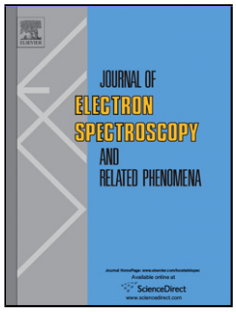

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Surface Stoichiometry Analysis by AES, EELS Spectroscopy and AFM Microscopy in UHV Atmosphere of SnO_2 Thin Film

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Highlights:

In this paper, we are interested to study the surface stoichiometry of SnO_2 thin films prepared by the Spray Pyrolysis method using the AES and EELS spectroscopy analysis, with especial attention to the effect of moderate temperature treatment and the Argon ion bombardment under the Ultra High Vacuum (UHV) environment.

- The presence of the carbon prevents the oxygen absorption on the surface of the thin film having the elevated roughness during the moderate heating treatment.
- The surface stoichiometry informs us on the surface roughness, the oxygen absorption, the charge effect and the stability of the surface. All these phenomena are related to the substrate temperature of the thin film.
- •The stoichiometry of the SnO_2 thin film surface was estimated by the AES spectra.
- •The EELS and AFM analysis methods confirm the AES results on the behaviour of the SnO_2 thin film's surfaces.

Abstract:

SnO_2 thin films are materials with surfaces sensitive to the processes of elaboration, synthesis and post-synthesis treatments for different technology applications. The main objective of the present work is to investigate three samples issued from spray pyrolysis method elaborated at different temperatures of substrate 300°C, 340°C and 380°C, with the precursor Bu_2SnAc_2 (dybutil tin diacitate) and submitted to three repeated heatings at 300°C and then to a treatment by Argon ions bombardment in an Ultra-High Vacuum Chamber (UHV). We found that the carbon has escaped by diffusion in depth to surface during the both heating effects for two samples, unlike to the sample of 300°C temperature of substrate carries the elevated rate of oxygen on the surface. These increases have been detected by both complementary methods of Auger Electron Spectroscopy (AES) and Electron Energy Loss Spectroscopy (EELS) analysis techniques, which are able to follow the stoichiometric change of oxygen. Furthermore, the bombardment by Argon beam has caused desorption of carbon and oxygen atoms from the surfaces. A third heating was carried out for two purposes, first to restore the surfaces