

## Supplementary material

### A cascade signal amplification strategy for ultrasensitive colorimetric detection of BRCA1 gene

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**Table S1**

Sequences of the used oligonucleotides (in 5'-3' direction).<sup>a</sup>

Oligonucleotide	Sequence (5'-3')
Target DNA (TD)	GAACAAAAGGAAGAAAATC
Hairpin probe(HP)	AGAAAATCATCTTCTCCGAGCCGGTCGAAATAGTGGGTGATTTCTCCTTTGTT C
MB1	P- TATTCGCCAACACACCAACCCACCCACTAT <u>r</u> AGGAAGAGATGCATCTCTCCGA GCCGGTCGAAATAGTGGGTG
MB2	P- TATTCGCCCAACCCAACCCCACCCACTAT <u>r</u> AGGAAGAGATGCATCTCT TCTCGAGCCGGTCGAAATAGTGGGTG
MB3	P- TATTCGCCCTAACCTAACCCCTAACCCACCCACTAT <u>r</u> AGGAAGAGATGCATCTCTC TCCGAGCCG GTCGAAATAGTGGGTG
MB4	P- TATTCGCCCAACCGCCCTACCCACCCACTAT <u>r</u> AGGAAGAGATGCATCTCTCC GAGCCGGTCGAAATAGTGGGTG
Primer1	TGGCGAAATAATAGTGGGTG
Primer2	GGGCGAAATAATAGTGGGTG
Primer3	GGGCGAAATAATAGTGGGTG
Primer4	GGGCGAAATAATAGTGGGTG
single-base mismatched	GA <u>A</u> AAAAGGAAGAAAATC
DNA (1 MT)	
two-base mismatched	GA <u>AG</u> AAAAGCAAGAAAATC
DNA (2 MT)	
non-complementary	CGGACCTGCATCCGCTGAT
DNA (NC)	

<sup>a</sup> The underlined characters of Oligonucleotide 1 MT and 2 MT indicated the mismatched base.

**Table S2**

The comparison of our strategy with other reported methods for the detection of BRCA1 gene.

Reference	Substrate used	Detection	Techniques used	Detection limit
(Li et al. 2012) <sup>1</sup>	SWCNT-modified SPEs	Hybridization between immobilized probe and target probe	Electrochemistry	378.52 nM
(Shimron et al. 2012) <sup>2</sup>	Solution phase	Autonomous assembly of HRP-mimicking DNAzyme nanowires	Colorimetry or Chemiluminescence	$10^{-13}$ M
(Rasheed and Sandhyarani 2014) <sup>3</sup>	Graphene-modified GCE	Sandwich-type hybridization by capture probe, target probe and reporter probe labeled with Au nanoparticles	Electrochemistry	1 fM
(Rasheed and Sandhyarani 2015) <sup>4</sup>	Functionalized gold electrode	Hybridization between DNA-r.AuNP and target probe	Electrochemistry	50 aM
Present study	Solution phase	DNAzyme assistant DNA recycling, RCA and HRP-mimicking DNAzyme amplification	Colorimetry	3.3 fM

1 C.-z. Li, H. Karadeniz, E. Canavar and A. Erdem, *Electrochim. Acta*, 2012, **82**, 137-142.2 S. Shimron, F. Wang, R. Orbach and I. Willner, *Anal. Chem.*, 2012, **84**, 1042-1048.3 P. Abdul Rasheed and N. Sandhyarani, *Sens. Actuators, B*, 2014, **204**, 777-782.4 P. Abdul Rasheed and N. Sandhyarani, *Biosens. Bioelectron.*, 2015, **65**, 333-340.