Zirconia/Poly(L–cysteine)/RGO-Modified Electrode for Sensing the CaMV 35S Gene Sequence

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Herein, a zirconia (ZrO₂)/poly(L–cysteine)/reduced graphene oxide (RGO)-modified electrode was reported. A ZrO₂ film was electrodeposited onto the poly(L–cys)/RGO electrode surface. Probe DNA was modified on the electrode surface via the interaction of DNA phosphate groups and ZrO₂. The electrochemical response changes of methylene blue were used as indicators for detecting target DNA. The performance of the biosensor was studied by electrochemical methods; methylene blue had an obvious change in its electrochemical signal when hybridized with completely matched target DNA compared with its signal when hybridized with mismatched target DNA. In addition, the biosensor had high sensitivity for completely matched target DNA, and the detection signals showed ideal linearity with a target DNA concentration range of 1.0×10^{-13} mol/L to 1.0×10^{-9} mol/L. The detection limit was 2.6×10^{-14} mol/L ($S/N = 3$). Experiments showed that the proposed biosensor had excellent reproducibility and stability and could be used to successfully assay the CaMV 35S gene sequence in human serum samples.

Keywords: CaMV 35S gene; Biosensor; Zirconia; RGO; Methylene blue

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