Electronic Supplementary Information

Investigating the effect of 6-mercaptohexanol on the performance of the biosensor based on nanosurface energy transfer between gold nanoparticles and quantum dots

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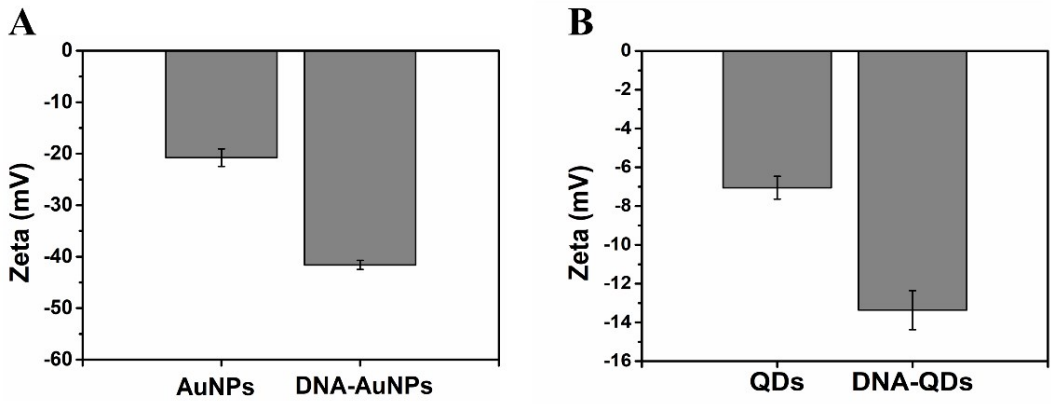

Figure S1. (A) Zeta potentials of AuNPs and DNA-AuNPs. (B) Zeta potentials of QDs and DNA-QDs.

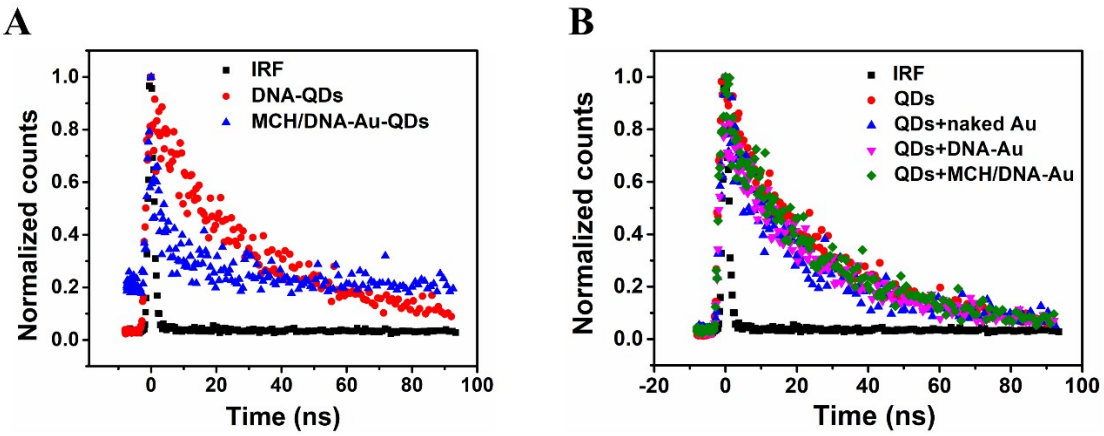

Figure S2. (A) Fluorescence lifetime decay of DNA-QDs and DNA-Au-QDs assembly. (B) Fluorescence lifetime decay of QDs in the absence and presence of naked AuNPs, DNA-AuNPs and MCH/DNA-AuNPs.

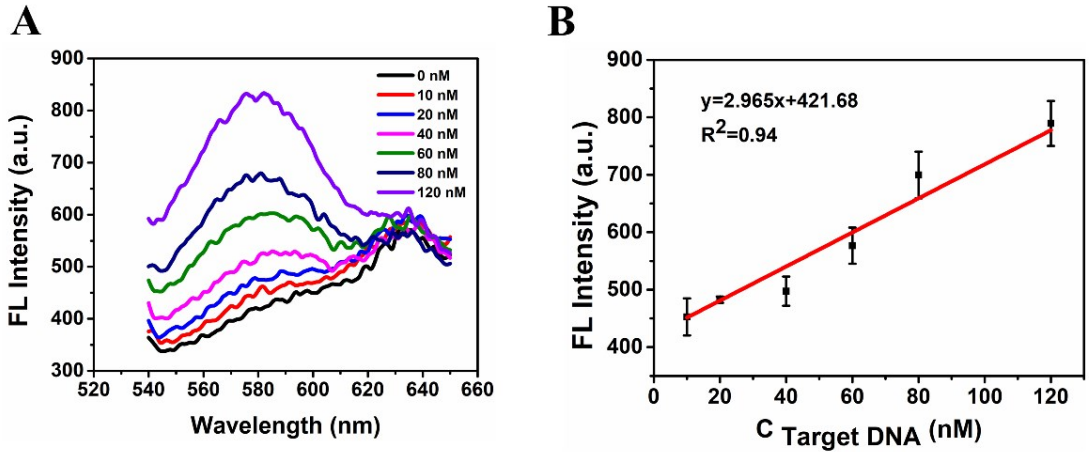

Figure S3. (A) Fluorescence spectra and (B) calibration curve of the original DNA-Au-QDs sensor upon addition of target DNA at different concentration.

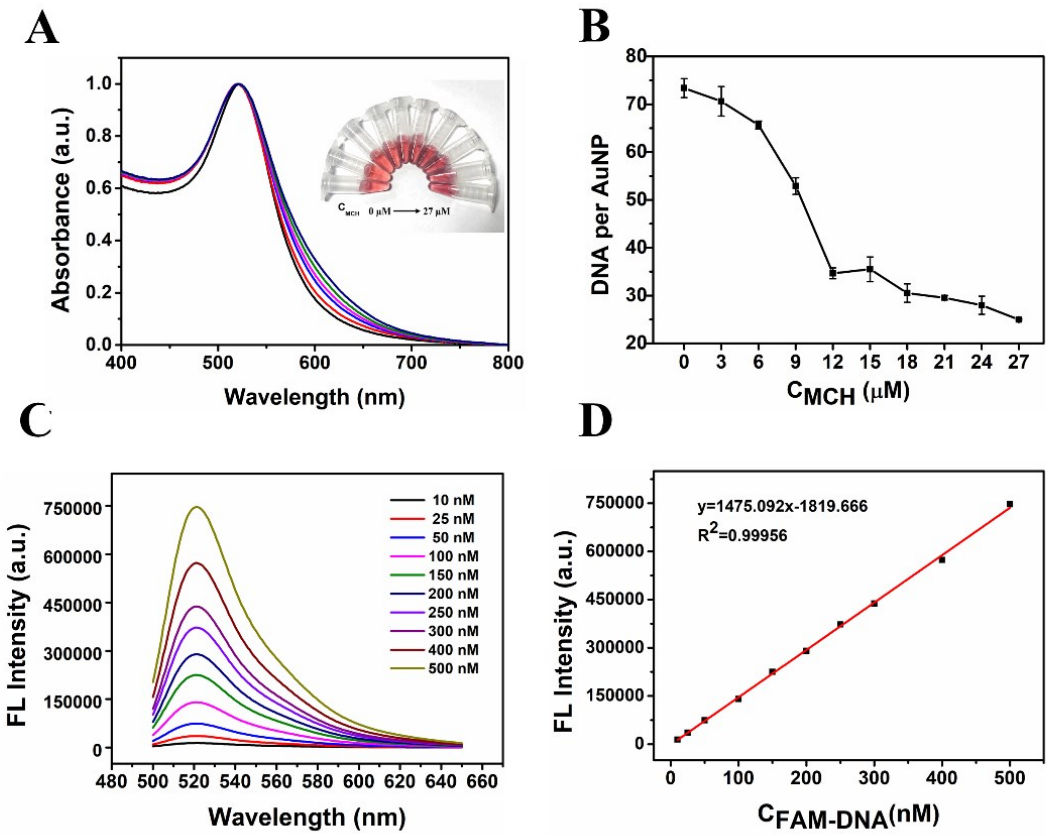

Figure S4. (A) UV−vis absorbance spectra and photograph (inset) of MCH/DNA-AuNPs treated with different concentration of MCH. (B) Plots of number of thiolated DNA per AuNP upon MCH treatment at different concentration. (C) Fluorescence spectra of various concentration of S1-FAM. (D) Calibration curve of fluorescence intensity and concentration of S1-FAM.

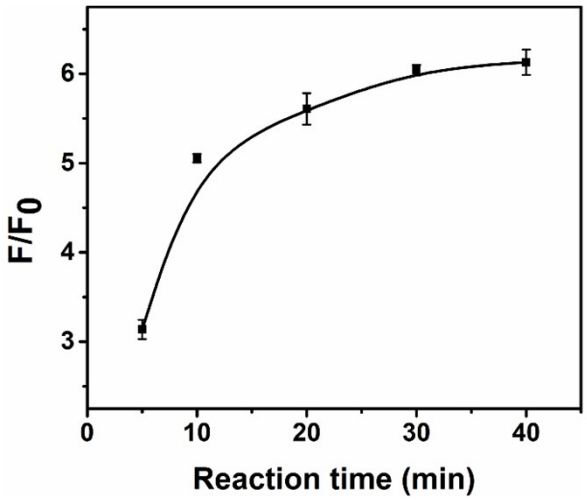

Figure S5. The effect of reaction time on the signal to background ratio of the MCH/DNA-Au-QDs sensor upon the addition of target DNA.

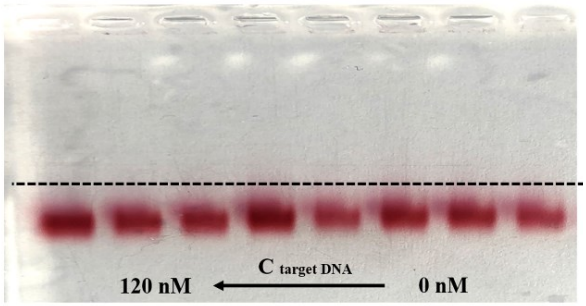

Figure S6. Agarose gel electrophoresis image of MCH/DNA-Au-QDs assembly upon the addition of different concentration of target DNA.

Table S1. Oligonucleotide sequences in this study.

Oligonucleotides	Sequence (5′ – 3′)
S1	TCATC CATAT AACTG AAAGC CATTT TTT-SH
S1-FAM	FAM-TCATC CATAT AACTG AAAGC CATTT TTT-SH
P1	G*G*G*G*G*G*G*G*G*G*TTTTT TGGCT TTCAG TTATA TGGAT GATGT GGTAT
T1(Target)	ATACC ACATC ATCCA TATAA CTGAA AGCCA
S2	CCAAA GGATC AACTG CTTTT TT-SH
P2 (Mucin1 aptamer)	G*G*G*G*G*G*G*G*G*G*TTTTT TGCAG TTGAT CCTTT GGATA CCCTG G

Table S2. Comparison of the method for nucleic acid detection in this work with other previously published methods.

Fluorescent probe	Linear range	LOD	References
FAM-DNA-TAMRA	0-200 nM	7.6 nM	1
FAM-DNA-AuNPs	0-30 nM	1.64 nM	2
QD-DNA-GO	50-1600 nM	10.4 nM	3
QD-DNA-AuBHQ	2.0-15.0 nM	0.22 nM	4
QD-NBs	10-300 nM	2.06 nM	5
This work	5-120 nM	1.19 nM	This work

References

1 N. Xie, J. Huang, X. Yang, Y. Yang, K. Quan, M. Ou, H. Fang and K. Wang, *ACS Sens.*, 2016, **1**, 1445-1452.

2 J. L. Wang, J. Huang, K. Quan, J. Li, Y. A. Wu, Q. M. Wei, X. H. Yang and K. M. Wang, *Chem. Commun.*, 2018, **54**, 10336-10339.

3 C. Zhang, J. Xu, S. Zhang, X. Ji and Z. He, *Chem. Eur. J.*, 2012, **18**, 8296-8300.

4 S. Q. Chai, W. Y. Lv, J. H. He, C. H. Li, Y. F. Li, C. M. Li and C. Z. Huang, *Anal.*

Chem., 2019, **91**, 6761-6768.

Y. Ma, G. Mao, W. Huang, G. Wu, W. Yin, X. Ji, Z. Deng, Z. Cai, X.-E. Zhang, Z. He and Z. Cui, *J. Am. Chem. Soc.*, 2019, **141**, 13454-13458.