Supporting Information

Rapid and colorimetric detection of nucleic acids based on

entropy-driven circuit and DNAzyme mediated autocatalytic reaction

Hongli Shi,^a Jianyuan Dai,^{*a} Fang Wang,^b Yushun Xia,^a Dan Xiao^{ab} and Cuisong Zhou^{*a}

^a College of Chemistry, Sichuan University, Chengdu 610064, China

^b College of Chemical Engineering, Sichuan University, Chengdu 610065, China

DNA name	DNA sequence (5' to 3')
R	GGTTGTACTGGAACTTTCTTACCC
Р	TGGGTAGGGCGGGTTTTCCCTTGGAGTGTGACAATGGAGGGT
Q	CAAACACCATTGTCACACTCCAAGGGGGGGTAAGAAAGTTCCA
	GTACAACCCACCCATGTTACTCT
F	GATATCAGCGATGGTTGTACTGGAACTTTCTTACCCCCCTTGG
	AGTGTGACAATGG
Нр	AACACCAAGAGTATrAGGATATC <u>TGGAGTGTGACAATGGTGTT</u>
	<u>TG</u>
Perfectly matched target	TGGAGTGTGACAATGGTGTTTG
Deleted target	TGGAGTGTGAC_ATGGTGTTTG
Inserted target	TGGAGTGTGACCAATGGTGTTTG
Mismatched target	TGGAGTGTGACTATGGTGTTTG

Table S1: DNA sequences used in this work

The green underlined sequences in P strand are the two split G-quadruplex sequences. The blue underlined sequences in Hp is "mimic target".



Fig. S1 Time-dependent absolute absorbance changes of EDC and AEDC systems in the presence of 10 nM target DNA. The concentrations of Beacon, F and Hp were 500 nM, 500 nM and 200 nM, respectively. A- A^0 : The absorbance intensity at 418 nm of detection systems in the presence of target DNA minus the absorbance intensity at 418 nm of detection systems in the absence of target DNA.

Methods	Detection mode	Detection limit	Cost of time	Ref.
Gold Nanoparticles and hybridization chain reaction amplification	Colorimetry	50 pM	1 h	[1]
G-quadruplex integrated hybridization chain reaction	Fluorescence	4 nM	1 h	[2]
Exonuclease III-assisted target recycling	Electrochemistry	20 pM	1 h	[3]
DNA templated silver nanoclusters fluorescent probe	Fluorescence	290 pM	2 h	[4]
AuNP and toehold-mediated strand displacement reaction	Fluorescence	258 pM	10 h	[5]
pyrrolo-deoxycytidine (P-dC) and catalyzed hairpin assembly (CHA)	Fluorescence	19 pM	1.5 h	[6]
DNA machine	Colorimetry	0.2 nM	19 h	[7]
Entropy-driven circuit and				
Mg ²⁺ -dependent DNAzyme mediated autocatalytic reaction	Colorimetry	10.2 pM	20 min	This work

Table S2: Comparison of different sensors for the determination of DNA

References

[1] P. Liu, X. H. Yang, S. Sun, Q. Wang, K. M. Wang, J. Huang, J. B. Liu and L. L. He, Anal.

Chem., 2013, 85, 7689-7695.

- [2] J. Dong, X. Cui, Y. Deng and Z. Tang, Biosens. Bioelectron., 2012, 38, 258-263.
- [3] F. Xuan, X. T. Luo and I. M. Hsing, Anal. Chem., 2012, 84, 5216-5220.
- [4] H. Y. Zhao, L. Wang, J. Zhu, H. P. Wei and W. Jiang, *Talanta*, 2015, 138, 163-168.

[5] B. Wang, X. Zhou, D. B. Yao, X. B. Sun, M. He, X. J. Wang, X. Yin and H. J. Liang, Chem.

Commun., 2017, 53, 10950-10953.

[6] Z. J. Duan, Z. Li, J. Y. Dai, H. F. He and D. Xiao, *Talanta*, 2017, 164, 34-38.

[7] H. L. Li, J. T. Ren, Y. Q. Liu and E. K. Wang, Chem. Commun., 2014, 50, 704-706.