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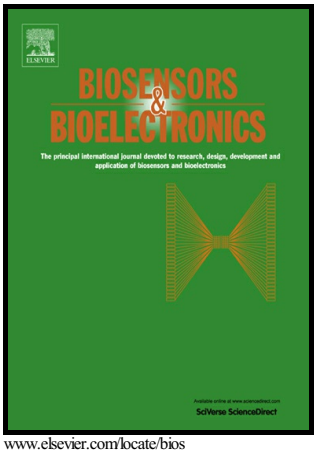

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A sandwich-type electrochemical immunosensor based on in situ silver deposition for determination of serum level of HER2 in breast cancer patients

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ABSTRACT

The sensitive quantification of Human Epidermal growth factor Receptor 2 (HER2), as a key prognostic tumor marker, plays a critical role in screening, early diagnosis and management of breast cancer. This paper describes a sandwich-type immunoassay with silver signal enhancement strategy for highly sensitive detection of HER2. For this purpose, the target capturing step was designed by functionalization of 3-aminopropyltrimethoxysilane coated magnetite nanoparticles with antibody (antiHER2/APTMS-Fe_3O_4), as a platform bioconjugate (PB), and immobilized at a bare GCE. Then, in the presence of label-free immunosensor, the PB was covered by magnetic gold nanoparticles self-assembled with thiolated antibodies (antiHER2/Hyd@AuNPs-APTMS-Fe_3O_4) containing chemically reduced silver ions, as a label bioconjugate (LB). Under optimum conditions, a linear relationship between the differential pulse voltammetric (DPV) stripping signal of silver and the logarithm of HER2 concentrations was obtained in the range of 5.0×10^{-4}-50.0 ng mL^{-1} (R^2=0.9906) with a detection limit of 2.0×10^{-5} ng mL^{-1}. The effectiveness of this protocol was evaluated experimentally through employing of designed immunosensor for detection of the serum level of tumor marker. The good consistency of the results with those obtained by the enzyme-linked immunosorbent assay (ELISA) conventional method (*p*-value of <0.05)