Electrochemical Behaviors of Horseradish Peroxidase on MoS₂ Nanosheets Modified Electrode

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In this paper molybdenum disulfide (MoS₂) nanosheets and horseradish peroxidase (HRP) modified electrode was prepared with ionic liquid 1-hexylpyridinium hexafluorophosphate based carbon ionic liquid electrode (CILE). UV-Vis and FT-IR spectra showed that the native framework of HRP was sustained after mixed with MoS₂ nanosheet. As a 2D layered nanosheet MoS₂ acted as the electron transfer bridge for HRP. A pair of well-defined redox peaks of HRP appeared on MoS₂/CILE, implying the realization of direct electron transfer. Electrochemical parameters of HRP were calculated according to the cyclic voltammetric data with the electron transfer coefficient and electron transfer rate constant as 0.51 and 1.65 s⁻¹. The HRP modified electrode exhibited a prominent electrocatalytic behavior towards the reduction of trichloroacetic acid with wider dynamic range and lower detection limit of 0.67 mmol L⁻¹ (3σ).

Keywords: Carbon ionic liquid electrode; Molybdenum disulfide; Horseradish peroxidase; Direct electrochemistry; Electrocatalysis.

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