Construction of a Sensitive Bisphenol A Electrochemical Sensor based on Metal-organic Framework/Graphene Composites

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Bisphenol A (BPA), as a typical endocrine disruptor, has caused widespread concern in recent years, and its sensitive detection is particularly important. In this study, a sensitive BPA electrochemical sensor was fabricated using composites of copper-based metal-organic frameworks (Cu-MOFs) and electrochemically reduced graphene oxide (ERGO). The Cu-MOFs, ERGO, and Cu-MOFs/ERGO were characterized by scanning electron microscopy. Compared with the Cu-MOFs- or ERGO-modified electrode, the Cu-MOFs/ERGO-modified electrode displayed significantly enhanced electrocatalytic activity toward BPA. The prepared electrode displayed linear range from 0.02 μM to 90 μM and limit of detection of 6.7 nM (S/N=3) for BPA detection as shown by differential pulse voltammetry results under optimized conditions. Such good sensitivity could be ascribed to the synergistic catalysis from high adsorption and catalytic capacity of Cu-MOFs and to the excellent conductive property of ERGO. The Cu-MOFs/ERGO-modified electrode also exhibited high stability and anti-interference ability. The proposed sensor was successfully applied to determine BPA in plastic products. Thus, a promising and reliable tool is provided for the rapid analysis of emergency pollution caused by BPA.

Keywords: Metal organic framework; Graphene; Electrochemical sensor; Bisphenol A

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