Electronic Supplementary Material (ESI) for Analyst.

SUPPORTING INFORMATION

An artificial enzyme cascade amplification strategy for highly sensitive and specific detection of breast cancer-derived exosomes

Huiying Xu, Lu Zheng, Yu Zhou, and Bang-Ce Ye*

Lab of Biosystem and Microanalysis, State Key Laboratory of Bioreactor Engineering, East China University of Science and Technology, Shanghai, 200237, China

E-mail: bcye@ecust.edu.cn

Table of content:

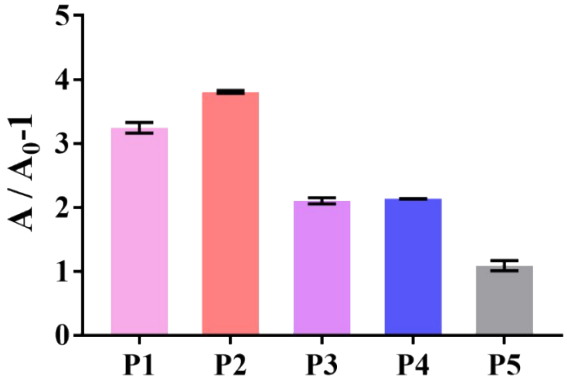

Fig. S1 Optimization of the G-quadruplex mimicking DNAzyme sequence by comparing the relative signal generated from five common G-quadruplex mimicking DNAzyme sequence. A is the absorbance at 420 nm in the presence of exosomes and A_0 is the absorbance at 420 nm in the absence of exosomes. Error bars show the standard deviation of three experiments.

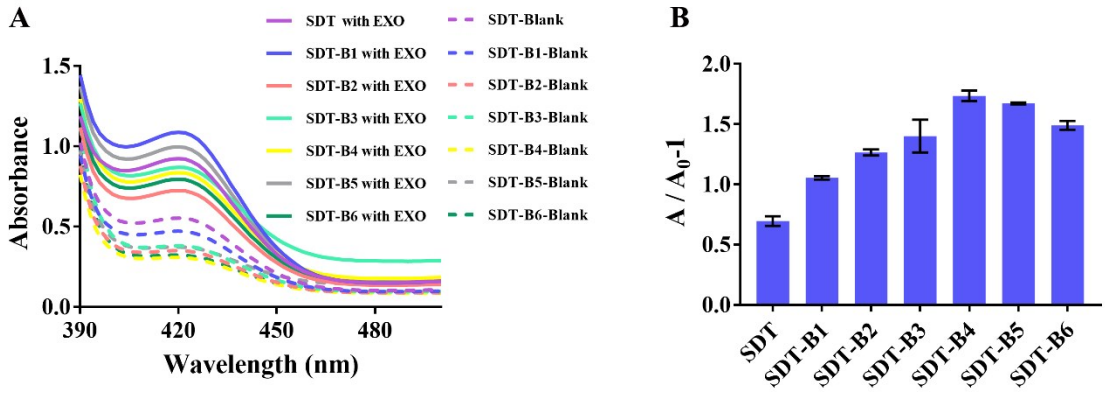

Fig. S2 Optimization of the switch strands. (A) Absorption spectra of the SDT sensing scaffold coupled with different switch strands (B1, B2, B3, B4, B5, and B6) in the presence and absence of exosomes. (B) The relative signal of the SDT sensing scaffold coupled with different switch strands.

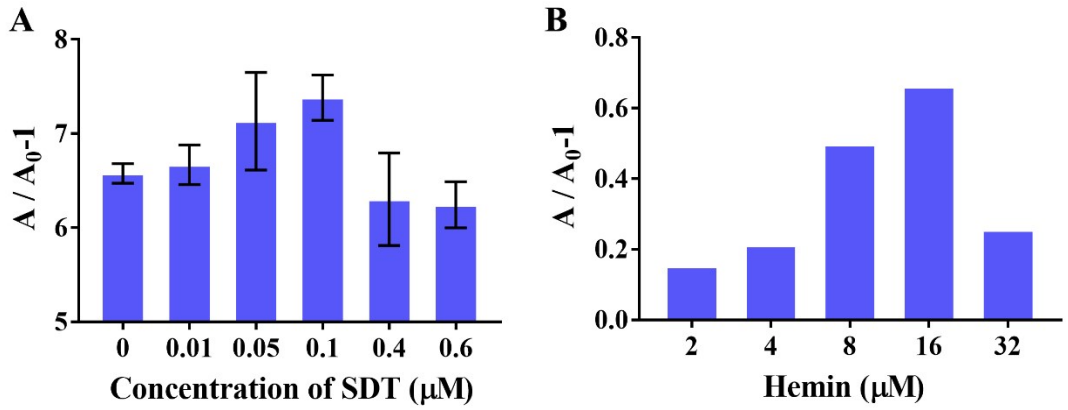

Fig. S3 (A) The relative signal of different concentration of SDT for detection of MCF-7 exosomes. (B) The relative signal of different concentration of hemin for detection of MCF-7 exosomes.

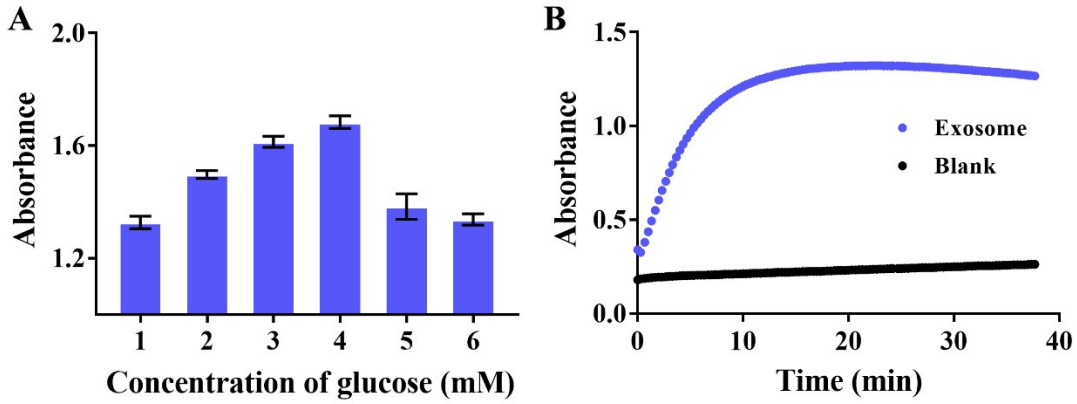

Fig. S4 (A) The relative signal of the SDT sensing scaffold at 420 nm after incubated with different concentration of glucose. (B) Time-course absorbance monitoring of the SDT sensing scaffold after adding all the reagents in the presence and absence exosomes.

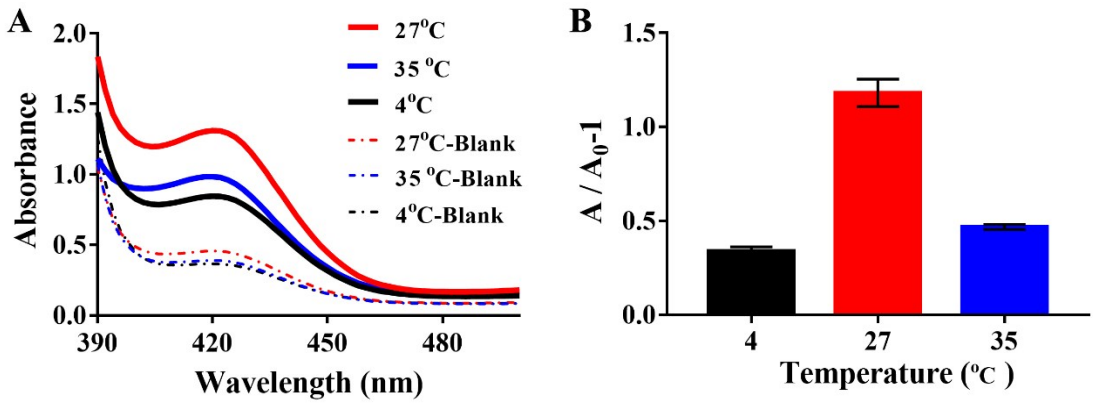

Fig. S5 Influence of temperature (4, 27, and 35℃) on the formation of G-quadruplex. (C) Histogram of absorbance change ratio (A/A_0-1) for the different reaction temperature.

2 Supporting Tables

Table S1. Sequence of oligonucleotides designed in this study[a]

DNA	Sequence (from 5′ to 3′)
P1	GGG TTG GGC GGG ATG GGG GTA TCCA
P2	TTT GGG TAG GGC GGG TTG GGG GTA TCC A
P3	GGG TAG GGC GGG TTG GGG GTA TCC A
P4	CTG GGA GGG AGG GAG GGA GGT ATC CA
P5	ACC TGG GGG AGT ATT GCG GTA TCC A
A76	TCAAC**TTTGGGTAGGGCGGGTTGGG**GGTATCCATGATAAAACGACACTACGT GGGAATCTACTATGGCGGCTCTTC
B76	TTCAG**TTTGGGTAGGGCGGGTTGGG**GGTATCCAAATGTGCTTCCCACGTAGT GTCGTTTGTATTGGACCCTCGCAT
C59	CTGAATTTTTATTACAGCTTGCTACACTTTTTGAAGAGCCGCCATAGTATTTTTA CATT
D59	GTTGATTTTTTGTGTAGCAAGCTGTAATTTTTTATGCGAGGGTCCAATACTTTTTT ATCA
B1	TTGATCCTTTGGATACC CCC AAC
B2	TTGATCCTTTGGATACC CCC AAC CCG
B3	TTGATCCTTTGGATACC CCC AAC CCG CCC
B4	TTGATCCTTTGGATACC CCC AAC CCG CCC TAC
B5	TTGATCCTTTGGATACC CCC AAC CCG CCC TAC CCA
B6	TTGATCCTTTGGATACC CCC AAC CCG CCC TAC CCA AA

[a] Bold bases are the G-quadruplex sequence, and underlined bases are MUC1 aptamer.

Table S2. Comparison of our method and reported methods for exosomes detection.

Platform	Linear range (particles/mL)	LOD (particles/mL)	Method	Assay time	Reference
B-Chol anchor assay with enzyme-linked HCR	2.3×10^6 - 2.3×10^8	2.2×10^6	Colorimetric	~16.5 h	[1]
large-AR AuNBP@MnO_2 NSs	8.5×10^5 - 8.5×10^7	1.35×10^5	Colorimetric	~2.5 h	[2]
Aptamer-based DNA nanodevices	10^6 - 10^{11}	10^6	Fluorescence	-	[3]
"on-off"-type aptasensor	1.0×10^8 - 1.6×10^9	4.2×10^7	Fluorescence	32 min	[4]
Aptasensor based on g-C3N4 nanosheets	1.9×10^9 - 3.38×10^{10}	1.35×10^9	Colorimetric	~30 min	[5]
HRP-pSC_4-AuNPs@COFs	5×10^5 - 1.5×10^{10}	1.6×10^5	electrochemical	~3 h	[6]
Switchable DNA tetrahedral scaffolds	3.8×10^6 - 1.2×10^8	1.51×10^5	Colorimetric	~2 h	This work

REFERENCES

1 F. He, H. Liu, X. Guo, B.-C. Yin and B.-C. Ye, *Anal. Chem.*, 2017, **89**, 12968-12975.

2 Y. Zhang, J. Jiao, Y. Wei, D. Wang, C. Yang and Z. Xu, *Anal. Chem.*, 2020, **92**, 15244-15252.

3 D. He, S.-L. Ho, H.-N. Chan, H. Wang, L. Hai, X. He, K. Wang and H.-W. Li, *Anal. Chem.*, 2019, **91**, 2768-2775.

4 J. Zhang, J. Shi, W. Liu, K. Zhang, H. Zhao, H. Zhang and Z. Zhang, *Sens. Actuators B Chem.*, 2018, **276**, 552-559.

5 Y.-M. Wang, J.-W. Liu, G. B. Adkins, W. Shen, M. P. Trinh, L.-Y. Duan, J.-H. Jiang and W. Zhong, *Anal. Chem.*, 2017, **89**, 12327-12333.

6 M. Wang, Y. Pan, S. Wu, Z. Sun, L. Wang, J. Yang, Y. Yin and G. Li, *Biosens. Bioelectron.*, 2020, **169**, 112638.