

Module type: Master		
Module title: Synthesis and structure of nanomaterials		
Module type: obligatory		
ESPB: 8		
Requirements: none		
Module aims: The aim of this course is to introduce the various techniques of obtaining nanomaterials and structure characterization at the nanoscale from the theoretical and practical point of view: ranging from isolated nanostructures, through to nanostructures integrated in bulk materials.		
Learning outcomes After the following course the student should be able to: - General abilities: Reading professional literature; Search and Internet use; Writing term papers and presentations; The ability to research - Course specific abilities: After completing the course the student should be able to independently carry out some of the techniques of obtaining and sintering of nanoparticles and nanomaterials. Also, it is expected that students will be able to prepare samples and perform some of the following techniques and interpret the results.		
Syllabus <i>Theoretical part:</i> The synthesis methods for fabrication of inorganic nanoparticles from the liquid and gas phase (co-precipitation, sol-gel mechanochemistry, plasma based synthesis, vapour condensation, the condensation in inert gas, pyrolysis, electrodeposition). Sintering and unconventional processing (microwave sintering, Shock-wave processing). Fundamentals of conventional experimental techniques of structural characterization. <i>Practical part:</i> Experimental techniques based on diffraction: X-ray diffraction, neutron diffraction and electron diffraction. Spectroscopic methods: photon-photon spectroscopy (FTIR-spectroscopy, IR Raman scattering), electron microscopy (SEM, TEM).		
Reading list 1. <i>Nanomaterials: An Introduction to Synthesis, Properties and Applications</i> , 2nd Edition, ISBN: 978-3-527-33379-0, Dieter Vollath, Wiley, 2013 2. <i>Handbook of Raman Spectroscopy</i> , edited by Ian R Lewis, Howell G.M. Edwards, CRC Press (2001)		
Contact hours	Theoretical: 3	Practical: 4
Method of delivery Lectures (3 hours per week), comp. lab (1 hour per week) и laboratory (2 hours per week).		