

# Tin passivation in alkaline media: Formation of SnO microcrystals as hydroxylation etching product

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**Keywords:** Tin passivation SnO microcrystals Tin etching Stoichiometric SnO electrosynthesis **a b s t r a c t:** N The mechanism of the electrochemical passivation on Tin electrodes in 0.1 M NaOH is studied at low scan rates in a wide potential range. To this aim, tin oxide layers were grown on a polycrystalline tin surface under potentiostatic conditions in both the active and passive electrochemical potential ranges, and characterized by field emission scanning electron microscopy (FESEM), X-ray diffraction (XRD), Raman spectroscopy and electrochemical impedance spectroscopy (EIS). The results show that the first anodic process in the active region corresponds to the formation of a SnO·nH<sub>2</sub>O prepassive layer that is removed upon increasing the applied potential due to surface etching occurring at the metal/oxide interface. During the etching process, Sn<sup>2+</sup> ions supersaturate at the electrode vicinity thus forming a SnO crystalline phase on top of the electrode surface in the presence of the alkaline medium. At higher anodic potentials, near the passive plateau, the etching process ceases and the current drops due to the formation of a n-type Sn(IV)-based oxide at the metal/SnO interface that provides an efficient electronic passivation of the electrode