

Electronic supplement Information (ESI)

**Electrochemical Biosensor for Simultaneous Detection of Breast Cancer
Clinically Related MicroRNAs Based on a Gold Nanoparticles/Graphene
Quantum Dots/ Graphene Oxide Film**

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Table S1 Table S1 The sequences of capture miRNA probes, miRNAs target, single-base mismatch (1MM), triple-base mismatch (3MM), and non-complementary miRNAs

Probes and miRNAs	Sequence
Capture miRNA-21	5'-UCAACAUCAGUCUGAUAAGCUAUUU-SH-3'
Capture miRNA-155	5'-SH-CCCCUAUCACGAUUAGCAUAAA-3'
Capture miRNA-210	5'-SH-UCAGCCGUUGUCACACGCACAG-3'
miRNA-21	5'-UAGCUUAAACAGACUGAUGUUGA-3'
1MM miRNA-21	5'-UAGCUUAAUC <u>GG</u> ACUGAUGUUGA-3'
3MM miRNA-21	5'-UU <u>GC</u> UUAUC <u>GG</u> ACUGAU <u>CU</u> UGA-3'
Non-complementary miRNA-21	5'- <u>G</u> UAAUGCAUCUGAC <u>CGAAGGCA</u> -3'
miRNA-155	5'-UUA <u>A</u> UUGC <u>UAA</u> UCGUGAUAGGGG-3'
1MM miRNA-155	5'-UUA <u>A</u> UGC <u>U</u> AUCGUGAUAGGGG-3'
3MM miRNA-155	5'-UUA <u>A</u> UGC <u>U</u> AUCG <u>A</u> GAUACGGG-3'
Non-complementary miRNA-155	5'- <u>ACUGCAUGAGAUUUUCCUCAU</u> -3'
miRNA-210	5'-CUGUGCGUGUGACAACGGCUGA-3'
1MM miRNA-210	5'-CUGUGCGU <u>A</u> UGACAACGGCUGA-3'
3MM miRNA-210	5'-CUG <u>C</u> CGUGU <u>A</u> ACAACG <u>U</u> CUGA-3'
Non-complementary miRNA-210	5'- <u>GCUC</u> AAUGUGAGUCCAAAUCAG-3'

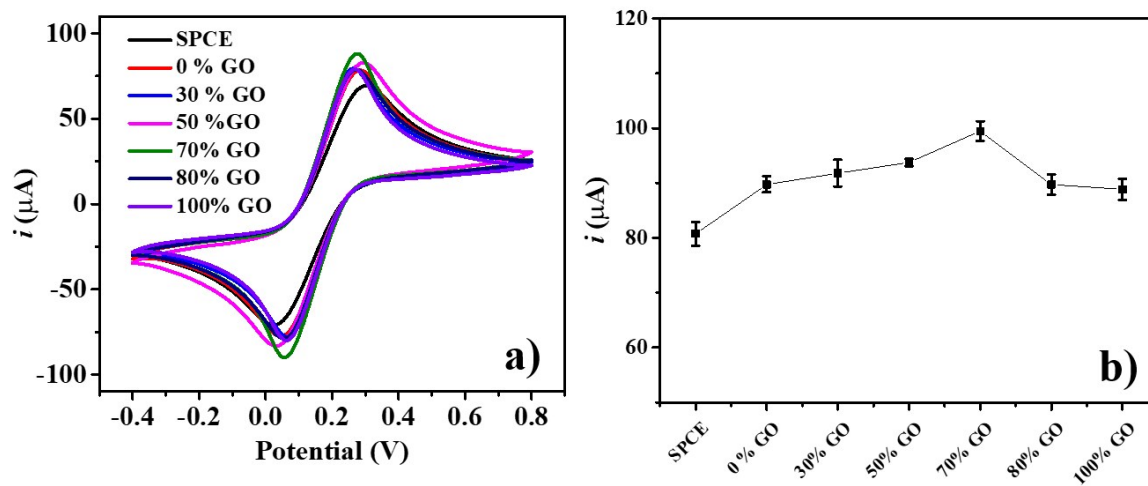


Fig S1 Optimization of the GO/GQDs ratio of composite sitting on the surface of SPCE.

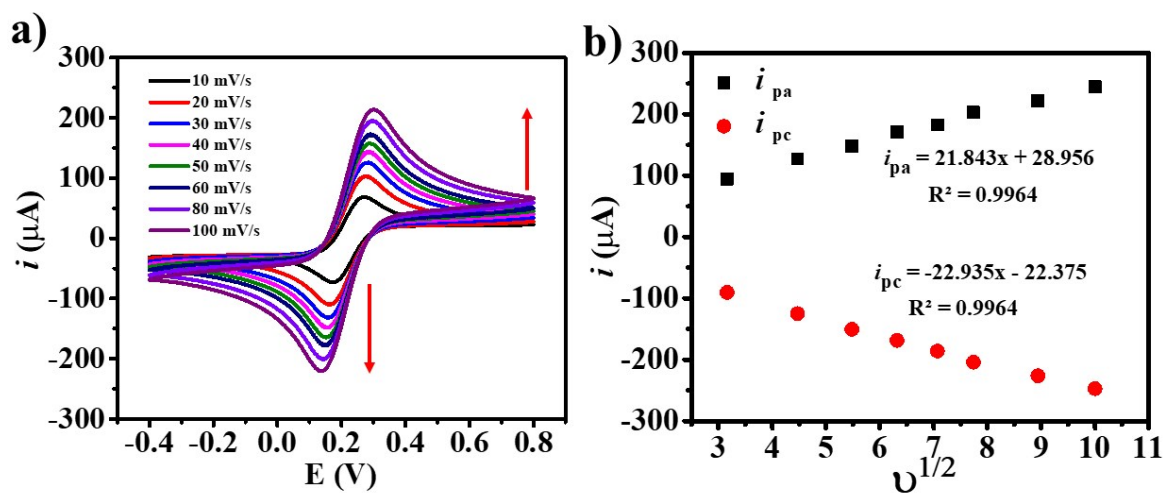


Fig. S2 (a) CVs of AuNPs/GQDs/GO modified SPCE in contact with 0.10 M KCl solution containing 5.0 mM $[\text{Fe}(\text{CN})_6]^{4-/3-}$ at different scan rates and (b) the oxidation (i_{pa}) and reduction (i_{pc}) peak currents increased linearly with the square root of scan rate.

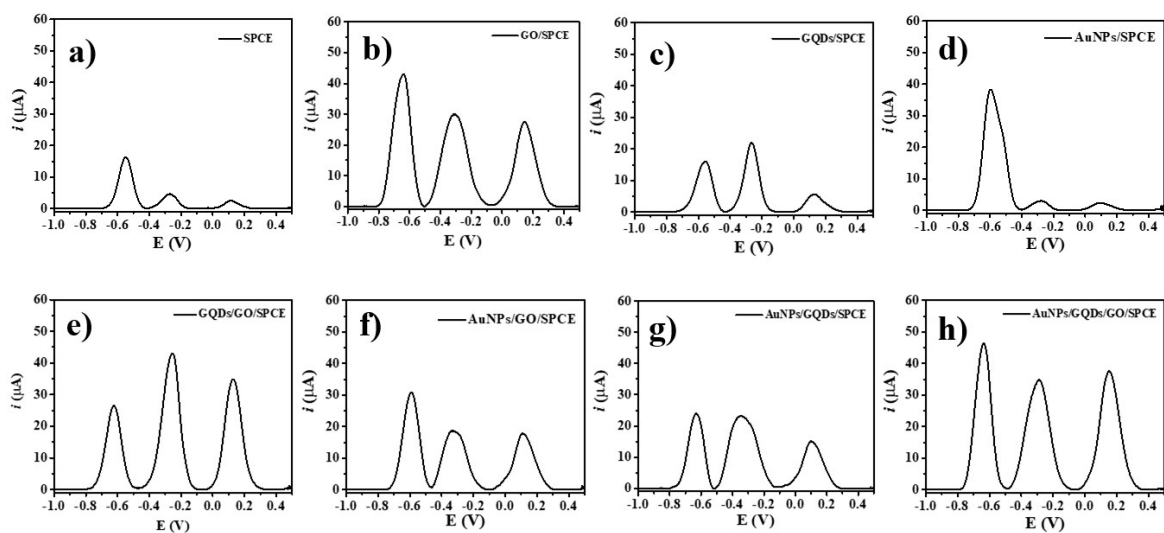


Fig. S3 Effect of different modified 3SPCEs on response signal intensities of the three redox probes.

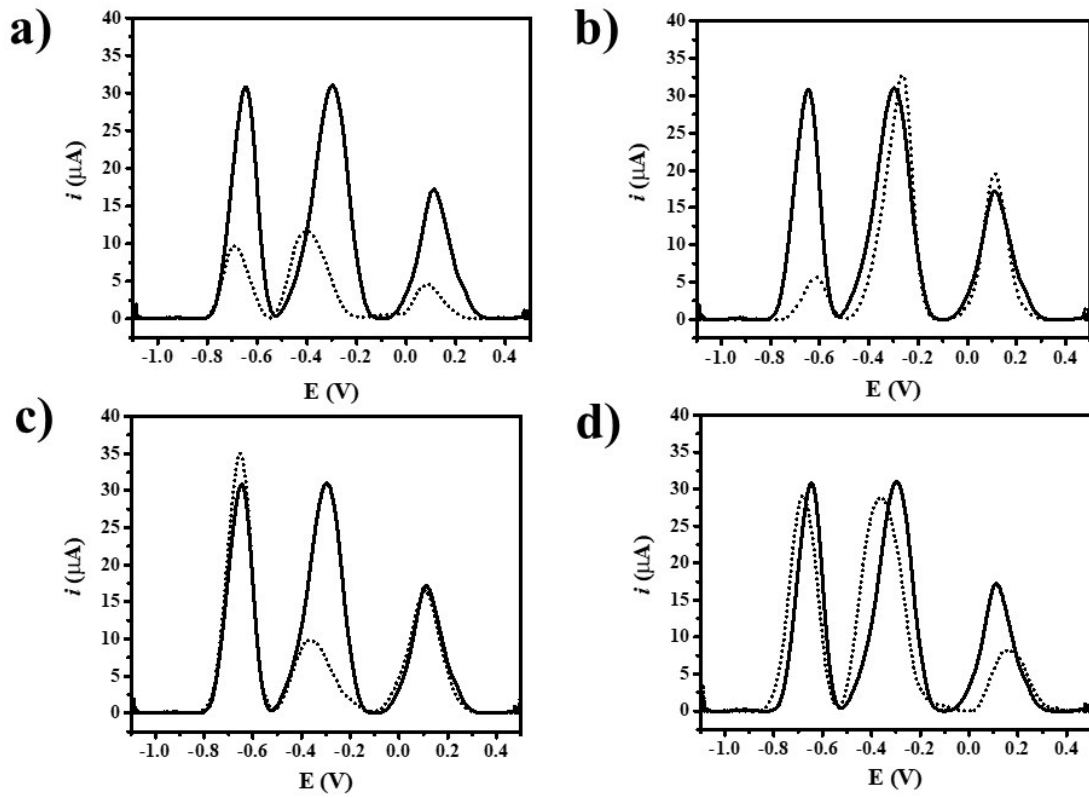


Fig. S4 SWV curves for the miRNA biosensor in the simultaneous detection of three miRNA targets (dash line) in solution with presence of (a) three miRNA targets, (b) only miRNA-21, (c) only miRNA-155, and (d) only miRNA-210. Solid lines represent blank.