Supporting information

A dual-functional fluorescence biosensor based on enzyme-involved catalytic hairpin assembly for the detection of APE1 and miRNA-21

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Condition optimization

For the optimization of APE1 inactivation time, 9.6 μL of 1 μM H1, 6 μL of 0.05 U/μL APE1 and 82.8 μL of 1× CutSmart buffer were first incubated at 37 ℃ for 20 minutes, and treated at 80 ℃ for different times. Then, 9.6 μL of 1 μM H2 and 12 μL of 500 nM miRNA-21 were added into the above system, and incubated at 37 ℃ for 30 minutes. For the optimization of CHA reaction time, 9.6 μL of 1 μM H1, 6 μL of 0.05 U/μL APE1 and 82.8 μL of 1× CutSmart buffer were first incubated at 37 ℃ for 20 minutes, and treated at 80 ℃ for 5 minutes. Then, 9.6 μL of 1 μM H2 and 12 μL of 500 nM miRNA-21 were added into the above system, and incubated at 37 ℃ for different times. To optimize the final concentration of H1 and H2, 9.6 μL of different concentrations of H1, 6 μL of 0.05 U/μL APE1 and 82.8 μL of 1× CutSmart buffer were first incubated at 37 ℃ for 20 minutes, and treated at 80 ℃ for 5 minutes. Then, 9.6 μL of different concentrations of H2 and 12 μL of 500 nM miRNA-21 were added into the above system, and incubated at 37 ℃ for 50 minutes. All the resulting solutions were measured with fluorescent intensity immediately.

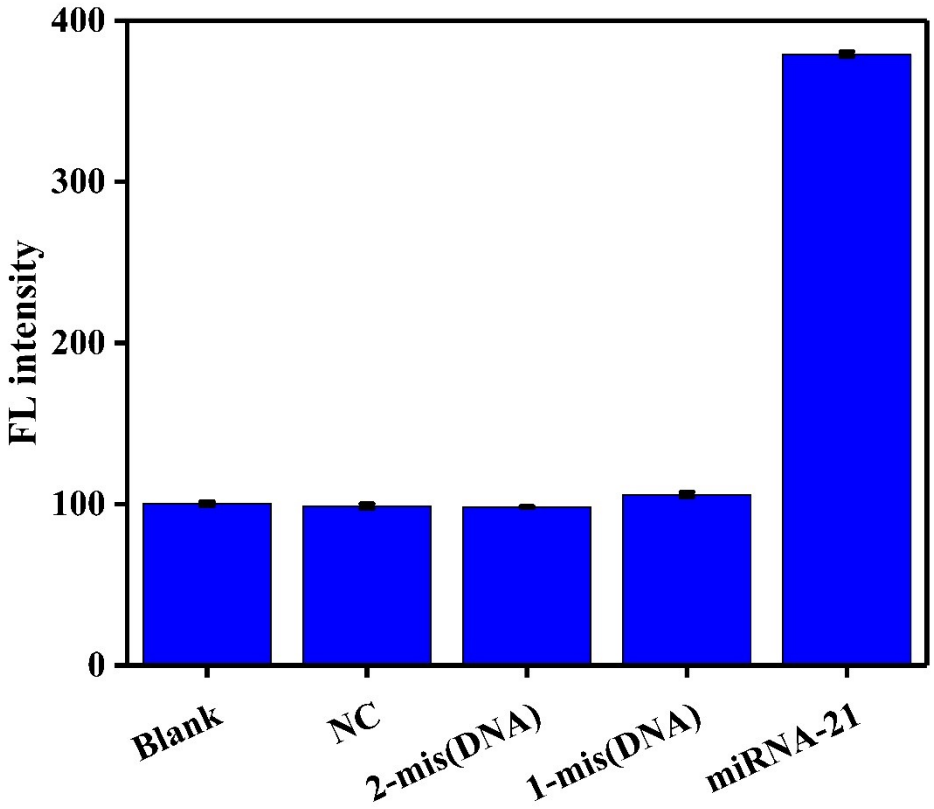

Figure S1 Selectivity of the biosensor for miRNA-21 against other miRNA-21 mimics (DNA strands). From left to right: blank; NC, non-complimentary miRNA-21 mimics; 2-mis, 2 nt mismatched miRNA-21 mimics; 1-mis, 1 nt mismatched miRNA-21 mimics.

Method	Target	Detection strategy	LOD	Linear range	
fluorescence	APE1	real time-qPCR	0.1 U/mL	0.1-5 U/mL	[1]
fluorescence	APE1	DNA nanoprobe	0.02 U/mL	0.02-2 U/mL	[2]
fluorescence	APE1	host-guest interaction	0.05 U/mL	0.05-5 U/mL	[3]
fluorescence	APE1	tetrahedral DNA nanostructure	0.01 U/mL	0.01-1 U/mL	[4]
colorimetric	APE1	G-quadruplex-hemin DNAzymes	1.8 U/mL	2.2-22.5 U/mL	[5]
fluorescence	APE1	enzyme involved CHA	0.016 U/mL	0.05-1 U/mL	This work
fluorescence	miRNA-21	MnO_2 nanosheets and CHA	0.33 nM	1-50 nM	[6]
colorimetric	miRNA-21	graphene/gold-nanoparticle [2]	3.2 nM	10-980 nM	[7]
fluorescence	miRNA-21	graphene/gold - nanoparticle	4.5 nM	0-300 nM	[8]
fluorescence	miRNA-21	surface acoustic wave	0.19 nM	0.5-5 nM	[9]

electrochemical	miRNA-21	gold nanoparticle/reduced graphene oxide	12 nM	-	[10]
fluorescence	miRNA-21	enzyme involved CHA	0.25 nM	2.5-40 nM	This work

Table S1 Comparison of different sensors for APE1 or miRNA-21 detection.

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