



Supplementary material to

Rapid single molecule detection of *Salmonella* DNA based on an electrode surface-based polymerase chain reaction technique

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Table S1. Oligonucleotides used for DNA hybridization

Label	Nucleic acid sequences (5' → 3')	Ref.
Probe DNA (ssDNA) (52 bp)	5AmMC6/ TTG AGG AGG AGA GTA GGC TGA GGT AGG GAG AAT GGG AGG TAC ACC AGT TAG C	[1]
Analyte/ Complimentary Target DNA (52 bp)	GCT AAC TGG TGT ACC TCC CAT TCT CCC TAC CTC AGC CTA CTC TCC TCC TCA A	[1]
Non-complimentary Target DNA (52 bp)	GCT <u>CAA</u> TGG <u>TTG</u> ACC TCC <u>TAC</u> TCT CCC <u>CAT</u> CTC <u>ACG</u> CTA CTC TCC TCC TCA -A 10' Mismatch bases relative to the probe are underlined	

Table S2. Oligonucleotides used for PCR

Label	Nucleic acid sequences (5' → 3')	Ref.
DNA template	GCT GTG GAA TCC GTT AGT GAA GTA ACC GAT AAC GCC ACG GGA ATC TCT	[2]
Immobilized forward primer (20 bp)	/5AmMC6/AGA GAT TCC CGT GGC GTT AT	[2]
Reverse primer (21bp)	GCT GTG GAA TCC GTT AGT GAA	[2]
Random sequence (52 bp)	GCT AAC TGG TGT ACC TCC CAT TCT CCC TAC CTC AGC CTA CTC TCC TCC TCA A	[2]

Table S3. PCR composition and concentration

Components	Volume, μ L	Final concentration
PCR master mix (2x)	25	(1x)
Reverse primer (2 μ M)	10	0.4 μ M
Immobilized forward primer		0.4 μ M
Target (template ssDNA)	10	2 pM - 35 zM
Nuclease free water	5	
Total volume		50 μ L

Table S4. PCR components for chicken juice study

Components	Volume, μL	Final concentration
PCR master mix (2x)	25	(1x)
Reverse primer (4 μM)	5	0.4 μM
Immobilized forward primer		0.4 μM
Target (template ssDNA)	5	35 zM or 1 molecule of target ssDNA
Chicken juice	15	
Total volume		50 μL

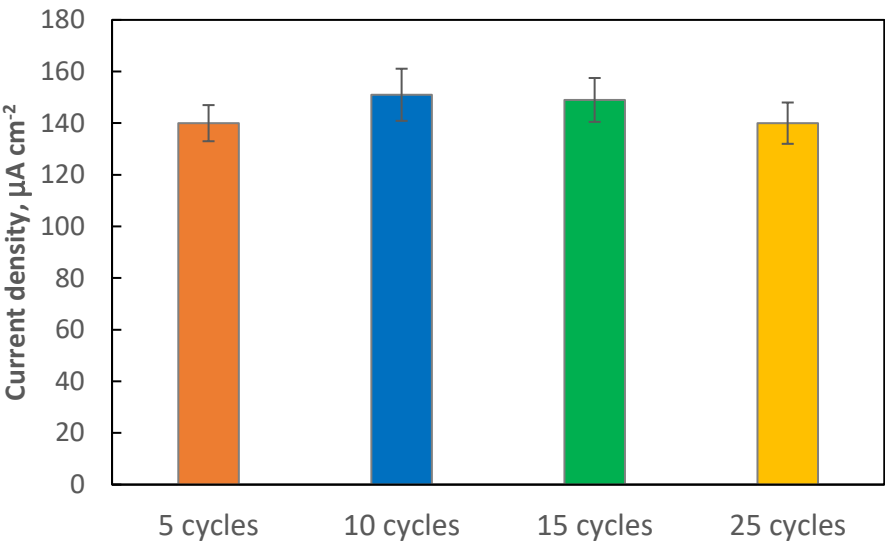


Figure S1. oE-PCR optimization cycles. 5 cycles are enough to saturate the surface with 35 zM target DNA

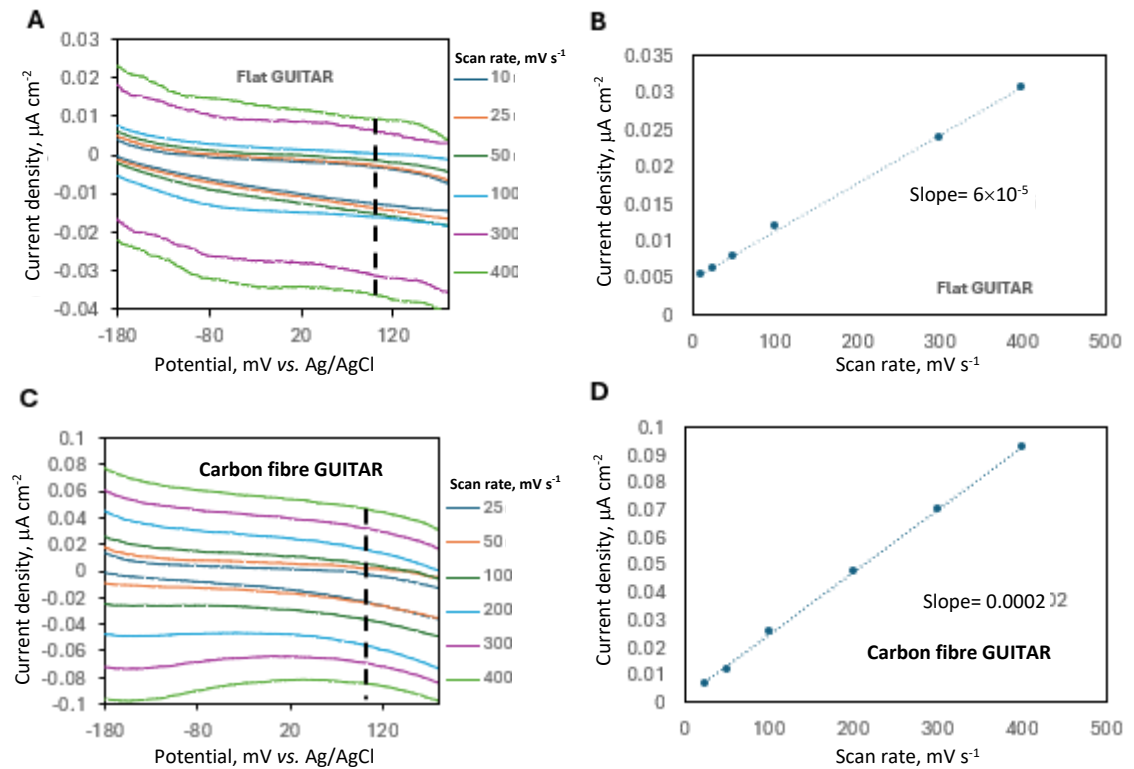


Figure S2. (A) and (C) cyclic voltammograms at different scan rates on flat GUITAR and GUITAR coated fibre electrodes in 0.1 M KOH; (B) and (D) plots of non-faradic current density at 100 mV vs. scan rate. The slope of these plots gives capacitive current

References

- [1] D. Koirala, F. Dalbec, J. May, K. Hamal, P. B. Allen, I. F. Cheng, Biosensing with Polymerase Chain Reaction-Stable DNA-Functionalized Magnetically Susceptible Carbon-Iron Microparticles, *Analytical Chemistry* **95** (2023) 16631-16638. <https://doi.org/10.1021/acs.analchem.3c02978>
- [2] M. Okeke, D. Koirala, M. Bashir, C. Brinkman, E. Coats, J. Russell, H. Xiong, I.F. Cheng, Rapidly Overcoming Inhibition of Taq-Polymerase in Wastewater Media: 17-Minute Attomolar Detection of Nitrobacter Based on the On-Electrode PCR Technique, *ACS Electrochemistry* **2** (2026) 1453-1459. <https://doi.org/10.1021/acselectrochem.6c00087>