A Sensing Interface Based on 3D CS-Au NPs/hPPy for Electrochemical Detection of Carcinoembryonic Antigen

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Carcinoembryonic antigen (CEA), a major tumor marker, has been applied to clinical screening and early diagnosis. Herein, an electrochemical detection platform using three-dimensional horn-like PPy (hPPy) and CS-Au nanoparticles micro/nanostructure as sensing interface, was utilized to detect varied concentrations of CEA. On account of the large specific surface area, remarkable conductivity, stability and biocompatibility of 3D CS-Au NPs/hPPy, low concentration of CEA could be detected precisely. Under optimal conditions of pH, incubation time and temperature, the electrochemical immunosensor showed favorable linear relationship, wide CEA detection scope of 0.01 to 120 ng/mL with a low detection limit of 0.0036 ng/mL (signal-to-noise ratio = 3). Besides, the prepared immunosensor revealed favourable specificity and stability for detection of CEA. Furthermore, such immunosensors applied in determination of CEA in human blood had satisfactory consistency comparing with the detected CEA reference values of hospital, implying that the 3D CS-Au NPs/hPPy sensing interface we obtained have reliability in cancer diagnosis and potential application in clinical immunology.

Keywords: Three-dimensional micro/nanostructure, 3D CS-Au NPs/hPPy, Electrochemical biosensor, CEA

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