

Gold Nanomaterial Hybrid on PEGylated Metal Oxide Interdigitated Mini-electrode Surface to Diagnose Prostate Cancer

Abstract

Prostate cancer is a leading health burden, the third most common cancer in a man. High accuracy detection and screening methods with a suitable biomarker can significantly reduce the risk of mortality. Prostate specific antigen (PSA) is the efficient and acceptable biomarker due to its level of increment in the biological fluid with the prostate cancer patient. This research was focused to establish a sensitive method of PSA detection by using gold nanoparticle (GNP) conjugated PSA specific aptamer on interdigitated mini-electrode. GNP allowed to capture higher number of aptamers on the surface and enhanced the interaction of PSA. This good detection method can determine PSA at 45aM with the sensitivity of 30aM. A linear range was noticed from 60 until 2000 aM on the regression curve at $y = 0.1568x + 0.143$; $R^2 = 0.955$. Moreover, spiking PSA in human serum enhances the current response with increasing PSA concentrations. This method of determination helps to quantify the PSA level and diagnose the prostate cancer at different stages.

Keywords

Aptamer; Electrochemical sensor; Gold nanoparticle; Prostate biomarker