# Supplementary Information

# Dual-Mode Graphene Field-Effect Transistor Biosensor with Isothermal Nucleic Acid Amplification

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| Target Region | Primer | Sequence | Amplicon (bp) |
|---|---|---|---|
| E | F3 | GCTGATGAGTACGAACTTATGTAC | 240 |
| | B3 | CAGAAGATCAGGAACTCTAGAAGA | |
| | FIP | AGGATGGCTAGTGTAACTAGCAAGA-GGAAGAGACAGGTACGTTAATAGTT | |
| | BIP | GCGCTTCGATTGTGTGCGT-CACGAGAGTAAACGTAAAAAGAAGG | |
| | LF | CGAAAGCAAGAAAAAGAAGTACGC | |
| | LB | CTGCTGCAATATTGTTAACGTGAG | |
| RdRP | F3 | CTTGTTCTTGCTCGCAAACA | 231 |
| | B3 | ACCATCAGTAGATAAAAGTGCA | |
| | FIP | CGCCACACATGACCATTTCACTCA-GTTGTAGCTTGTCACACCGTTTC | |
| | BIP | GGTGGAACCTCATCAGGAGATG-TAACATTGGCCGTGACAG | |
| | LF | ACTTGAGCACACTCATTAGCTAATC | |
| | LB | CCACAACTGCTTATGCTAATAGTGT | |

**Table S1:** Information on the Loop-Mediated Isothermal Amplification Primer Sets Used in the Assay. Primers were designed using Primer Explorer V5 software (http://primerexplorer.jp/lampv5e/index.html).

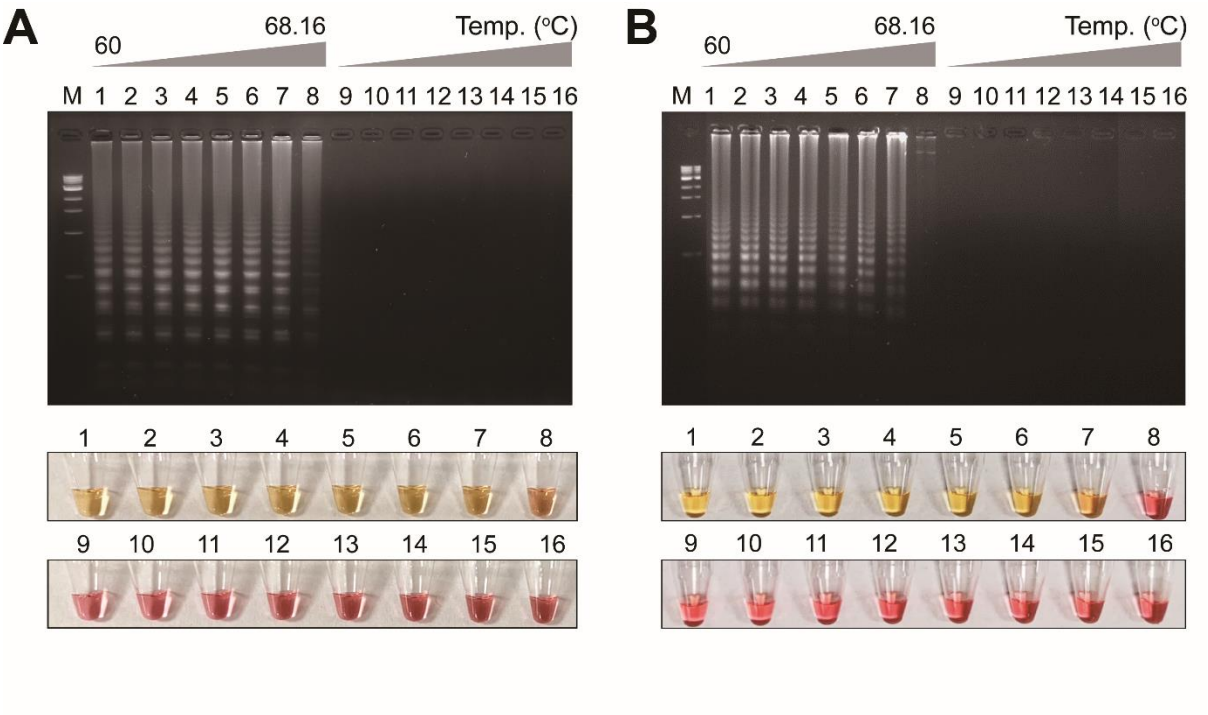
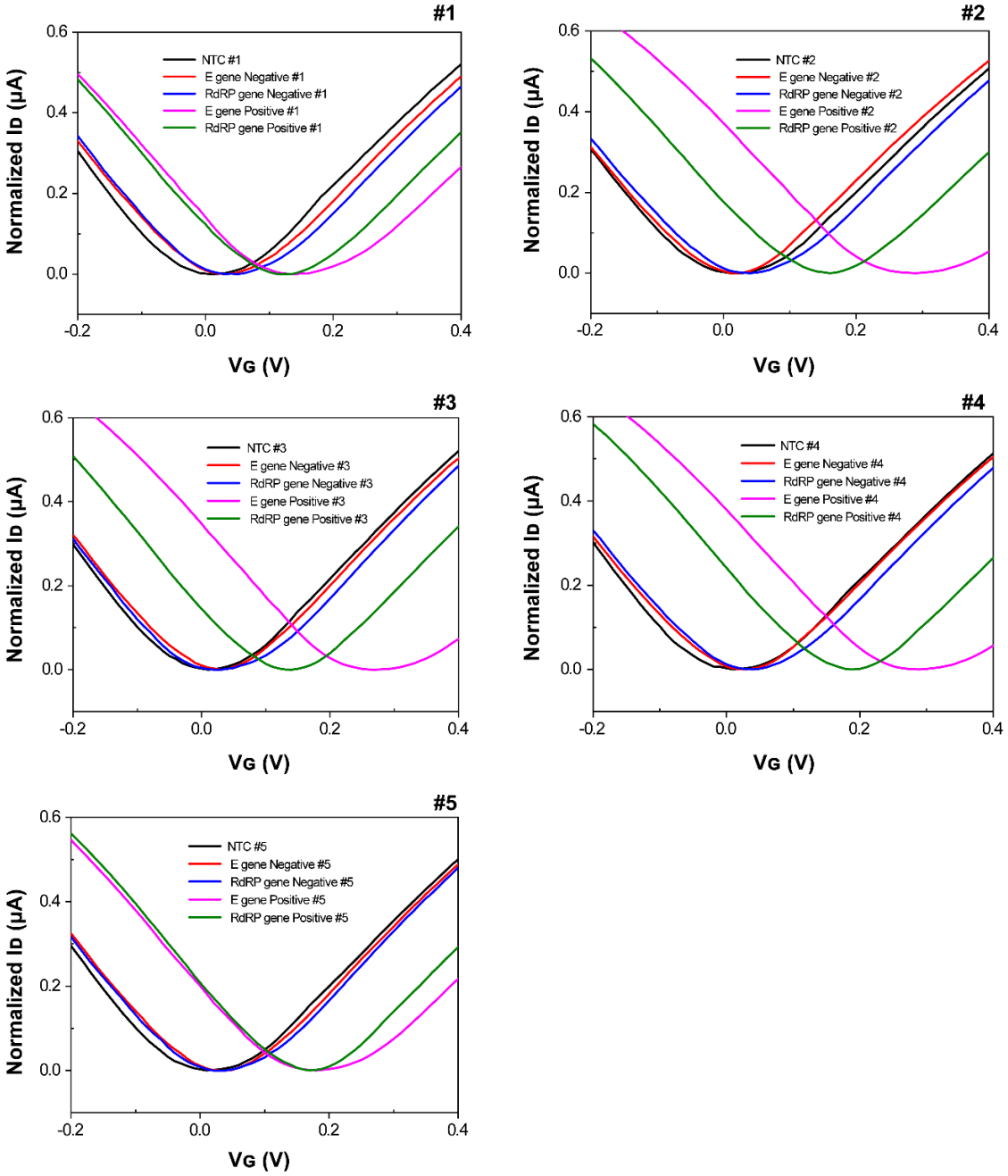



**Figure S1:** Agarose Electrophoresis Results and Naked-Eye Detection Following the Loop-Mediated Isothermal Amplification Assay. (A) E and (B) RdRP genes. Positive reactions display a distinct ladder of multiple bands in electrophoresis (lane M, 1 kb ladder; lanes 1-8, positive samples; lanes 9-16, non-template control; temperature gradient from 60-68.12 °C). In the colorimetric detection, orange signifies a positive reaction and neutral pink a negative reaction.




| | $\Delta V_{Dirac}$ (V) | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| NTC | 0.009 | 0.005 | 0.004 | 0.008 | 0.003 |
| E gene ( -) | 0.020 | 0.010 | 0.016 | 0.012 | 0.026 |
| RdRP gene (-) | 0.019 | 0.024 | 0.017 | 0.027 | 0.020 |
| E gene (+) | 0.149 | 0.281 | 0.261 | 0.284 | 0.167 |
| RdRP gene (+) | 0.121 | 0.162 | 0.146 | 0.188 | 0.167 |

NTC, non-template control; $\Delta V_{Dirac}$, shifts in the Dirac voltage.

**Figure S2**: Dirac voltage shift values for each clinical sample.