

Electrochemical Sensing with Metal Oxides

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The effective sensing of hydrogen peroxide is important for a variety of reasons. It can be utilized as a diagnostic tool for diseases like asthma; also, the sensing can be utilized in pharmaceutical and food production for quality control. The use of silver oxide nanoparticles with varying morphologies has not been investigated as a sensing agent for hydrogen peroxide in the past. The particles' properties and ability to oxidize and reduce hydrogen peroxide suggest that they will be effective to create a sensitive sensor. The silver oxide particles were prepared through chemical reduction using varying molar ratios of reactants. The varying ratios created three different particle shapes: hexapod, octahedral, and cubic. A three electrode system was to evaluate electrochemical properties, and the working electrode was coated with the silver oxide particles. Current response, detection limit, and electrical impedance spectroscopy (EIS) tests were done to gauge the effectiveness of the sensor, and X-ray diffraction (XRD), Zeta potential, and scanning electron microscopy (SEM) were performed to characterize the particles. The use of these particles has shown positive results for a sensor, with very high sensitivity and a good detection limit. The hexapods gave more response than the octahedral which gave more response than the cubic particles. The low stability suggests a new coating method must be investigated, but overall, the very high sensitivity of the silver oxide particles would be useful for aforementioned applications of hydrogen peroxide sensing.