Development of a Metal-Organic Framework for the Sensitive Determination of 2,4-Dichlorophenol

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The present study proposed a facile and highly sensitive electrochemical sensor based on a carbon paste electrode modified by the metal–organic framework (MOF) [Cu(bpy)(H₂O)₂(BF₄)₂(bpy)] for the analysis of 2,4-dichlorophenol (2,4-DCP). X-ray diffraction (XRD) and Fourier transform infrared spectrometry (FT-IR) were used to investigate the morphology and composition, respectively, of [Cu(bpy)(H₂O)₂(BF₄)₂(bpy)]. Additionally, cyclic voltammetry (CV) was carried out to study the electrochemical performance. Considering the high charge transfer efficiency, strong adsorption capacity and large specific surface area of [Cu(bpy)(H₂O)₂(BF₄)₂(bpy)], our developed sensor was favorably selective to the detection of 2,4-DCP under optimum parameters, with a wide linear range of 4 to 100 μM and a low limit of detection (LOD) of 1.1 μM.

Keywords: Metal–organic frameworks; [Cu(bpy)(H₂O)₂(BF₄)₂(bpy)]; 2,4-dichlorophenol; Electrochemical determination; Sensor

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