Microwave assisted growth of stannous ferrite microcubes as electrodes for potentiometric nonenzymatic H2O2 sensor and supercapacitor applications

ABSTRACT

Electrochemical sensors and supercapacitors are two noteworthy applications of electrochemistry. Herein, we report the synthesis of $SnFe_2O_4$ microcubes and Fe_2O_3 nanorods through a facile microwave assisted technique which are employed in fabricating the electrodes for nonenzymatic hydrogen peroxide (H_2O_2) sensor and supercapacitor applications. $SnFe_2O_4$ microcubes exhibited an enhanced specific capacitance of $172Fg^{-1}$ at a scan rate of $5mVs^{-1}$ in comparison to Fe_2O_3 nanorods ($70Fg^{-1}$). Furthermore, the H_2O_2 sensing performance of the fabricated $SnFe_2O_4$ electrodes through chronopotentiometry studies in 0.1M PBS solution (at pH 7) with a wide linear range revealed a good sensitivity of $2.7mV\mu M^{-1}\mu g^{-1}$ with a lowest detection limit of 41nM at a signal-to-noise ratio of 3. These results indicate that $SnFe_2O_4$ microcubes are excellent materials for the cost effective design and development of efficient supercapacitors as well as nonenzymatic sensors.

Keyword: Stannous ferrite; Microwave assisted method; Hydrogen peroxide sensor; Supercapacior; Electrochemical performance