Amperometric Sensing of Paracetamol Using a Glassy Carbon Electrode Modified with a Composite of Water–Stable Metal–Organic Framework and Gold Nanoparticles

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A paracetamol electrochemical sensor was facilely fabricated by modifying a glassy carbon electrode (GCE) with a water–stable metal–organic framework (MOF) and gold nanoparticles (AuNPs). The MOF/AuNP composites were synthesized by hydrothermal and sonication methods. The MOF possesses a high specific area and coordinatively unsaturated sites as an amplification element, and the AuNPs can amplify the electrochemical signal with excellent conductivity intensity. The modification activity of the MOF/AuNP composites was investigated via voltammetric determination of paracetamol. A sensitive paracetamol measurement method was built using the MOF/AuNP modified GCE. The oxide peak response changed linearly as the paracetamol concentration increased from 0.01 nmol L⁻¹ to 100 μmol L⁻¹, and the low detection limit was 0.0011 nmol L⁻¹ (3σ). The present work offers a new method to analyze paracetamol in tablets and expands the application of MOFs in the electrochemical field.

Keywords: Nanomaterial; Electrochemical Sensor; Acetaminophen; Pharmaceutical analysis

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