XPS study of ZnO nanolayers prepared by laser deposition

Genoveva Atanasova[1], Anna Dikovska [2], Mariana Stankova[3] and Plamen Stefanov[1]

[1] Institute of General and Inorganic Chemistry, Bulgarian Academy of Sciences, 1113 Sofia, Bulgaria. *E-mail:* stefanov@svr.igic.bas.bg

[2] Institute of Electronics, Bulgarian Academy of Sciences, 72 Tsarigradsko Chaussee, Sofia 1784, Bulgaria

[3] Serví de Recursos Científicas i Técnicas, Campos Sescelades, Universitad Rovira i Virgili, Av. Paisos Catalans, 26, Tarragona 43007, Spain

Nanosized ZnO has great potentiality for being used in gas sensors, photocatalysts, chemical absorbents, solar cells, electrical and optical devices. Hence, investigations on the synthesis and modification of nanosized ZnO have attracted tremendous attentions.

In this work, nanostructured ZnO films were produced by pulsed laser deposition on amorphous SiO_2 substrates. The nanostructured films were fabricated via a two step process. As a first step, thin ZnO layers were fabricated on SiO_2 substrates at different oxygen pressures in order to form different types of growth nuclei. As a second step, ZnO films were deposited on the as-created nuclei in an on-axis PLD configuration. The influence of the growth nuclei parameters on the morphology and physicochemical properties of the nanostructured films was investigated.

The surface morphology and structure of the nanostructured ZnO films were characterized with AFM in order to determine the optimum conditions of formation of different types of nuclei. XPS was used to investigate the composition and chemical state of the nanostructured ZnO. The changes occurring on the surface of the films after prolonged exposition in air are considered in the light of the nanostructure of the ZnO layers.

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