

# "Nanotechnology and nanomaterials"

## ZnO, Zn<sub>2</sub>SnO<sub>4</sub> thin layers growth by pulverization method and investigation of their electrical and optical properties.

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Zinc oxide and its Sn compounds are of particular interest for researchers related to their technical using due to the wide band gap and high resisatance to the temperature, chemical influence and corpuscular radiation.

Recently for ZnO and Zn<sub>2</sub>SnO<sub>4</sub> nanometric layers fabrication such a methods as magnetron sputtering, gaseous phase deposition and pulverization are used. Nevertheless the properties of polycrystalline layers of these wide band gap semiconductors deposited by pulverization are not sufficiently studieid which delays the process of their practical implementation in different devices.

The objective of our study were establishing of the optimum deposition conditions for ZnO and zinc stanate (Zn<sub>2</sub>SnO<sub>4</sub>) layers by pulverization method on the glass substrates and investigation of their electrophysical properties. The oxide layers deposition by pulverization method has a series of priorities: simplicity; using of low cost equipment; minimum loses of the material; economical at the deposition on large areas; excludes the using of toxic gases. For ZnO and Zn<sub>2</sub>SnO<sub>4</sub> layers fabrication the installation described in [1] was used.

The system allows to obtain the ZnO and Zn<sub>2</sub>SnO<sub>4</sub> layers with a surface area up to 80 cm<sup>2</sup>. The layers were grown in an oxygen atmosphere at a pressure of 40 kPa through the pulverizer. For ZnO and Zn<sub>2</sub>SnO<sub>4</sub> layers deposition the ethanol solutions of ZnCl<sub>2</sub> and SnO<sub>4</sub> molarity of 0.2M were used. The layers were grown on glass substrates having temperature in the range range of the 300 ... 400 ° C for various ZnCl<sub>2</sub> and SnO<sub>4</sub> ratios in the solution of a 10 mL volume. ZnO and Zn<sub>2</sub>SnO<sub>4</sub> layers with a thickness of 500-350 nm depending on ZnCl<sub>2</sub> / SnO<sub>4</sub> ratio there were obtained.

The electrical and optical properties of the obtained at the temperature of 300 °C, 350 °C și 400°C layers in dependence of ZnCl<sub>2</sub>/SnCl<sub>4</sub> ratio were studied. The surface resistance of the layers grown for Zn/Sn ratio from 9/1 up to 5/5 is of 10<sup>7</sup> Ω/cm<sup>2</sup> by reaching values of 6·10<sup>7</sup> Ω/cm<sup>2</sup> for 1/9 ratio. The optical transmittance in the wavelength region of 300...900 nm is of 60-70% up to the ratio 5/5 and increases to 80% for Zn/Sn ratio where Sn prevails.

1. Botnariuc V., Gorceac L., Coval A., Cinic B., Ketrush P., Raevschi S., Micli V. Synthesys and Electrophysical Properties of Nanometric CdS Layers Deposited on SnO<sub>2</sub>-coated Glass Substrates by Pulverization Method. //J.of Nanoelectronics and Optoelectronics. -2013. Vol.7. -P.1-7.