

A Magnetite-Incorporated Hydroxyapatite-Based Electrochemical Sensor for Rapid Detection of Phenolic Content in Water

Law, Matthew

The presence of toxic phenolic compounds in drinking water presents a major health concern in areas near aerosol manufacturing plants. Maintaining quality drinking water in these areas requires a sensitive, cost-effective sensor. As part of the development of an electrochemical sensor, magnetite-incorporated hydroxyapatite (HA) films have been successfully produced on a glassy carbon electrode substrate by electrodeposition in modified Hank's solution at a potential of $E = -1.5\text{ V}$. I determined the optimal electrodeposition parameters through experiments based on a cyclic voltammetry study. I have confirmed the presence of both magnetite and hydroxyapatite in the films with analysis via Fourier transform infrared spectroscopy, and I have analyzed the films through scanning electron microscopy and electrochemical impedance spectroscopy. In my produced films, I observed increased HA growth, lowered electrical resistance, increased surface area, and excellent film adhesion to the substrate. These are all desirable and advantageous properties in an electrochemical sensor, and they demonstrate the potential for magnetite-hydroxyapatite films to be utilized in sensors for detection of phenolic compounds in drinking water.