Gold/Copper-Based Metal-Organic Framework/Glassy Carbon Electrode as High Efficient Electrochemical Sensor for Determination of Hydrogen Peroxide

Danfeng He¹, Fujiang Zhou², Liqun Sun¹, Yanbin Tong¹, Long Tang^{1,*}, Zhicheng Zhong³, Hongqin Li³

¹ Heilongjiang Provincial Key Laboratory of Oilfield Applied Chemistry and Technology, Daqing Normal University, Daqing 163712, China

² Daqing Oilfield Chemical Corporation, Daqing, Heilongjiang, 163712, China

³ College of Instrumentation and Electrical Engineering, Jilin University, Changchun 130012, China

*E-mail: tanglong088@163.com and choubuzhongjiang@163.com

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In this study, the modified gold/copper-based metal-organic framework on glassy carbon electrodes [(Au_x:Cu_y)-MOFs/GCE (x, y = 0, 1, 2 and 3 as volume ratio)] were applied for electrochemical determination of hydrogen peroxide (H₂O₂). (Au_x:Cu_y)-MOFs were synthesized through the oriented growth method and were applied to modification of GCE. SEM and XRD analyses were employed to structural studies of synthesized (Au_x:Cu_y)-MOFs. Cyclic voltammetry and amperometry techniques were used to electrochemical characterization of (Au_x:Cu_y)-MOFs/GCE as H₂O₂ sensor. Results showed that (Au_x:Cu_y)-MOFs were synthesized in porous and densely packed irregular nano-sheet structure. The electrochemical studies showed that (Au₁:Cu₂)-MOF/GCE was fast response, sensitive, stable and selective sensor for the determination of H₂O₂. The wide linear range, sensitivity and detection limit of the sensor were estimated of 1 to 19 μM, 2.022 μA/μM and 0.014 μM, respectively. Comparison performance (Au₁:Cu₂)-MOF/GCE with other H₂O₂ sensor exhibits higher or comparative sensitivity in determination of H₂O₂. Study the sensor response to the determination of H₂O₂ in real sample indicated satisfactory RSD and recovery values was less than 4.51% and more than 91.86%, respectively.

Keywords: Hydrogen peroxide; Metal-organic framework; Amperometry technique; Sensitivity and selectivity electrochemical sensor

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