Electronic Supplementary Material (ESI) for Sensors & Diagnostics.

Supplementary data

Electrochemical aptasensor for Salmonella detection using Nafion-doped reduced graphene oxide

Shalini Muniandy[1], Kwai Lin Thong[1], Jimmy Nelson Appaturi[2], Chin Wei Lai[1], Bey Fen Leo[1,3*]

[1]Nanotechnology and Catalysis Research Centre, Institute of Graduate Studies, University of Malaya, 50603 Kuala Lumpur, Malaysia

[2]School of Chemical Sciences, Universiti Sains Malaysia, 11800 Penang, Malaysia

[3]Department of Molecular Medicine, Faculty of Medicine, University of Malaya, 50603 Kuala Lumpur, Malaysia

*Corresponding author: beyfenleo@um.edu.my

The selectivity of the aptasensor

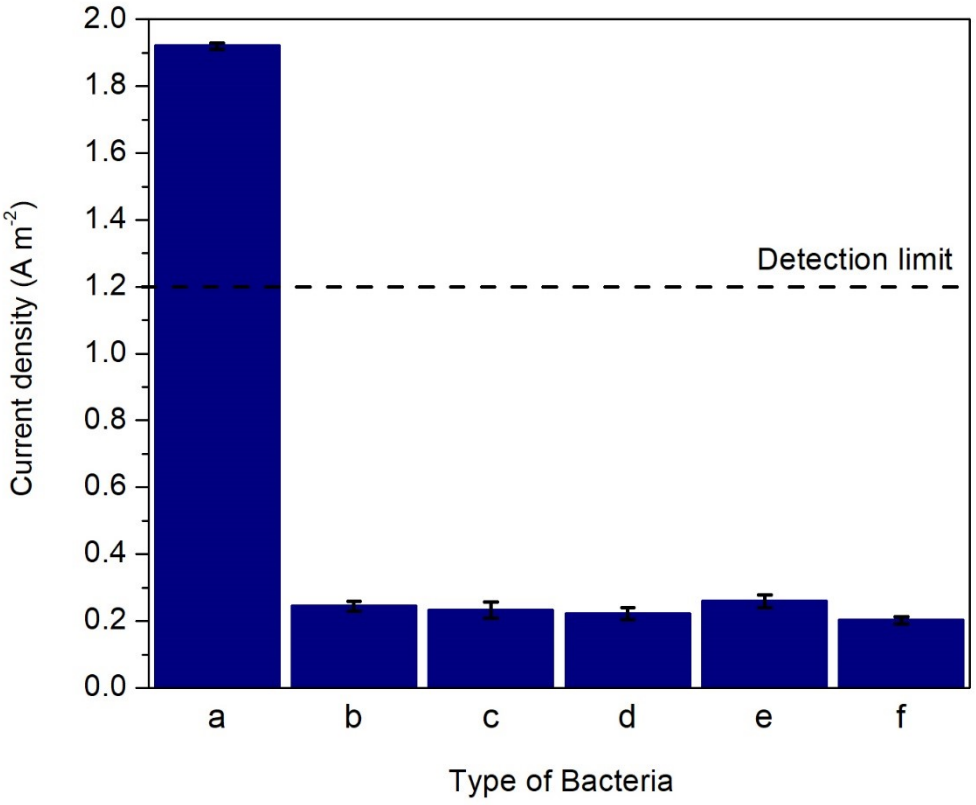

Fig. S1: The selectivity of the aptasensor was analysed by exposing the fabricated electrodes to (a) *S.* Typhimurium, (b) *E. coli*, (c) *Shi. dysenteriae*, (d) *V. cholerae*, (e) *Staph. aureus* and (f) *K. pneumoniae*.

Validation of experimental results with PCR method

The results obtained by aptasensor for sensitivity test was validated with PCR assay as shown in **Figure S2** (A). PCR amplification of the ompC of *S.* Typhimurium gave a DNA fragment of 204 bp. DNA extracted from the different concentrations of bacterial cell density (10^8-10^1 cfu mL^{-1}) were tested with PCR. The results obtained showed the detection limit of PCR was only up to 10^2 cfu mL^{-1} as compared to the detection limit of aptasensor which was 10^1 cfu mL^{-1}. This shows aptasensing is more sensitive than PCR. Moreover, the selectivity and specificity of the aptamer to other types of Salmonella and non-*Salmonella* bacteria were also investigated. For both the selectivity and specificity test, the DNA of Salmonella and non-*Salmonella* bacteria were captured using aptamer-conjugated magnetic beads. All the DNA were extracted and subjected to PCR reaction using species-specific primers.

Figure S2 (B) shows the selectivity test of the aptamer against other types of *Salmonella* bacteria namely, *S.* Paratyphi A, *S.* Enteritidis, *S.* Typhimurium, *S.* Typhi, *S.* Albany, *S.*Corvallis and *S.* Pullorum. The PCR image showed the presence for a positive band for all other types of *Salmonella* bacteria which indicates the aptamer used in this study is selective for all other *Salmonella* bacteria other than S. Typhimurium. Moreover, **Figure S2** (C) shows the PCR obtained for different types of bacteria. The PCR amplification for non-*Salmonella* bacteria showed the absence of a positive band for all the five samples tested indicating the aptamer used in this study were only specific to *Salmonella* bacteria.

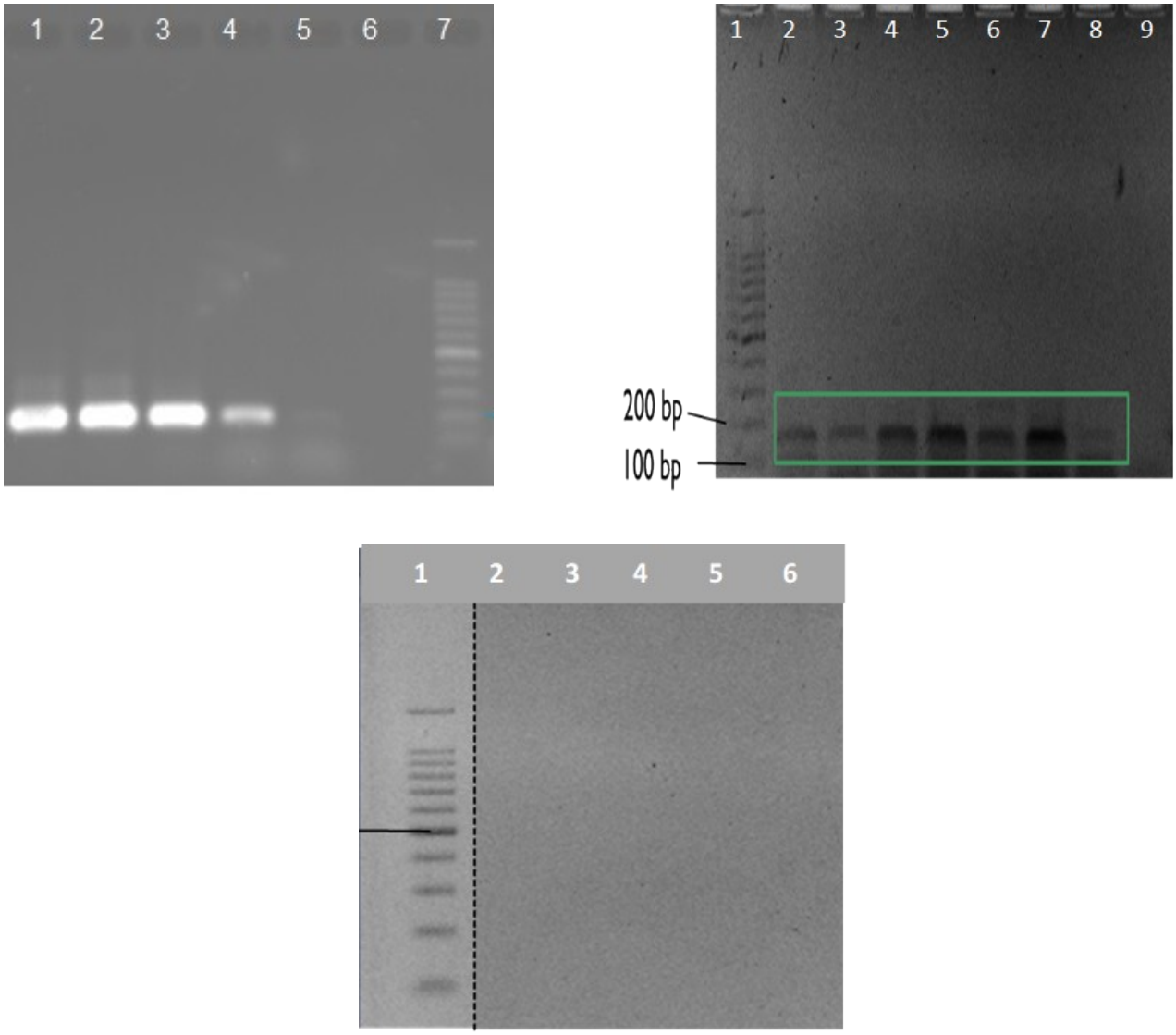

Figure S2 (A) The sensitivity of detection by PCR for *S.* Typhimurium. Gel electrophoresis patterns of PCR products obtained at different concentration of DNA: Lane 1, 10^8 cfu mL^{-1}; Lane 2, 10^6 cfu mL^{-1}; Lane 3, 10^4 cfu mL^{-1}; Lane 4, 10^2 cfu mL^{-1}; Lane 5, 10^1 cfu mL^{-1}; Lane 6, negative control; and Lane 7, 100 bp ladder. (**B**) The specificity test for different types of *Salmonella* bacteria: Lane 1, 100 bp ladder; Lane 2, S. Typhimurium; Lane 3, S. Enteritidis; Lane 4, S. Paratyphi A; Lane 5, S. Typhi; Lane 6, S. Albany; Lane 7, Corvallis; Lane 8, S. Pullarom; and Lane 9, negative control. (**C**) The selectivity test for non-*Salmonella* bacteria: Lane 1, *V. cholerae;* Lane 2, *Sh. dysenteriae*; Lane 3, *E. coli*; Lane 4, *K. pneumoniae*; and Lane 5, *Staph. aureus* with 100 bp ladder.