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Micro-interdigitated electrodes genosensor based on Au-deposited nanoparticles for early detection of cervical cancer

Abstract

Genosensor-based electrodes mediated with nanoparticles (NPs) have tremendously developed in medical diagnosis. Herein, we report a facile, rapid, low cost and highly sensitive biosensing strategy for early detection of HPV 18 using gold-nanoparticles (AuNPs) deposited on micro-IDEs. This study represents surface charge transduction of micro-interdigitated electrodes (micro-IDE) alumina insulated with silica, independent and mini genosensor modified with colloidal gold NPs (AuNPs), and determination of gene hybridization for early detection of cervical cancer. The surface of AuNPs deposited micro-IDE functionalized with optimized 3-aminopropyl-triethoxysilane (APTES) followed by hybridization with deoxyribonucleic acid (DNA) virus to develop DNA genosensor. The results of ssDNA hybridization with the ssDNA target of human papillomavirus (HPV) 18 have affirmed that micro-IDE functionalized with colloidal AuNPs resulted in the lowest detection at 0.529 aM. Based on coefficient regression, micro-IDE functionalized with AuNPs produces better results in the sensitivity test (R2 = 0.99793) than unfunctionalized micro-IDE.

Keywords

Cervical cancer; Genosensor; Gold nanoparticles (AuNPs); Human papillomavirus (HPV); Interdigitated electrodes (IDEs)