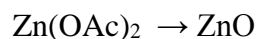


Microwave solvothermal synthesis and characterisation of doped and undoped nano-ZnO with controlled grain size

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Laboratory Nanostructures IHPP PAS is an expert in the synthesis of nanoparticles (NP) with small size distribution using technology microwave solvothermal synthesis (MSS). MSS technology allows precise control parameters of NP synthesis such as reaction time, temperature and pressure. The authors obtain the zinc oxide particle with narrow size distribution in solvothermal synthesis which can be expressed as follows:



The developed method enables precisely control of the average grain size and chemical composition of the obtained ZnO NP and doped ZnO NP by regulating composition of precursor and synthesis parameters. The authors synthesized

a pure, fully crystalline hexagonal ZnO NP with a specific surface area from 9 to 53 m²/g, and an average grain size from 22 nm to over 115 nm (Fig. 1).

Research directions of the Laboratory of Nanostructures IHPP PAS are focused on the characteristics of nanomaterials according to ISO/IEC 17025 and the possibility of their application in medicine, optics, optoelectronics pharmacy and cosmetics. Laboratory of Nanostructures IHPP PAS deals with the characteristics of nanomaterials obtained by our team, project partners (e.g. Shyman), as well as provides research services such as analysis of density, surface area, morphology, phase composition, thermogravimetry of nanomaterials, surface tension, viscosity, stability and the size of nanoparticles in colloidal solutions and suspensions.

Name	Average crystallite size from Scherer's formula (XRD) [d _c ±σ.nm]	Average grain size calculated from SSA BET [d±σ.nm]	Specific Surface Area (BET) [a _s ±σ.m ² /g]	Density [ρ±σ.g/cm ³]
ZnO Type 1	21 ± 4	22 ± 3	53 ± 3	5,20 ± 0,05
ZnO Type 2	25 ± 4	28 ± 4	40 ± 3	5,24 ± 0,05
ZnO Type 3	33 ± 7	33 ± 4	34 ± 3	5,33 ± 0,05
ZnO Type 4	50 ± 17	48 ± 4	23 ± 3	5,48 ± 0,05
ZnO Type 5	58 ± 18	78 ± 4	13 ± 3	5,52 ± 0,05
ZnO Type 6	52 ± 10	115 ± 4	9 ± 3	5,57 ± 0,05

Fig.1 Properties of ZnO nanopowders synthesized by Laboratory Nanostructures IHPP PAS.