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Electronic Supplementary Material

A label-free ultrasensitive and selective strategy for Pb(II) assay by a multifunctional DNA probe-mediated rolling-circle amplified synthesis of G-quadruplex

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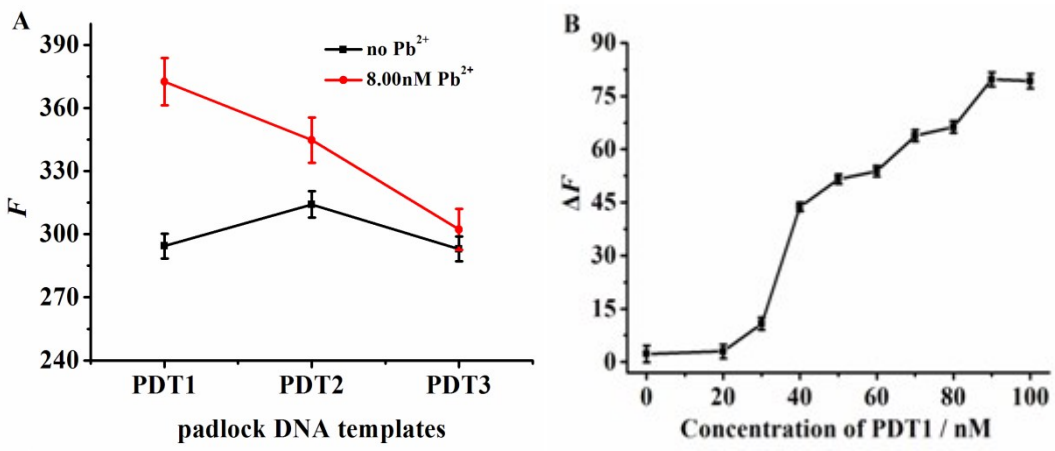

Fig. S1. Optimization of the padlock DNA template (A) and PDT1's concentration (B). (A) and (B) $c_{\text{S-DNA}}$ = 44.4 nM, $c_{\text{E-DNA}}$ = 35.6 nM, $c_{\text{Pb(II)}}$ = 8.00 nM, $c_{\text{T4 DNA ligase}}$ = 50 U, c_{phi29} = 4.0 U, c_{dNTPs} = 20 μM, c_{NMM} = 0.112 μM. (A) $c_{\text{PDT1}} = c_{\text{PDT2}} = c_{\text{PDT3}}$ = 50.0 nM.

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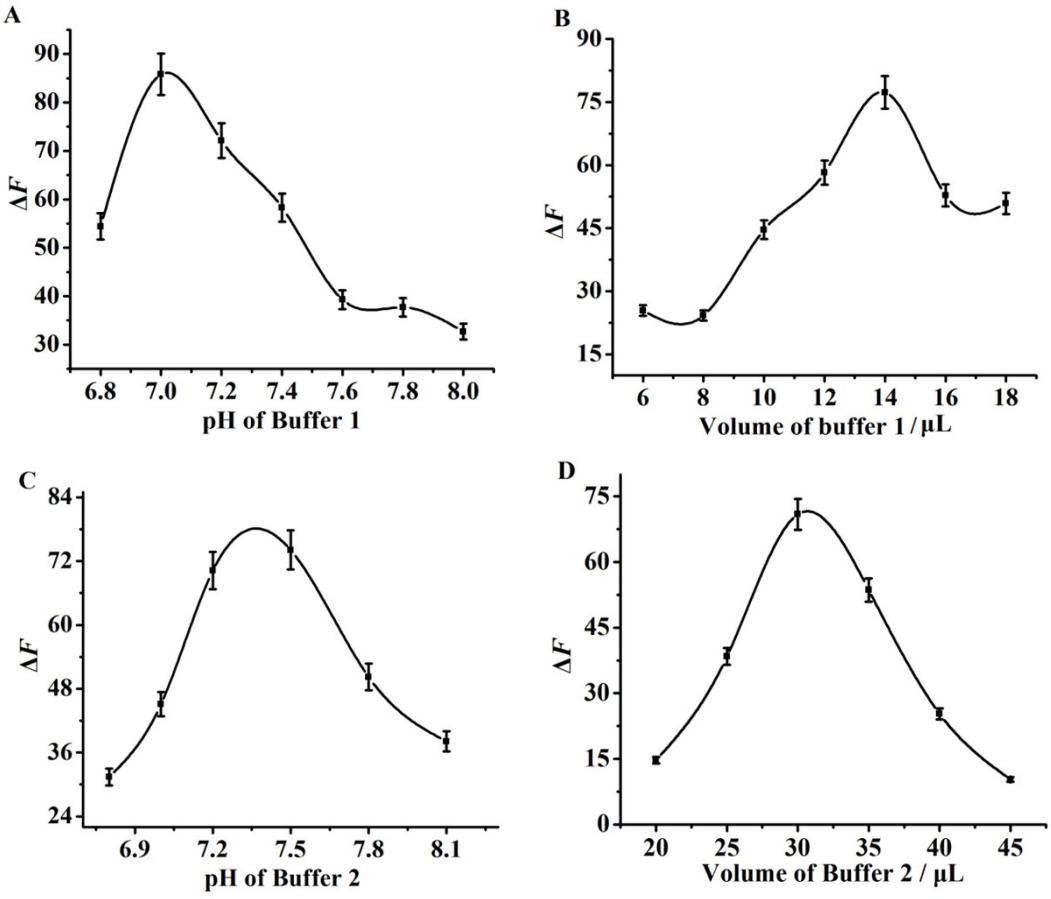

Fig. S2. Effect of the buffer on the sensing system.

(A), (B), (C) and (D) $c_{\text{E-DNA}}$ = 53.3 n M, $c_{\text{S-DNA}}$ = 66.7 nM, $c_{\text{Pb(II)}}$ = 8.00 nM, c_{PDT1} = 90.0 nM, c_{NMM} = 0.112 μM. (A) and (B) $c_{\text{T4 DNA ligase}}$ = 50 U, c_{phi29} = 4.0 U, c_{dNTPs} = 20 μM. (C) and (D) $c_{\text{T4 DNA ligase}}$ = 35 U, c_{phi29} = 3.5U, c_{dNTPs} = 28 μM. (B) pH = 7.0. (D) pH = 7.5.

Table S1. Sequence information for padlock DNA templates (the italic part is complementary to the E-DNA)

Name	Sequence(5'- 3')	Base numbers	Pairing numbers
PDT1	*TCG ACC GG*T AAA ACC CAA CCC GCC CTA CCC AAA A*AC TCA CTA TT*	44	18
PDT2	*TTC GAC CT*A AAA CCC AAC CCG CCC TAC CCA AAA *ACT CAC TAT*	42	17
PDT3	*TTT CGA CC*T AAA ACC CAA CCC GCC CTA CCC AAA A*AC TCA CTA*	42	16

1 Table S2. Comparison of this strategy with other methods for determination of Pb(II)

Material/method	Detection technique	Linear range	Detection limit	Reference
graphene and gold nanoparticles	Fluorescence	50−1000 nM	10 nM	1
T30695 and ZnPPIX	Fluorescence	20 – 1000 nM	20 nM	2
polyguanine(G33) and terbium ions (Tb^{3+})	Fluorescence	3.0 – 50 nM	1.0 nM	4
DNAzyme	Fluorescence	10 – 100 nM	10 nM	6
DNAzyme	Fluorescence	N/A[a]	7.8 nM	8
DNAzyme and gold nanoparticle	Colorimetric	N/A[a]	500 nM	7
DNAzyme	Colorimetric	5 –100 nM	5.0 nM	5
DNAzyme	Surface enhanced Raman Scattering	N/A[a]	20 nM	3
DNAzyme	strand displacement signal amplification	200 pM-20 nM	200 pM	14
G-quadruplex	Fluorescence	5 nM-1 μM	1 nM	30
Graphene_DNAzyme	Fluorescence	1 nM-1 μM	300 pM	18
MDP	Fluorescence	0.32 – 16 nM	94.29 pM	This method

2 [a] Not available

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