

Supporting Information

Rapid and colorimetric biosensor based on GR-5 DNAzyme and self-replicating catalyzed hairpin assembly for lead detection

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Table S1: The sequences of DNA used in the experiments.

DNA name	DNA sequence (5' to 3')
Substrate strand	<u>TCCTCGTATGTTTTGGGTTGGATCACTA</u> TrAGGAAGAGATGATG TCTGT
Enzyme strand	ACAGACATCATCTCTGAAGTAGCGCCGCCGTATAGTGAT
H1	<u>TCCTCGTATGTTTTGT</u> AGTGATCCAACCCAAAACATACGAGGAT CACTAGGTTGGATCGTATGTTT <u>TGGGTTGGGCGGG</u>
H2	<u>TGGGT</u> TAAACATACGATCCAACCTAGTGATCCTCGTATGTTTTG GGTGGATCACTA <u>GGTTGGATCACTA</u>
H1C	<u>TTTTTTTTTTTTTTT</u> TAGTGATCCAACCCAAAACATACGAGGAT CACTAGGTTGGATCGTATGTTTTGGGTTGGGCGGG
H2C	TGGGTAAACATACGATCCAACCTAGTGATCCTCGTATGTTTTG GGTGGATCACTA <u>GGTTGGATCTTTT</u>

^a The blue underlined sequences in substrate strand are the trigger. The blue underlined sequences in H1 and H2 are the two split trigger DNA. The green underlined sequences in H1 and H2 are the two split G-quadruplex sequences. The pink underlined sequences in H1C and H2C are the two thymine-rich sequences which were used to replace the two split trigger DNA sequences.

Table S2: Different signal approaches for Pb²⁺ detection.

Strategy	Signal readout	Detection limit	Detection time	Ref.
G-quadruplex/DNAzyme	Colorimetric detection	10 nM	16 h	[1]
Lead(II)-induced allosteric G-quadruplex DNAzyme	Colorimetric detection	32 nM	100 min	[2]
Cationic-perylene-G-quadruplex complex	Fluorescence detection	5 nM	50 min	[3]
Gold nanoparticles/dsDNA/exonuclease I	Colorimetric detection	2.4 nM	80 min	[4]
DNA-catalyzed porphyrin metalation/G-quadruplex	Fluorescence detection	23.5 nM	3 h	[5]
Gold nanorods/ target-responsive DNA hydrogel	Colorimetric detection	13.9 nM	2.5 h	[6]
G-quadruplex/ GR-5 DNAzyme/ ZNPPIX	Fluorescence detection	3 nM	190 min	[7]
DNAzyme cross-linked hydrogel / lead-responsive DNAzyme	Colorimetric detection	5 nM	2.5 h	[8]
G-Quadruplex/SRCHA	Colorimetric detection	2.6 nM	20 min	This work

Table S3: Recovery experiments of Pb²⁺ in river water and serum samples.

Sample	Added/nM	Found/nM	Recovery/%	RSD/%
River water	30.0	28.7	95.7	4.1
	60.0	57.6	96.0	2.1
	90.0	93.9	104.3	2.4
Serum	30.0	32.5	108.3	3.7
	60.0	63.1	105.2	2.3
	90.0	88.7	98.6	2.9

References

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