

## *Silver Oxide-Graphene Sensor for Hydrogen Peroxide*

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A nonenzymatic, amperometric sensor for Hydrogen Peroxide ( $\text{H}_2\text{O}_2$ ) was designed by drop coating glassy carbon electrodes (GCEs) with Silver Oxide ( $\text{Ag}_2\text{O}$ ). Combining  $\text{Ag}_2\text{O}$  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  $\text{Ag}_2\text{O}$  itself has not been researched extensively. So, in order to produce the best  $\text{H}_2\text{O}_2$  sensor, the configuration of all components had to be optimized. Three different  $\text{Ag}_2\text{O}$  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  $\text{Ag}_2\text{O}$  by itself showed the best electrochemical properties and response to  $\text{H}_2\text{O}_2$  as compared to the  $\text{Ag}_2\text{O}$  with Graphene Oxide and PEDOT. Of the three  $\text{Ag}_2\text{O}$  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  $\text{Ag}_2\text{O}$ . It will also provide a foundation for future studies of particle shapes in sensors.