Electronic Supporting Information

Table S1. The DNA sequences used in this study.

Title	Sequences (5' to 3')
Chain ii	TGG TTA GTT ACC GTT TTG TC T AAT GAC TC CCG GTT AGG AAG CAG GGA CGA AAC AAG AAC CAT AAC TGG TTA GTT ACC GTT TTG TC
F23 aptamer	CCC CCG TTG CTT TCG CTT TTC CTT TCG CTT TTG TTC GTT TCG TCC CTG CTT CCT TTC TTG
Chain i	GTT ATG GTT CTT GTT TTA GAA CAA AAG CGA CCT AAC CGG
Template sequence	TGG TTA GTT ACC GTT TTG TC T AAT GAC TC TGG TTA GTT ACC GTT TTG TC
sgRNA	GCU UCA CUG AUA AAG UGG AGA ACC GCU UCA CCA AAA GCU GUC CCU UAG GGG AUU AGA ACU UGA GUG AAG GUG GGC UGC UUG CAU CAG CCU AAU GUC GAG AAG UGC UUU CUU CGG AAA GUA ACC CUC GAA ACA AAU UCA UUU GAA AGA AUG AAG GAA UGC AAC UGG UUA GUU ACC GUU UUG UC

Table S2. A brief comparison of the method with former ones

Title	Mechanism	Recognizing molecule	LOD	Time	Signal mode	Cell lysis	Ref
The method	Chain extension+ target recycling	F23 aptamer	3.4 cfu/mL	30 min	Fluorescence	No	
TMB based	MBs based enrichment	F23 aptamer	20 cfu/mL	60 min	Color	No	[1]
Isolation method	MBs based enrichment	F23 aptamer	10 cfu/mL	90 min	Fluorescence	No	[2]
CRISPR-Cas system	Trans-cleavage activity of Cas12a	Genomic material	50 cfu/mL	120 min	Fluorescence	Yes	[3]

Note: MBs, magnetic beads; LOD, limit of detection; TMB, 3,3′,5,5'-tetramethylbenzidine

Supplemented experimental section

Specificity test

Three solution samples were prepared before conducting the detection procedures, including the solution A, solution B, and solution C. In details, the solution A contains 2 μL of *P. aeruginosa* or interfering bacteria, 2 μL of 5 × NEB buffer, 2 μL of dNTP (5 mM), 2 μL of TWJ probe (5 nM), and 2 μL of TWJ template (0.5 nM); the solution B was composed of 0.3 U/μL of Nt.BstNBI nicking endonuclease, 0.02 U/μL of Vent

(exo-) DNA polymerase, and 2 μL of ThermoPol reaction buffer; the solution C contains 2 μL of Cas14a1 reaction buffer, 1 μL of Cas14a1 protein (125 nM), 1 μL of sgRNA (500 nM), and 2 μL of "Reporter probe" (400 nM). For specificity test, the solution A was incubated at room temperature for 10 min and was then mixed with solution B, which was placed in a T100 Thermal Cycler (BIO-RAD) at 40 ℃ for 20 min. After incubation, 4 μL amplified product was taken out and further mixed with the solution C. The fluorescence signal of final mixture was immediately detected by Hitachi fluorescence spectrophotometer F-4700 (Tokyo, Japan) at 37 ℃.

References:

1. Wu, Z.; He, D.; Cui, B.; Jin, Z., A bimodal (SERS and colorimetric) aptasensor for the detection of Pseudomonas aeruginosa. *Mikrochim. Acta* **2018,** *185* (11), 528.
2. Zhong, Z.; Gao, X.; Gao, R.; Jia, L., Selective capture and sensitive fluorometric determination of Pseudomonas aeruginosa by using aptamer modified magnetic nanoparticles. *Mikrochim. Acta* **2018,** *185* (8), 377.
3. Huang, S.; Wang, X.; Chen, X.; Liu, X.; Xu, Q.; Zhang, L.; Huang, G.; Wu, J., Rapid and sensitive detection of Pseudomonas aeruginosa by isothermal amplification combined with Cas12a-mediated detection. *Sci. Rep.* **2023,** *13* (1), 19199.