Supplemental Information

Label-Free Electrochemiluminescent Detection of Transcription Factors with Hybridization Chain Reaction Amplification

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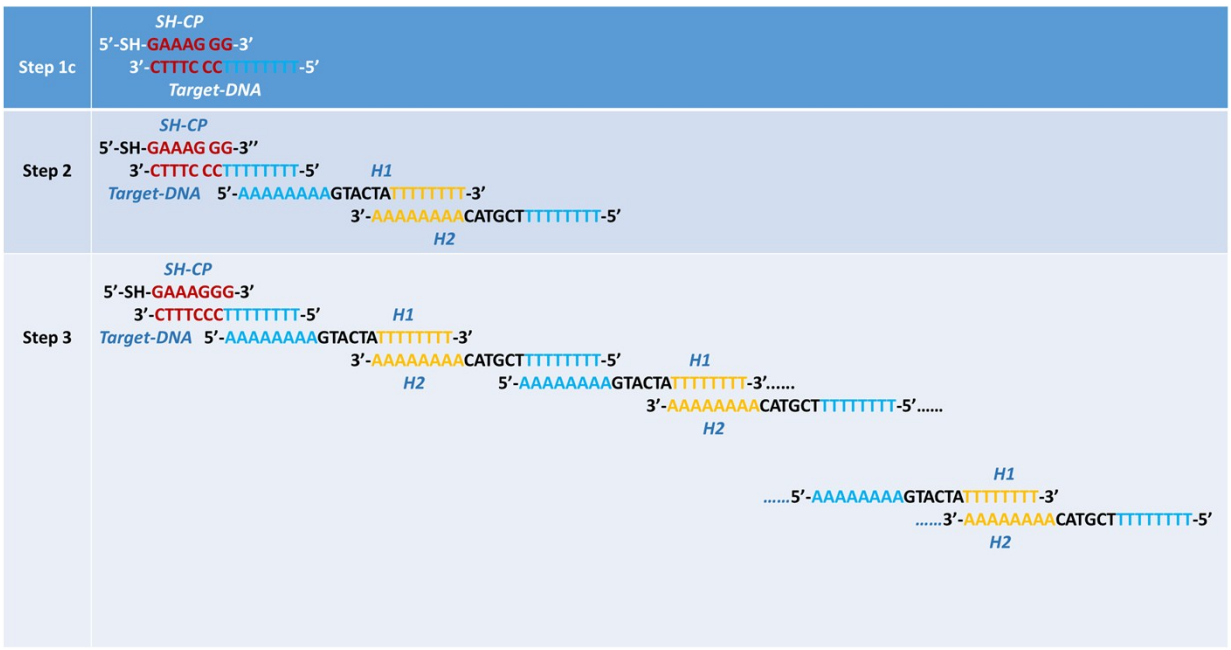
1. Principle of the HCR Amplification:

With the SH-capture probe DNA assembled gold electrode, the presence of the target DNA could conjugated with SH-capture probe DNA by hydrogen bond, as we can see from step 1 of Table S2, after helper DNA-1 and helper DNA-2 were added to the above system, as shown in step 2 and step 3, helper DNA-1 and helper DNA-2 leads to the formation of long chain dsDNA polymers on the gold electrode surface through hybridization chain reaction, which allowed the intercalation of numerous ECL indicators $Ru(phen)_3^{2+}$ (phen=1,10-phenanthroline) into the dsDNA grooves, resulting in significantly amplified ECL signal output.

Table S1. DNA sequences

SH-CP	5'-SH-GAAAGGG-3'
Target-DNA	5'-TTTTTTTTCCCTTTC-3'
H1	5'-AAAAAAAAGTACTATTTTTTTT-3'
H2	5'-TTTTTTTTTCGTACAAAAAAAA-3'

Table S2.



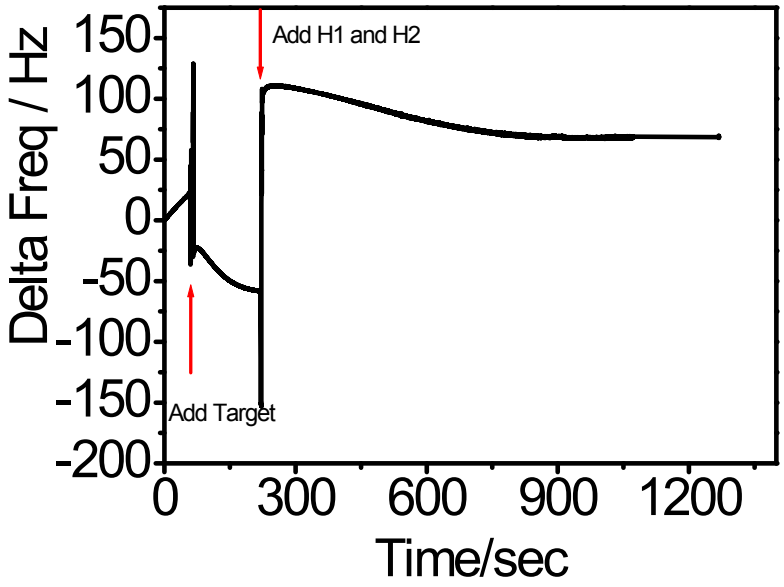


Figure S1: Real time frequency change monitored on different QCM sensors: SH-CP/GE in the presence of TFs. (The red arrows denote the moment that the added samples arrive at the sensing surface.)

2. Comparison with Some reported biosensors

Table S3. Comparison of the proposed assay with some reported biosensors

Methods	Label	Detection Limit/nM	Linear Range/nM	Reference
Fluorescence	FAM labeled	8.4	10-100	1
Fluorescence	Label free	0.1	0.1-1	2
Colorimetric	Biotin labeled	0.7	0.7-16.8	3
Electrochemical	methylene blue Labeled	4.0	4-121	4
Fluorescence	Label free	0.2	0.5-50	5
Colorimetric	AuNPs labeled	4.5	5-50	6
This Method	Label free	0.017	0.05-2	This Work

References

1. T. Gao, L. Wang, J. Zhu, D. Zhu and W. Jiang, *Talanta*, 2015, **144**, 44–50.

2. X. Liu, X. Cai, L.Yang, Y. Huang, X. Feng, Q. Fan and W. Huang, *Biosens. Bioelectron.*, 2013, **41**, 218–224.

3. Z. Fang, W. Zhang, C. Ge, J. Liu, P. Lie and L. Zeng, *Analyst*, 2012, **137**, 4127.

4. A.J. Bonham, K. Hsieh, B. Scott Ferguson, A. Vallée-Bélisle, F. Ricci, H.T. Soh and K.W. Plaxco, *J. Am. Chem. Soc.*, 2012, **134**, 3346−3348.

5. D. Zhu, L. Wang, X. Xu and W. Jiang, *Biosens. Bioelectron.*, 2016, **75**, 155–160.

6. X. Li, N. Yang, Y. Zhang, H. Li, T. Yin, L. Sun and G. Li, *Electroanalysis*, 2014, **26**, 2520 – 2525.