

## Synthesis of different ZnO nanostructures

I.Mihailova, V.Gerbreders, E.Tamanis, E.Sledevskis, M.Krasovska, P.Sarajevs, A.Ogurcovs,  
J.Livmanis

G. Liberts' Innovative Microscopy Centre, Daugavpils University, Latvia

e-mail: irena.mihailova@du.lv

The application prospect of zinc oxide (ZnO) nanostructures largely relies on the ability to grow nanoobjects with necessary geometry. In this study well-aligned ZnO nanorod and nanotube arrays with a high density and uniformity were successfully synthesized by a hydrothermal method at low-temperature. The aqueous solutions of zinc nitrate hexahydrate and hexamethylenetetramine was used. Type of nanostructures depends on the seed layer, composition of growth solution, temperature, heating time, and heating method (conventional heating, laser heating and microwave heating), etc. The effect of seed layer (obtained by vacuum deposition method, by electrochemical method and by sol-gel method) on the morphology and alignment of ZnO nanostructures has been investigated. We found that it is possible to obtain the nanorods with desired inclined columnar growth by changing the geometry of the deposition of precursors [1]. Long-term isothermal growth kinetics of ZnO nanorods was investigated. The effect of laser heating in controlling the position and morphology of the nanocrystals is investigated. Morphological, structural and compositional characterizations of obtained films were carried out by scanning electron microscopy, energy-dispersive X-ray spectroscopy and X-ray diffraction analysis methods. Obtained nanostructured thin films have a promising potential for the use in solar cells, nanogenerators, chemical and biological sensors, photodetectors and templates, where a large surface area is necessary.

### References

1. I. Mihailova, V. Gerbreders, A. Bulanovs, E. Tamanis, E. Sledevskis, A. Ogurcovs and P. Sarajevs, Proc. SPIE **9421**, 94210A (2014); doi: [10.1117/12.2083960](https://doi.org/10.1117/12.2083960)

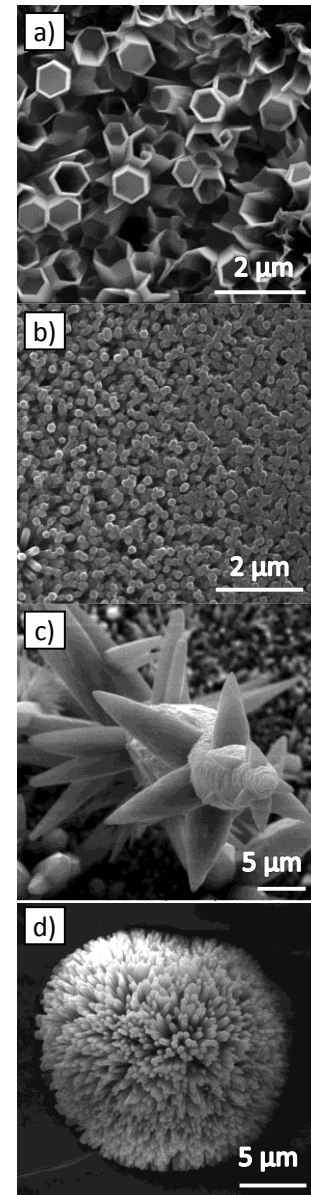


Fig.1. ZnO nanostructures obtained by hydrothermal growth method:  
a) nanotubes, b) nanorods, c) and d) laser assisted growth.