

# Structural, electrical and optical parameters of ZnO thin films grown by ALD with water and ozone precursors.

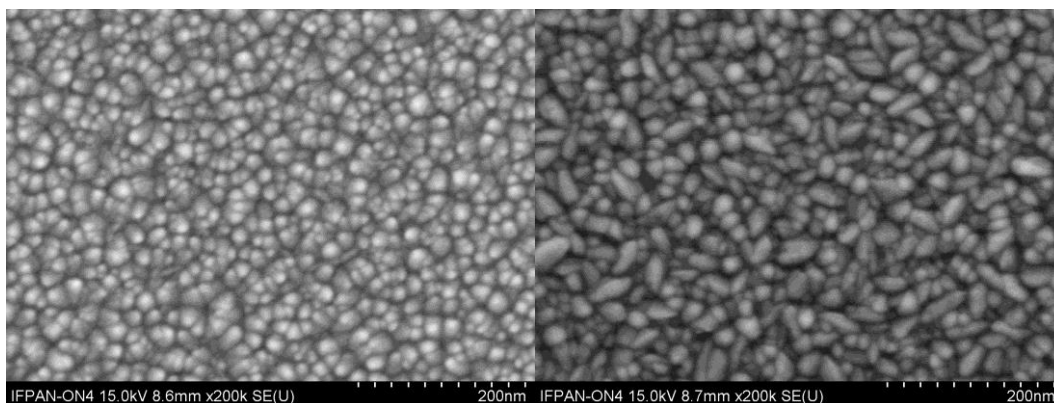
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Atomic Layer Deposition (ALD) technology is widely used to obtain thin layers on various substrates. In particular, it is used to obtain metal oxides using organic precursors. Usually water is used as an oxygen precursor. It is also possible to use hydrogen peroxide, ammonia water, ozone or plasma as the compound responsible for the oxidation process.

Comparison of the properties of ZnO thin layers obtained by ALD technology, which were prepared with two different oxygen precursors: water and ozone will be presented. Diethylzinc (DEZ) was used as an organic precursor of zinc. The processes were carried out in a wide range of temperatures, from 50°C up to 250°C. Parameters of the growth were selected in a manner allowing to obtain all layers with a thickness of 100 nm. Conducted measurements of SEM, SIMS, AFM, XRD, transmittance and Hall effect for the samples provides a lot of valuable informations on the structural and opto-electric properties, which will be presented. The crystallographic analysis indicates that the method of crystallization varies depending on used oxygen precursor. For ZnO layers obtained using ozone, strong domination was observed for the c-plane orientation (00.1). For selected temperatures, their resistivity increases comparing to the layers deposited at the same temperature using water as the oxygen precursor.

Conducted research indicates that introducing oxygen precursor different than water may have beneficial effect on the structural, electrical and optical properties and significantly extended potential applications of obtained ZnO layers.



*Fig. SEM image of ZnO layer obtained in 100°C using ozone (left) and water (right) as oxide precursor.*

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