Effects of Reaction Conditions on the Morphology and Property of Sb Doped SnO₂ Nanorods Anode

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Sb-doped SnO₂ nanorods anodes were synthesized by a hydrothermal method with Ti sheets as substrates (Ti/SnO₂-Sb-NRs anodes). In this paper, we focus on the effects various preparing conditions, such as the acidity and basicity of the solution, precursor solvent, concentration, reaction temperature, growth time and annealing temperature, on the formation and electrochemical properties of SnO₂-Sb-NRs anodes. The surface morphology of SnO₂-Sb-NRs is investigated by scanning electron microscopy (SEM), and chronoamperometry (CA) is measured as an indirect assessment of the electrochemical performance of the anodes. It is shown that SnO₂-Sb-NRs can be synthesized in both strong acid solution and strong alkaline solution, and the microstructure of Sb-doped SnO₂ can be controlled to some extent by varying the reaction conditions. The Ti/SnO₂-Sb-NRs anode shows the best morphology and properties when the precursor concentration is 0.010 mol·L⁻¹, using ethanol-water (1:1, v/v) as the solvent, at 200 °C for 24 h, and annealing at 550 °C for 2 h. An electrochemical degradation experiment of Acid Red 73 (AR 73) verifies its good electro-catalytic performance. Moreover, the growth mechanism of the SnO₂-Sb-NRs is also discussed.

Keywords: Sb-doped SnO₂; Nanorods; Hydrothermal; Electrochemical oxidation; Optimal conditions.

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