A Novel H₂O₂ Biosensor Based On the composite of MP-11 encapsulated in PCN-333(Al)-Graphene Oxide

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In this work, a novel H₂O₂ biosensor was developed based on the composites of microperoxidase-11 (MP-11) encapsulated in graphene oxide (GO)-PCN-333 (Al) (PCN stands for porous coordination network, one of the metal-organic frameworks). The PCN-333(Al) firmly and uniformly grew on the surface of GO sheet with large specific surface and excellent electrical conductivity, which provided a lots of pores for the encapsulation of MP-11 in the composites and selectively accumulated analytes into its mesopores to improve the selectivity of enzymatic reaction. The MP-11 molecules might freely move through mesopores of PCN-333 (Al) to maintain bioactivity, which remarkably enhanced the mass transfer rate and quickened the electron transfer for electrochemical biosensors. Scanning electron microscopy was used to characterize the GO and PCN-333(Al)-GO composites. Cyclic voltammetry and differential pulse voltammetry were used to characterize the electrochemical behaviors and performance of the H₂O₂ biosensor. The target electrode showed excellent performance with a wide linear range from 10 μ M to 800 μ M, a low detection limit of 3 μ M, good stability and high selectivity, which was superior to some other H₂O₂ biosensors.

Keywords: Electrochemical biosensor; Graphene oxide; PCN-333 (Al); Microperoxidase-11; H₂O₂; Metal-organic frameworks

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