

Silver Oxide-Graphene Sensor for Hydrogen Peroxide

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A nonenzymatic, amperometric sensor for Hydrogen Peroxide (H_2O_2) was designed by drop coating glassy carbon electrodes (GCEs) with Silver Oxide (Ag_2O). Combining Ag_2O with Graphene Oxide and a polymer, PEDOT, was also attempted in order to increase stability and electrochemical properties. Using metal oxides along with Graphene Oxide for sensors has been done quite a bit, but Ag_2O itself has not been researched extensively. So, in order to produce the best H_2O_2 sensor, the configuration of all components had to be optimized. Three different Ag_2O particle shapes (Hexapod, Octahedra, and Cube) were synthesized and tested on the GCEs. The different shapes caused the particles to have different surface properties, so each sample performed differently. The coatings on the electrodes were characterized using UV-Vis spectroscopy, scanning electron microscopy, and x-ray diffraction. The electrochemical properties and sensing abilities of the electrodes were tested using cyclic voltammetry, electrochemical impedance spectroscopy, zeta potential, calibration curves, DC current response, and selectivity tests. The Ag_2O by itself showed the best electrochemical properties and response to H_2O_2 as compared to the Ag_2O with Graphene Oxide and PEDOT. Of the three Ag_2O particle shapes, the Hexapod showed the best electrochemical properties and sensitivity, but the Cube showed the best stability. This sensor will push the limits of previous designs and introduce new uses of Ag_2O . It will also provide a foundation for future studies of particle shapes in sensors.