Electronic Supplementary Material (ESI) for RSC Advances.

Electronic Supplementary Information

Detection of nucleic acids via G-quadruplex-controlled $_{L}$-cysteine oxidation and catalyzed hairpin assembly-assisted signal amplification

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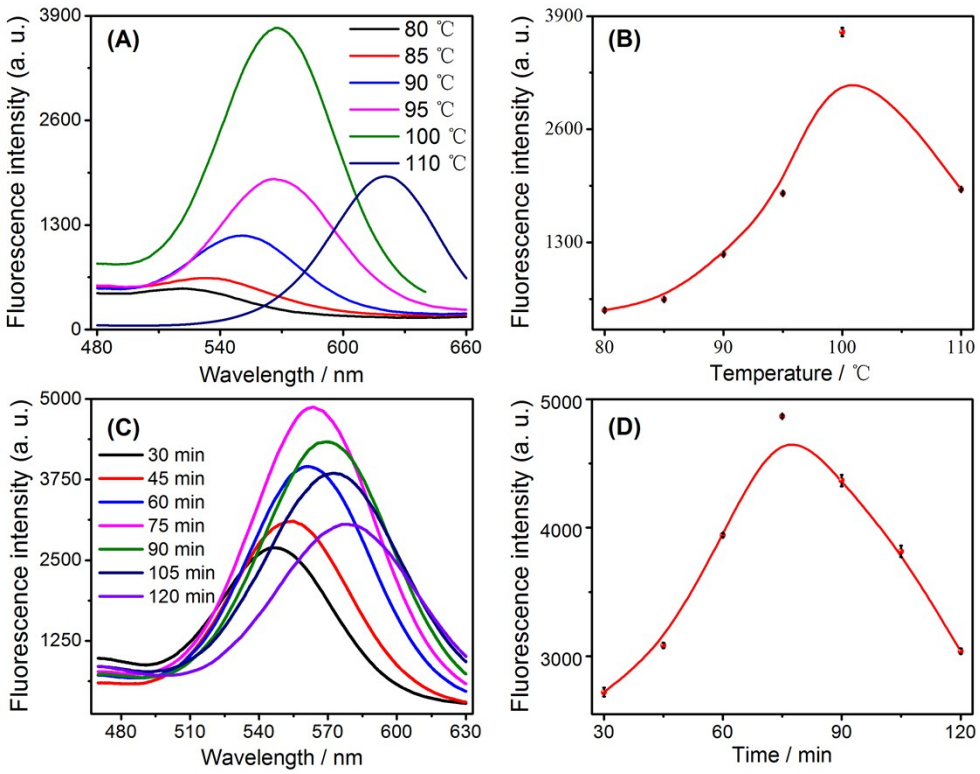

Fig. S1 Optimization of L-cysteine-modulated synthesis of CdTe QDs conditions. (A) and (B): reaction temperature; (C) and (D): reaction time. Error bars were estimated from three replicate measurements.

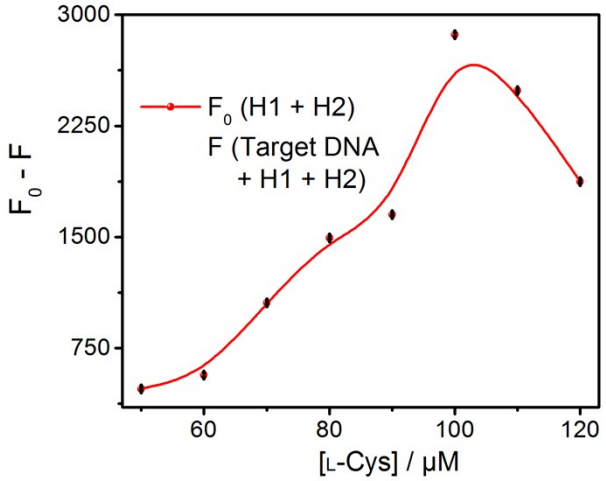

Fig. S2 Optimization of concentration of L-cysteine (L-Cys) for CdTe QDs synthesis. Error bars were estimated from three replicate measurements.

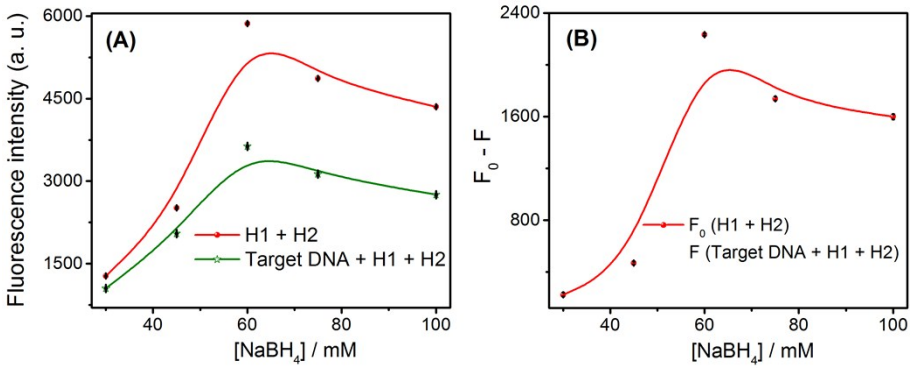

Fig. S3 Optimization of concentration of $NaBH_4$ for CdTe QDs synthesis. Error bars were estimated from three replicate measurements.

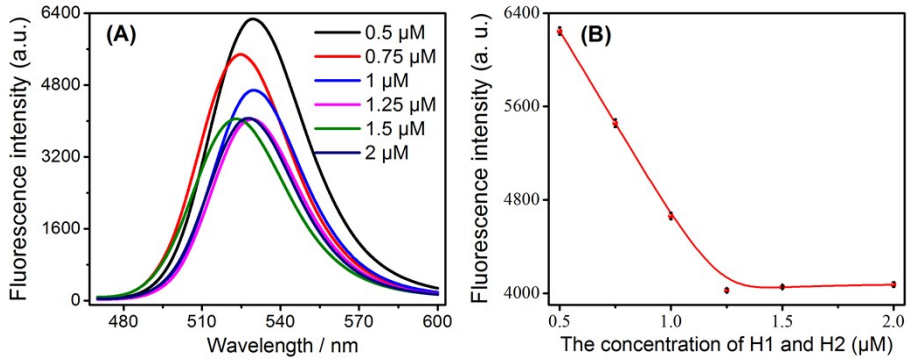

Fig. S4 Optimization of concentration of H1 and H2 for catalyzed hairpin assembly-assisted signal amplification reaction. Error bars were estimated from three replicate measurements.

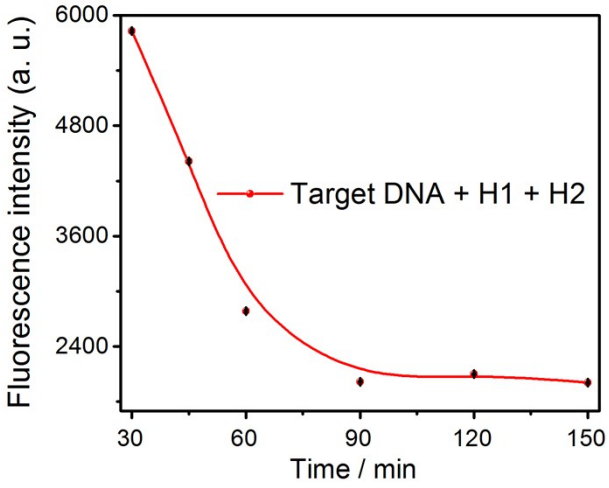

Fig. S5 Optimization of time of catalyzed hairpin assembly-assisted signal amplification reaction. Error bars were estimated from three replicate measurements.

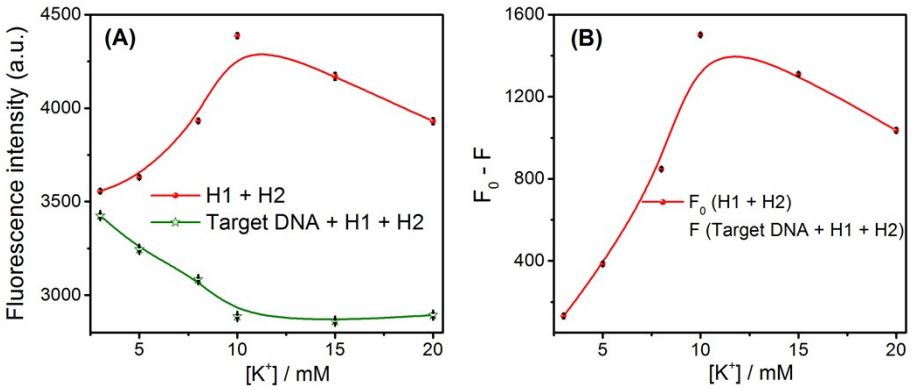

Fig. S6 Optimization of concentration of K^+ for form the G-quadruplex structure. Error bars were estimated from three replicate measurements.

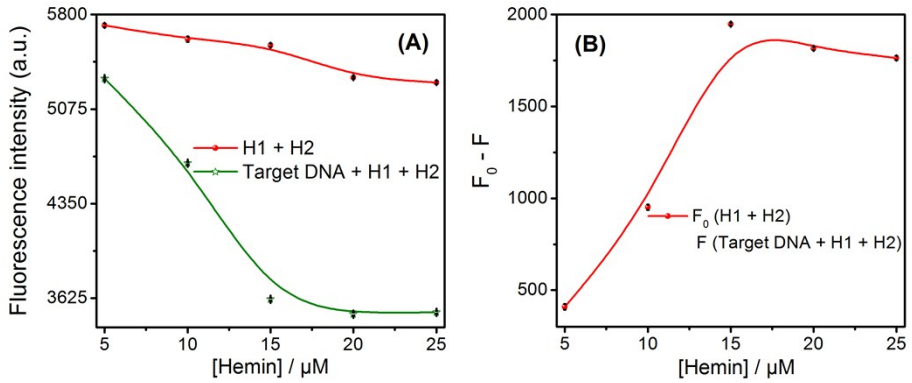

Fig. S7 Optimization of concentration of hemin for form the G-quadruplex-hemin complex. Error bars were estimated from three replicate measurements.

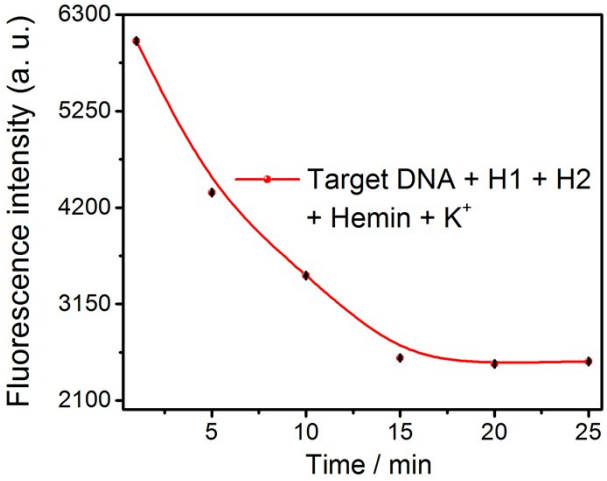

Fig. S8 Optimization of time of form the G-quadruplex-hemin complex. Error bars were estimated from three replicate measurements.

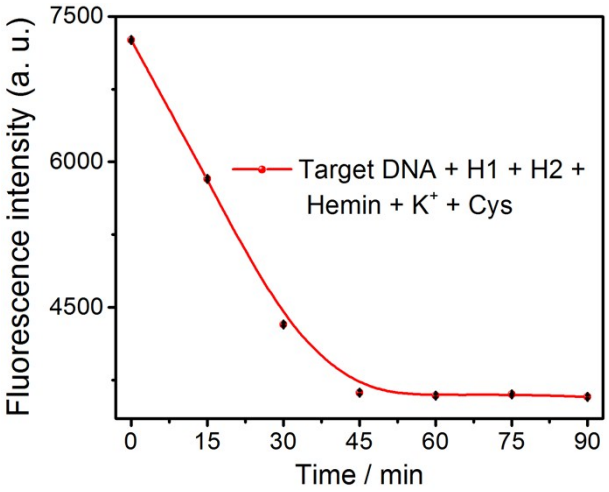

Fig. S9 Optimization of time of oxidation L-cysteine to cystine by the G-quadruplex-hemin-K^+ complex. Error bars were estimated from three replicate measurements.

Table S1 Comparison of different strategies for the detection of nucleic acids

Method	System	LOD; Linear range	Reference
Fluorescence	Molecular beacon; exonuclease and polymerase	28.2 fM; 50 fM-1 nM	1
Fluorescence	G-quadruplex-NMM; Exonuclease III	36 pM; 0.6-3 nM	2
Fluorescence	G-quadruplex-NMM; DNA walker	4.1 fM; 0.02-500 pM	3
Fluorescence	Molecular beacons; strand displacement reaction	10 pM; 10-1000 pM	4
FRET[a]	Catalyzed hairpin assembly (CHA)	33 pM; 0-4 nM	5
Colorimetric	G-quadruplex-ABTS; polymerase and nicking endonuclease	10 pM; 10 pM-200 nM	6
EC[b]	Strand displacement amplification and hybridization chain reaction	0.16 fM; 0.2 fM-1 pM	7
ECL[c]	Restriction enzyme-powered DNA walking machine	0.19 pM; 0.5 pM-10 nM	8
SERS[d]	Exonuclease III	1 fM; 1 fM-10 nM	9
CL[e]	Enzyme-free DNA walker	3.9 pM; 0.05-1 nM	10
ICP-MS[f]	Rolling circle amplification; Au NPs	0.1 fM; 1-20 fM	11
ICP-MS	Hybridization chain reaction; Cu NPs	4 pM; 20-1000 pM	12
Fluorescence	CdTe QDs; catalyzed hairpin assembly	0.12 pM; 0.1 pM-1 nM	This work

[a]Donor donor-acceptor fluorescence resonance energy transfer, [b]Electrochemical, [c]Electrochemiluminescence, [d]Surface-enhanced Raman spectroscopy, [e]Chemiluminescence,

[f]Inductively coupled plasma mass spectrometer.

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