



## **Influence of plasma exposure on physical characteristics of thin films of SnO<sub>2</sub> obtained from SnCl<sub>4</sub> solutions with additives of NH<sub>4</sub>F and NH<sub>4</sub>OH**

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The electrical conductivity of tin dioxide is extremely sensitive to the state of the surface in the temperature range 300-800 K, at which oxidation-reduction reactions take place on its surface. Nanocrystalline films of tin dioxide are selectively sensitive to the presence of toxic gases, organic and certain biological molecules in the surrounding atmosphere [1]. SnO<sub>2</sub>-based films are also used as transparent conductive coatings [2]. To modify the properties of the films, alloying, heat treatment, plasma treatment is used.

In this paper, we consider the effect of oxygen and hydrogen plasma on SnO<sub>2</sub> films synthesized from solutions of tin tetrachloride containing additives NH<sub>4</sub>F and NH<sub>4</sub>OH.

It has been established that the transmission spectra of films synthesized from solutions of tin tetrachloride containing, respectively, NH<sub>4</sub>F and NH<sub>4</sub>OH additives and treated with hydrogen and oxygen plasmas for 5 minutes, don't have the interference because of the high roughness. Therefore, the transmission spectra don't allow determining the refractive index, film thickness, extinction coefficient, porosity. However, it is seen that at a wavelength of 450 nm for SnO<sub>2</sub> films containing the NH<sub>4</sub>F additive, the transmittance decreases by 1.1 and 1.24 times for films treated with O and H plasmas. In the case of the addition of NH<sub>4</sub>OH, a similar decrease in the transmittance of 1.17 and 1.52 is observed. Analysis of the surface topography of SnO<sub>2</sub> films with the addition of NH<sub>4</sub>F shows that the rms roughness increases by 1.1 times as a result of O-plasma treatment, while after treatment with H-plasma it decreases by 1.3 times, which confirms data on the decrease in the transmission of films, treated with hydrogen plasma. Analysis of the surface topography of SnO<sub>2</sub> films obtained from a solution of tin tetrachloride supplemented with NH<sub>4</sub>OH, shows that as a result of treatment with O and H plasmas, the root-mean-square roughness decreases by 7.6 and 2.1 times.

The response time after plasma treatment of films synthesized from solutions with the addition of NH<sub>4</sub>F and NH<sub>4</sub>OH changes insignificantly and fluctuates within 2-3 seconds, but the recovery time is reduced by 25-35%.

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