A Sensitive Phenol Electrochemical Sensor Based on Magnetic Oxide/Amino-Functional Graphene Nanocomposite

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doi: 10.20964/2019.03.25

Received: 20 January 2018 / Accepted: 12 December 2018 / Published: 7 February 2019

A sensitive electrochemical sensor for the detection of phenol was fabricated based on a magnetic oxide/amino-functionalized graphene ($\text{Fe}_3\text{O}_4/\text{AGO}$) nanocomposite. $\text{Fe}_3\text{O}_4/\text{AGO}$ was synthesized by chemical coprecipitation. The morphologies and structures of $\text{Fe}_3\text{O}_4/\text{AGO}$ were studied with a scanning electron microscope (SEM), transmission electron microscope (TEM), Fourier transform infrared spectroscopy (FTIR) and X-ray diffractometer (XRD). The effects of the pH and scan rate on the electrocatalytical oxidation of phenol were also investigated. Under the optimized conditions, the oxidation peak currents were proportional to the phenol concentrations in the ranges of 0.45 μM ~56 μM and 156 μM ~456 μM with a lower detection limit of 0.4 μM ($S/N=3$). Furthermore, the fabricated sensor was successfully applied to the detection of phenol in an oilfield wastewater sample with satisfactory results.

Keywords: Fe_3O_4 magnetic nanoparticle, amino-functional graphene, phenol, sensor

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