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Microwave-assisted Synthesis and Surface Characterization of Graphene oxide-Antimony trioxide Nanocomposites for Ascorbic Acid Electrochemical Sensor

The detection and monitoring of Ascorbic Acid (AA) concentration is of crucial importance. Abnormal AA level in bodily fluids have been reported to cause cancer, cardiovascular diseases, and Alzheimer's and Parkinson's diseases. Nanoparticles have played a critical role in developing affordable, sensitive, and selective sensors. This work reports on electrochemical detection of AA using glassy carbon electrodes (GCEs) modified with microwave assisted graphene oxide-antimony trioxide nanocomposite and chitosan films. The developed sensor displayed enhanced electron transfer and a better electrocatalytic reaction towards AA compared to other fabricated electrodes. Cyclic voltammetry and chronoamperometry were used for electrochemical measurements. Scanning Electron Microscopy (SEM), X-ray Photoelectron Spectroscopy (XPS), X-ray Diffraction (XRD), and Fourier Transform Infrared Spectroscopy (FTIR) techniques were used for electrode surface analysis. AA oxidation peak was observed (measured on the CS/GO/GCE) at 200 mV vs Ag/AgCl. Under the optimum conditions, the sensor showed high sensitivity, lower detection limit, wide linear responses over physiologically relevant concentration, and fast response (< 5s). Furthermore, the biosensor exhibits optimal detection at strong acidic conditions, the experiment shows how it improves performance at physiological pH compared to intermediate pH levels.