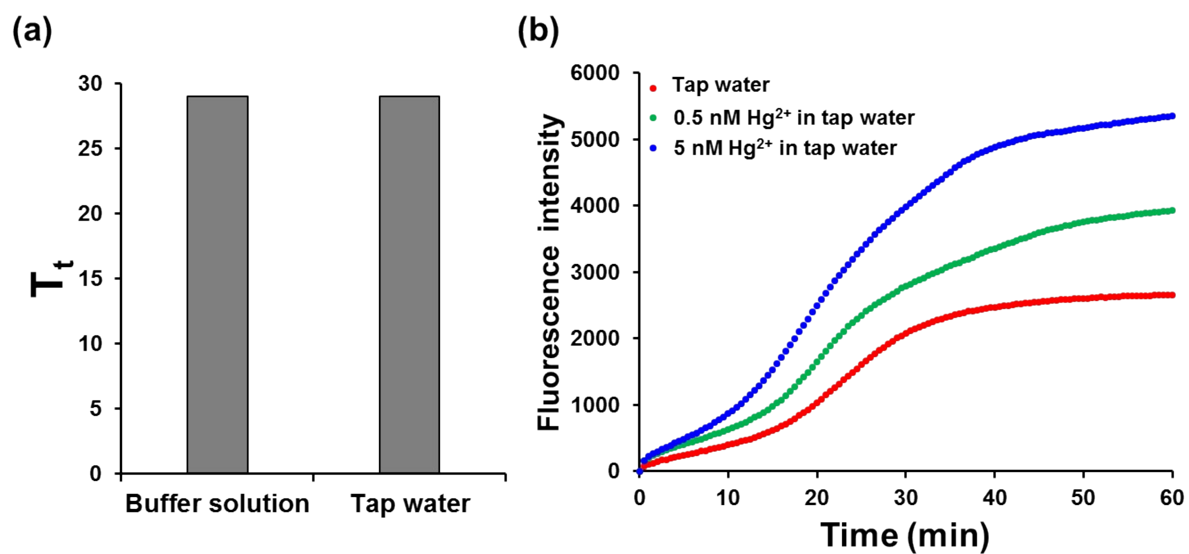


Fig. S3 (a) T_t in the presence of buffer solution and tap water. (b) Fluorescence intensities from SYBR green I plotted as a function of time in the presence of Hg^{2+} spiked in the tap water.



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