Supplementary Information

Oligonucleotides sequence information. The following oligonucleotides purchased from Takara (China) were synthesized and purified by HPLC (from left to right: 5′ to 3′; the nucleic acid bases in red font are mismatched):

Substrate strand of DNAzyme:

Substrate of GR5:

ACTCATGTGACTCACTATrAGGAAGAGATGATGTCTGTTGTCAACTCGTG

^{32}P labeled substrate:

^{32}P-ACTCATGTGACTCACTATrAGGAAGAGATGATGTCTGTTGTCAACTCGTG

Substrate of M1:

ACTCATGTGACTCACTACrAGGAAGAGATGATGTCTGTTGTCAACTCGTG

Substrate of M2:

ACTCATGTGACTCACTATrAGGAAGAGATGATGTCTGTTGTCAACTCGTG

Substrate of M3:

ACTCATGTGACTCACCATrAGGAAGAGATGATGTCTGTTGTCAACTCGTG

Substrate of M4:

ACTCATGTGACTCACTATrAGGAAGAGATGATGTCTGTTGTCAACTCGTG

Substrate of M5:

ACTCATGTGACTCACTATrAGGAAGAGATGATGTCTGTTGTCAACTCGTG

Substrate of M6:

ACTCATGTGACTCACTATrAGGAAGAGATGATGTCTGTTGTCAACTCGTG

Substrate of M7:

ACTCATGTGACCCACTATrAGGAAGAGATGATGTCTGTTGTCAACTCGTG

Substrate of M8:

ACTCATGTGACTCACTATrAGGAAGAGATGATGTCTGTTGTCAACTCGTG

Substrate of M2M5:

ACTCATGTGACTCACTATrAGGAAGAGATGATGTCTGTTGTCAACTCGTG

Enzyme strand of DNAzyme:

ACAGACATCATCTCTGAAGTAGCGCCGCCGTATAGTGAG

Enzyme strand of M1:

ACAGACATCATCTCTGAAGTAGCGCCGCCGTATAGTGAG

Enzyme strand of M2:

ACAGACATCATCTCTGAAGTAGCGCCGCCGTACAGTGAG

Enzyme strand of M3:

ACAGACATCATCTCTGAAGTAGCGCCGCCGTATAGCGAG

Enzyme strand of M4:

ACAGACATCATCTCTGAAGTAGCGCCGCCGTATAATGAG

Enzyme strand of M5:

ACAGACATCATCTCTGAAGTAGCGCCGCCGTATAGCGAG

Enzyme strand of M6:

ACAGACATCATCTCTGAAGTAGCGCCGCCGTATAGTAAG

Enzyme strand of M7:

ACAGACATCATCTCTGAAGTAGCGCCGCCGTATAGTGAG

Enzyme strand of M8:

ACAGACATCATCTCTGAAGTAGCGCCGCCGTATAGTGAA

Enzyme strand of M2M5:

ACAGACATCATCTCTGAAGTAGCGCCGCCGTACACTGAG

Inactive enzyme strand: ACAGACATCATCTCTGAAGTCCGGTATAGTGAG

5′DNA$_{Au}$: AuNPs-S-$(CH_2)_6$-CACGAGTTGACA

3′DNA$_{Au}$: TCACAGATGAGT-$(CH_2)_3$-S-AuNPs

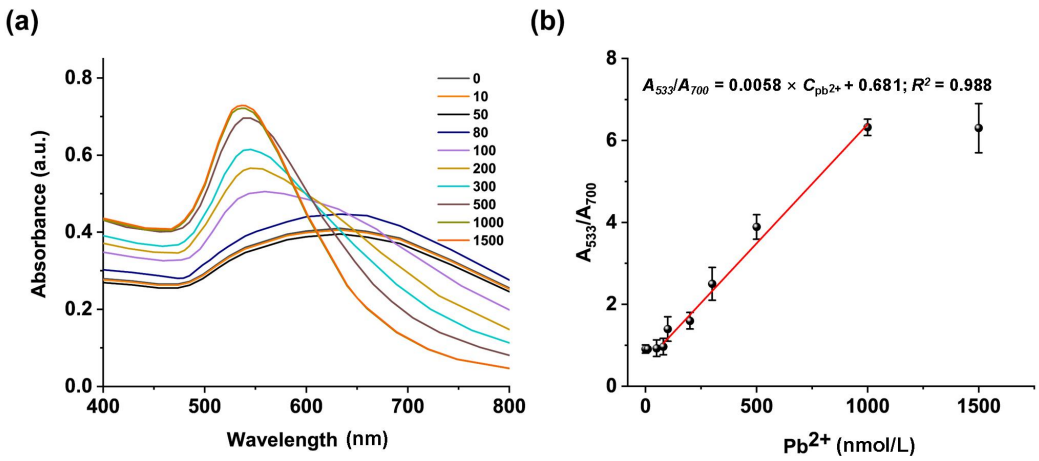

Fig. S1 (a) Visible spectra with various concentration of Pb^{2+} ranging from 0 to 1500 nmol/L; (b) Absorption ratio of A_{533}/A_{700} versus different Pb^{2+} concentration in nmol/L (linear fitting curve in the range of 100–1000 nmol/L).

Table S1 Summary of RNA-cleaving DNAzyme-based biosensors developed for the analysis of Pb^{2+}

Methods	Detection time (h)	LoD (nmol/L)	Linear range (nmol/L)	Environmental sample	Recovery (%)	Ref.
Fluorescent	1	16.7	50–4000	/	/	(Niu et al., 2018)
Fluorescent	1.2	5	0–500	Tap water; Pond water	96.1–102.6	(Ravikumar et al., 2017)
Fluorescent	1.5	1.6	3–9	Tap water; Pond water	96.1–105.1	(Rajaji and Panneerselvam, 2020)
Colorimetric	> 2	100	100–4000	/	/	(Liu and Lu, 2003)
Colorimetric	0.33	500	/	/	/	(Wei et al., 2008)
Colorimetric	0.33	8	0–100	Tap water	65.3–90.4	(Diao et al., 2020)
Electrochemical	> 2	18	50–1000	Tap water; River water	96.8–97.1	(Tan et al., 2016)
Electrochemical	0.25	0.03	0.1–1000	Lake water	96.0–104.0	(Wu et al., 2018)
SPR	2	0.0004	0.001–0.1	Cola; Sprite	98.7–104.3	(Wang et al., 2021)
Colorimetric	0.5	8.6	10–300	Mineral water; Tap water; River water	86.5–106.4	This work

Notes: "/" means data was not available in the reference. "Ref." means the corresponding reference in the article.

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