A Molecularly Imprinted Polythionine-Modified Electrode Based on a Graphene-Gold Nanoparticle Composite (MIP/AuNPs/rGO/GCE) for the Determination of Thrombin

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A novel electrochemical sensor for the detection of thrombin (THR) was fabricated based on a glassy carbon electrode by the modification of molecularly imprinted polymers (MIP) and nanocomposites of graphene and gold nanoparticles. A MIP polythionine (PTH) film was formed by cyclic voltammetric electropolymerization and took the role of the redox probe to explore the sensor performance. Nanocomposites for the purpose of enhancing the sensitivity were characterized with SEM and energy dispersive spectroscopy. The stepwise preparation process of the MIP sensor was monitored with cyclic voltammetry and electrochemical impedance spectroscopy. After the experiments to determine the optimal conditions, the performance of the sensor was investigated. A linear relationship between the peak current of the PTH redox probe and the logarithm of the THR concentration was obtained over the range of 1.0×10^{-8} g/L $\sim$ 1.0×10^{-5} g/L with a detection limit of 1.0×10^{-9} g/L. In comparison with the non-molecularly imprinted sensor, the MIP sensor showed good anti-interference ability and high selectivity.

Keywords: Molecularly imprinted polymer · Polythionine · Nanocomposites · Sensor · Thrombin

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