

## **Xps Investigations of Sn Oxides Nanolayers Doped By Au, Ag And Pd.**

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Thin SnO<sub>2</sub> layers are widely used as resistance gas sensors, transparent electrical contacts in monitors, solar cells and film heaters. Doping of SnO<sub>2</sub> thin films with noble metals raises up by one order its sensitivity to gases.

XPS investigations of as surface doped, as bulk doped SnO<sub>x</sub> nanolayers were performed with the use of synchrotron radiation (SRC, Stoughton, USA). Bulk doped samples of SnO<sub>x</sub> were obtained by a simultaneous magnetron sputtering of the targets of tin and Au, Ag and Pd metals and the following oxidation of nanolayers in the air. Surface doping was performed by thermal deposition of 10 – 50 equivalent monolayers of metals on the preliminary oxidized tin layers.

Oxidation of both series of the samples was made in the air as follows: a smooth heating up to 230 C and next, the oxidizing anneal for 1 hour, then a smooth heating up to the necessary temperature (450 and 650 C) with the following one-hour annealing at the same temperature. Thickness of the obtained nanolayers was of 30 nm.

XPS spectra of doped nanolayers, obtained in 0 – 35 eV energy range show a considerable dependence as for distribution of valence states Sn 5s,p + O 2p, as for intensities ratio change of subvalent Sn 4d and O 2s states on annealing temperature and the way of doping. In undoped nanolayers obtained at 450 C of annealing the unusual intensive peak of O 2s states is observed. This peak remains for nanolayers doped with palladium and disappears for nanolayers doped with gold and silver. Moreover, along with the appearance of intensive peak of O 2s states N 2s peak is also observed meaning the presence of adsorbed gases in the surface layer.

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