

Development of disposable electrode for the detection of mosquito-borne viruses

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Abstract

Development of disposable, rapid and convenient biosensor with high sensitivity and reliability is the most desired method of viral disease prevention. To achieve this goal, in this work, a practical impedimetric biosensor has been implemented into a disposable electrode on a screen-printed carbon electrode (SPCE) for the detection of two mosquito-borne viruses. The biosensor fabrication has step-wisely carried out on the disposable electrode surface at room temperature: starting from conductive film formation, physical binding of the gold nanoparticles (AuNPs)-polyaniline (PAni) into the conductive film, and biofunctionalization. To get the maximum efficiency of the antibody, biotinylated antibody has been conjugated on the surface of AuNP-PAni /PAni-SPCE via the streptavidin-biotin conjugation method which is a critical factor for the high sensitivity. Using the antibody-antigen interaction, this disposable electrode has designed to detect mosquito-borne infectious viruses, Chikungunya virus (CHIKV) and Zika Virus (ZIKV) separately in a wide linear range of 100 fg/mL to 1 ng/mL with a low detection limit of 1.33 fg/mL and 12.31 fg/mL, respectively.

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