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Supporting Information

Sensitive detection of p53 DNA based on spatially confined fluorescence resonance energy transfer and multivalent assembly of branched DNA

Yeling Liu[a], Xia Sun[a], Hui Yuan[a], Bingxin Liu[a], Bingqian Zhou[a], Xuening Chen[b], Xia Li[a*], Qingwang Xue[a*]

[a]*Department of Chemistry, Liaocheng University, Liaocheng 252059, China*

[b]*College of Chemistry and Molecular Engineering，Qingdao University of Science and Technology, China*

Correspondence: lixia@lcu.edu.cn; xueqingwang1983@163.com (Q-W. X)

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Table S1 Sequences of oligonucleotides used in this study

Name	Sequence (5'-3')
p53 DNA	TCA TCA CAC TGG AAG ACT C
HP	GCC AAT GTT CAG ATG TTT TTT TTT TTT CTC ATA CCA CTC CTC AGC GAG TCT TCC AGT GTG ATG A
ss1	TAMRA - TTT TCT CAT ACC ACT GCT CAT CCA TGC CTA GAC TGG CGATAA GTA GCC AGC
ss2	TAMRA - TTT TCT CAT ACC ACT GCT CAG CAA GCG TTA TGC GTC TAG GCA TGG ATG AGC
ss3	TAMRA - TTT TCT CAT ACC ACT GCT CTG GTA TGC ATG TCG GCA TAA CGC TTG CTG AGC
ss4	TAMRA - TTT TCT CAT ACC ACT GCT GGC TAC TTA TCG CCA CGA CAT GCA TAC CAG AGC
ss5	CGA CCG ATG AAT AGC GGT CAG ATC CGT ACC TAC TCG GCC AAT GTT CAG ATG - FAM
ss6	CGA GTA GGT ACG GAT CTG CGT ATT GCG AAC GAC TCG GCC AAT GTT CAG ATG - FAM
ss7	CGA GTC GTT CGC AAT ACG GCT GTA CGT ATG GTC TCG GCC AAT GTT CAG ATG - FAM
ss8	CGA GAC CAT ACG TAC AGC ACC GCT ATT CAT CGG TCG GCC AAT GTT CAG ATG – FAM
T1	TCA TCA CAC TGG AAG AAT C
T2	TCA TCA CAC TGG AAG GAT C
Tn	GGT CTC TTG ATA GCA CTC G

Table S2. Detection of p53 gene in spiked cell lysis samples by the proposed sensing system

sample	Added p53 DNA / nM	Measured p53 DNA / nM	Recovery/%	RSD/%
1	1.0	1.022	102.2	5.98
2	10	11.03	101.3	5.57
3	100	97.1	97.1	5.46

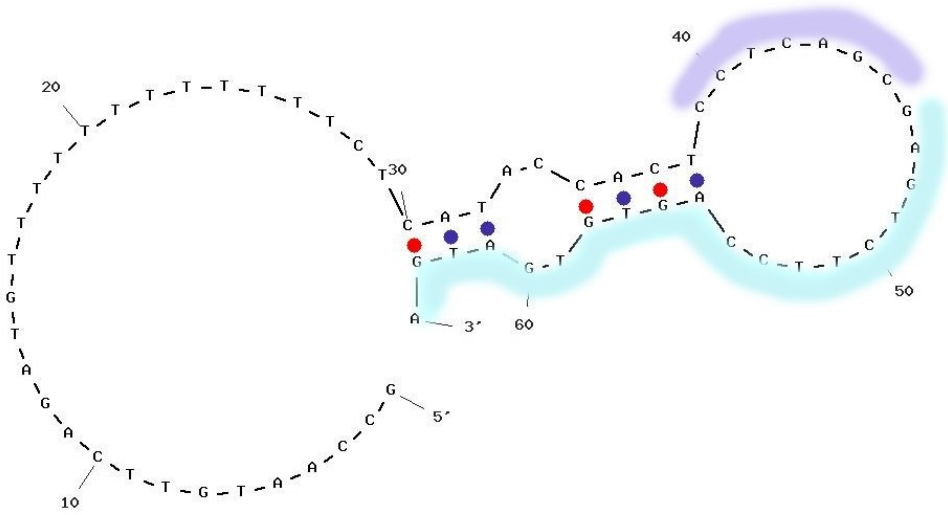

Fig. S1. The secondary structure of HP

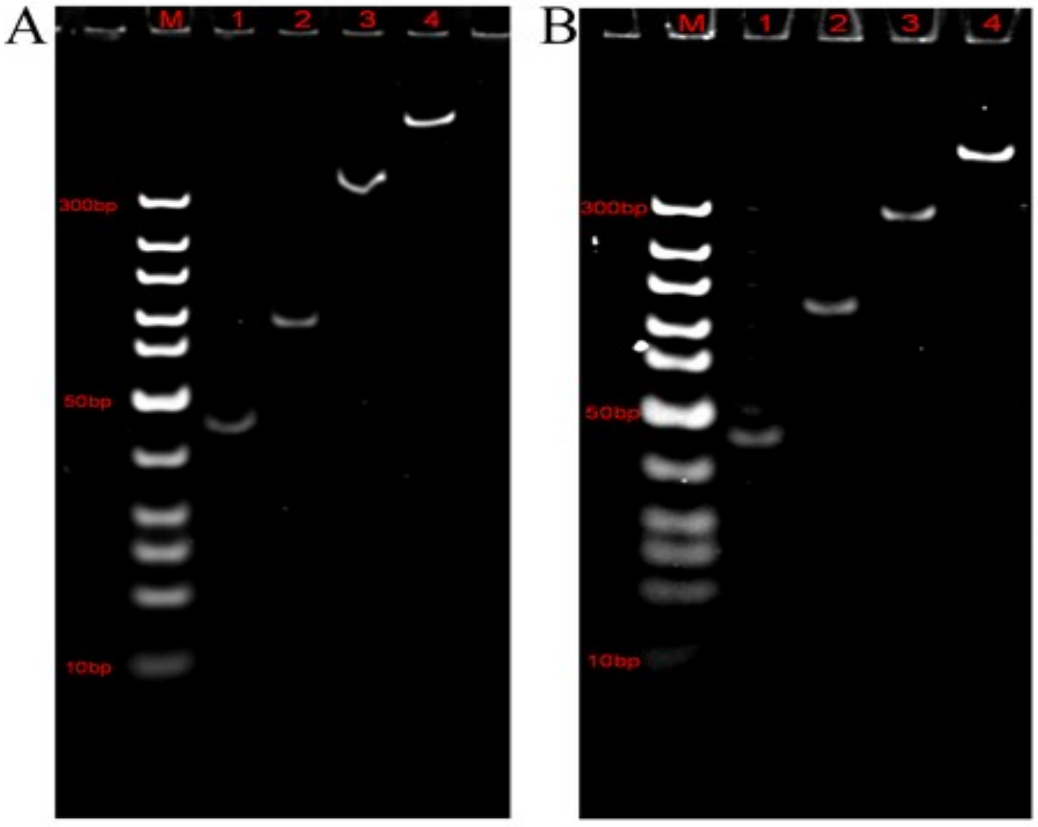

Fig. S2. Gel electrophoresis characterization of the proposed X-shaped branched-DNA; Lane 1: ss1；Lane 2: ss1 + ss2；Lane 3: ss1 + ss2 + ss3；Lane 4: ss1 + ss2 + ss3 + ss4；（B）Lane 1: ss5；Lane 2: ss5 + ss6；Lane 3: ss5 + ss6 + ss7；Lane 4: ss5 + ss6 + ss7 + ss8

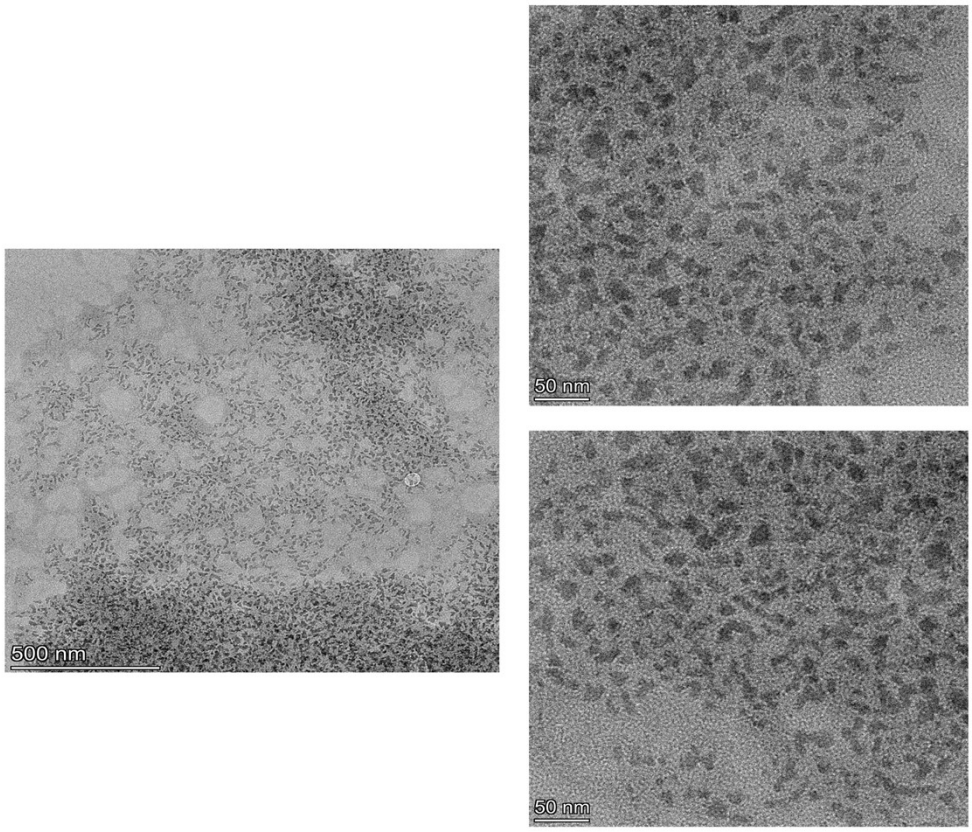

Fig. S3 TEM image of the proposed SC-FRET probes: HP, 250 nM; Nb.BvCI, 2.5 U; KFP, 1U; X-FAM, 250 nM; X-TAMRA, 250 nM

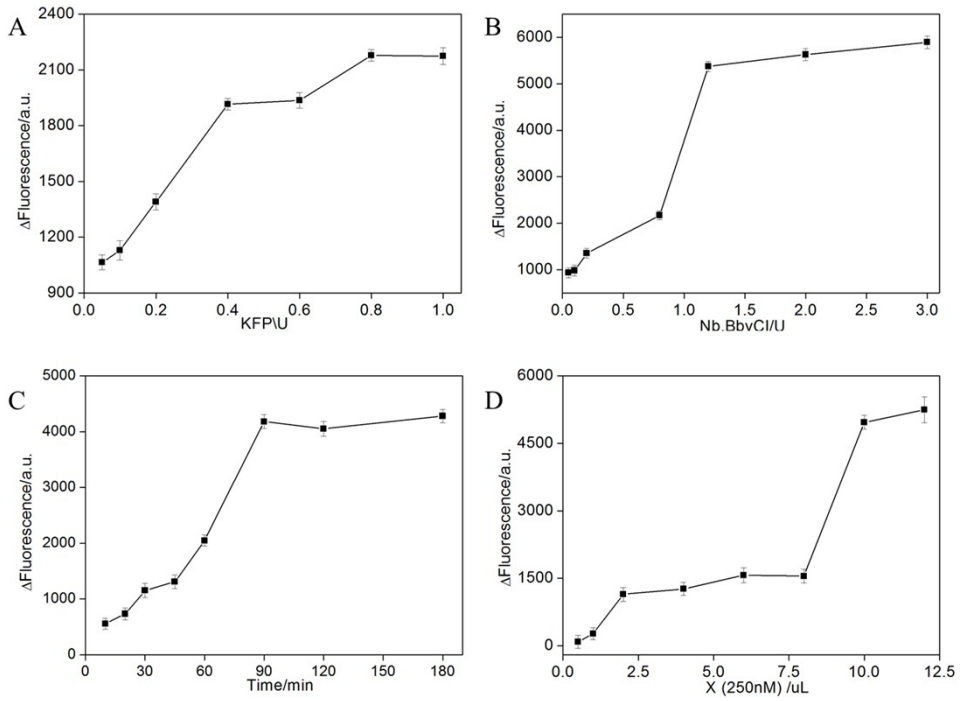

Fig. S4. Effect of the concentration of KFP (A); the concentration of Nb.BbvCI (B); the SDA reaction time (C); the volume of X-shaped branched-DNA (X-FAM , X-TAMRA) (D) on the fluorescence intensity of the sensing system.

Table S3. Comparison of different methods for p53 DNA detection.

signal readout	amplification	LOD	linear range	selectivity	Ref.
Quartz crystal microbalance	−	0.3 nM	not given	good	1
Electrochemistry	−	230 pM	1.0-95 nM,	good	2
Colorimetric	+	1 pM	1-100 pM	good	3
Electrochemistry	++	0.3 fM	1 fM -1000 pM	good	4
Electrochemistry	+	0.5 fM	1 fM -1 nM	good	5
Electrochemistry	++	0.45 fM	1 fM -100 pM	good	6
Electrochemiluminescence	++	0.02 fM.	0.05-100 fM	good	7
SERS	++	21 aM,	not given	good	8
Fluorescence	+	2.5 pM	10 pM -100 nM	good	9
Fluorescence	+	80 pM	not given	good	10
Fluorescence	−	0.26 pM	0.001 -100 nM	good	11
FRET	**+**	**0.01394 pM**	**0.1-500 pM.**	**good**	**Our work**

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