Electrochemical supercapacitive performance of spray deposited NiSnO3 thin films

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Electrochemical supercapacitive performance of spray deposited $NiSnO_3$ thin films

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Abstract

Mixed transition metal oxides with hierarchical and porous structures are considered to be the promising electrodes for high-performance supercapacitors. Nickel–Tin–Oxide ($NiSnO_3$) thin films are deposited by spray pyrolysis for electrochemical supercapacitors. The films are characterized by X-ray diffraction (XRD), scanning electron microscopy and UV-Vis spectrophotometer. XRD patterns confirm formation of Perovskite $NiSnO_3$. $NiSnO_3$ thin films show flake and spongy type of morphology. The band gap energy is found to be in the range of 3.31-3.56 eV. The pseudocapacitive behavior of $NiSnO_3$ electrodes has been investigated through cyclic voltammetry, galvanostatic charge/discharge and electrochemical impedance spectroscopy (EIS) measurements in 2M aqueous KOH. $NiSnO_3$ electrode shows maximum specific capacitance of 386 Fg^{-1} at scan rate 5 mVs^{-1}. Further, 92.63% retention in specific capacitance is observed after 1000 charge/discharge cycles. EIS study reveals low solution and charge transfer resistance. These features make $NiSnO_3$ electrode attractive for high-performance supercapacitors.

Keywords: Spray pyrolysis; Nickel tin oxide; Nickel stanate; Thin films; Electrochemistry; Supercapacitor; Cyclic voltammetry.

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