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Immuno-field Effect Transistor Using Carbon Nanotubes Network – Based for Human Serum Albumin Highly Sensitive Detection

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Abstract : Human serum albumin plays a significant part in the physiological functions of the human body system (HSA).HSA level monitoring is critical for early detection of HSA-related illnesses. The goal of this study is to show that a field effect transistor (FET)-based immunosensor can assess HSA using high aspect ratio carbon nanotubes network (CNT) as a transducer. The CNT network were deposited using air brush technique, and the FET device was made using a shadow mask process. Field emission scanning electron microscopy and a current-voltage measurement system were used to examine the morphology and electrical properties of the CNT network, respectively. X-ray photoelectron spectroscopy and Fourier transform infrared spectroscopy were used to confirm the surface alteration of the CNT. The detection process is based on covalent binding interactions between an antibody and an HSA target, which resulted in a change in the manufactured biosensor's drain current (Id).In a linear range between 1 ng/ml and 10zg/ml, the biosensor has a high sensitivity of 0.826 mA (g/ml)-1 and a LOD value of 1.9zg/ml.HSA was also identified in a genuine serum despite interference from other biomolecules, demonstrating the CNT-FET immunosensor's ability to quantify HSA in a complex biological environment.

Keywords : carbon nanotubes network, biosensor, human serum albumin
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