Electronic Supplementary Information

Triple-helix molecular switch-induced hybridization chain reaction amplification for developing universal and sensitive electrochemical aptasensor

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Table S1. Oligonucleotides used in this work.

Entry	Sequence
CP	TTTTTTGTGTGTGTGT
TFO	AGAGAGAGAGAGGGAAAGAGAGAGACACACACAC
APT-Ade	CTCCCTTTACCTGGGGGAGTATTGCGGAGGAAGGTTTTCCCTC
APT-Tmb	TCCCTTTGGTTGGTGTGGTTGGTTTCCCT
H1	TTTTTTTTTTCTCTCTCTTTCCCTCTCTCTCTCTCGGCAGAGAGAGAGAGGGAAAG
H2	TTTTTTTTTTAGAGAGAGAGAGGGAAAGAGAGAGCTTTCCCTCTCTCTCTCTGCCG

Table S2. Comparison of different aptasensor methods for adenosine detection.

Method	Detection limit (nM)	Linger range (nM)	References
Fluorescence	101	200-900	[1]
Fluorescence	420	1-100000	[2]
Electrochemiluminescence	5.0	10-100	[3]
Electrochemical	2.5	10-400	[4]
Electrochemical	10.0	10-1000	[5]
Electrochemical	0.6	10-200	This work

Table S3. Determination of adenosine in fetal bovine serum samples.

Samples	Spiked concentration (nM)	Detected concentration (nM)	Relative error (%)
1	50	45.86	8.28
2	100	93.56	6.44
3	200	183.04	8.48

Table S4. Comparison of different aptasensor methods for Tmb detection.

Method	Detection limit (nM)	Linger range (nM)	References
Fluorescence	2	2-50	[6]
Fluorescence	8.4	50-900	[7]
Electrochemical	16	20-2000	[8]
Electrochemical	14	20-200	[9]
Electrochemical	0.86	1-500	[10]
Electrochemical	0.0709	1-500	This work

Table S5. Determination of Tmb in fetal bovine serum samples.

Samples	Spiked concentration (nM)	Detected concentration (nM)	Relative error (%)
1	50	47.22	4.56
2	100	93.58	6.42
3	500	460.64	7.87

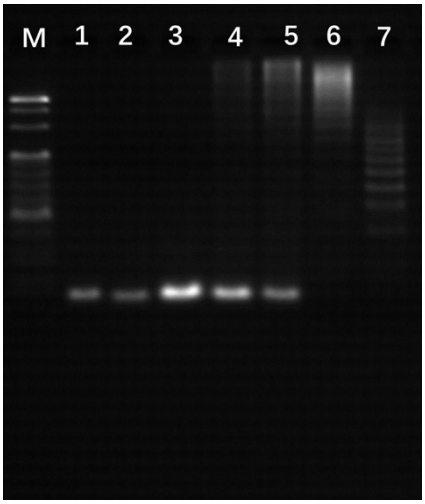

Fig. S1. 3% agarose gel electrophoresis demonstrates TFO-initiated HCR: lane M, 25 bp marker; lane 1, 1 μM H1; lane 2,1 μM H2; lane 3, mixture of 1.0 μM H1 and 1 μM H2; lanes 4-7, mixture of 1 μM H1 and 1 μM H2 in the presence of TFO with different concentration (100 nM, 200 nM,500 nM and 1 μM). SYBR gold was used as the DNA stain and mixed with the samples. HCR time: 2 h.

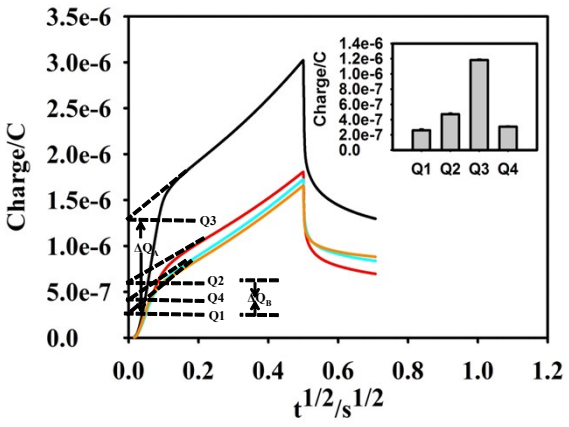

Figure S2. The CC intensities response of (a) the CP/MCH modified gold electrode (Q1, black line), (b) the CP/MCH/TFO modified gold electrode (Q2, green line), (c) the CP/MCH/TFO modified gold electrode after treated with the mixture solution of the two hairpin probes (Q3, blue line) and (d) the CC response signal of the CP/MCH modified electrode treated with the THMS and the solution containing two hairpin probes sequentially in the absence of target (Q4, red line). ΔQ_A=Q3 – Q1, ΔQ_A was the variation in the redox charge of $[Ru(NH_3)_6]^{3+}$ with HCR, and ΔQ_B=Q2 – Q1, ΔQ_B was the variation in the redox charge of $[Ru(NH_3)_6]^{3+}$ without HCR. Intercepts at t = 0 in CC curves represented redox charges of $[Ru(NH_3)_6]^{3+}$ trapped in DNA. Inset is a bar diagram with a standard error to show the reproducibility of Feasibility investigation. Error bars show the standard deviation of three experiments (n=3). CC measurements were obtained at a pulse period of 250 ms in 10 mM Tris-HCl buffer containing 50 μM $[Ru(NH_3)_6]^{3+}$ (PH 7.4).

Notes and references

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