

Thermal oxidation of tin layers and study of the effect of their annealings on their structural and electrical properties

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Abstract: The main objective of this article is the control of tin dioxide preparation process on glass substrate. Layers of pure tin with thicknesses of 500 and 1000 deposited. Their enrichment with oxygen is ensured by thermal annealing for 1 and 2 h in a continuous tube furnace with temperatures varying between 300 and 500 °C. The tin film formed by vacuum evaporation has tetragonal crystalline structure, and is composed of grains of various sizes separated by grain boundaries. After annealing in oxygen, the formed phases consist of a mixture of SnO and SnO₂ crystalline mixtures and sometimes amorphous tin oxide. The more the time or the temperature of annealing, the more the quantity of SnO₂ and SnO. For an annealing at 500 °C for 10 h the size of grains increases more than annealing for 2 h. This is confirmed by the study of their micrographs. The electrical resistivity of these layers, measured by the 4 point method, is correlated to the size of the oxide particles: the smaller the particle size, the lower the electrical resistivity.

Keywords : vacuum evaporation, SnO₂, Thermal oxidation, X-rays, Thin layers, SEM