Course Unit Descriptor

Study Programme: Doctoral Academic Studies in Chemistry

Course Unit Title: Inorganic nanostructures

Course Unit Code: DSH-725

Name of Lecturer(s): Full Professor Aleksandar Djordjević; Assistant Professor, Senior Research Associate Ivana Borišev

Type and Level of Studies: PhD degree

Course Status (compulsory/elective): elective

Semester (winter/summer): summer

Language of instruction: English

Mode of course unit delivery (face-to-face/distance learning): Face-to-face

Number of ECTS Allocated: 15

Prerequisites: None

Course Aims:

The aim of the course is to introduce the students and to give them good insight into the nanomaterials, nanocomposites and nanostructures of inorganic, hybrid and composite materials. To get them informed about physical and chemical properties and possibilities of applications of these materials in various technologies, medicine, pharmacy as well as to get them aware of potential harmful effects of inorganic nanostructures.

Learning Outcomes:

To attain necessary knowledge about inorganic nanomaterials, cognition about applicability, the survey of patent documentation and contemporary scientific literature, practical skills regarding characterization of nanomaterials.

Syllabus:

Theory

The following topics will be processed: inorganic nanomaterials division according to their chemical composition; physical and chemical properties of inorganic nanomaterials, nanocomposites and hybrid nanomaterials; structures of inorganic nanomaterials; application of inorganic nanomaterials in construction, electronics, mechanical engineering, biology, human medicine and pharmacy, phytopharmacy, catalysis, new material technologies.

Practice

Experimental work will be based on the characterization of inorganic nanomaterials and nanocomposites using FTIR, UV / VIS, X-ray, TG, SEM, photocatalytic processes. Safety guidance regarding nanomaterials manipulation

Required Reading:

1. The chemistry of nanostructured materials, Peidong Yang, 2003World Scientific.
2. Bio-inorganic Hybrid Nanomaterials, Eduardo Ruiz-Hitzky,Katsuhiko Ariga and Yuri Lvov , 2008, Wiley-VCH.
3. Michael A. Stroscio and Mitra Dutta, Biological Nanostructures and Applications of Nanostructures in Biology Electrical, Mechanical, and Optical Properties, 2004Springer.
4. Biomaterijali, Dejan Raković, Dragan Uskoković, Institut tehničkih nauka 2010, SANU.
5. General safe practices for working with engineered nanomaterials in research laboratories, Department of health and human servicesniosh, 2012, NIOSH.
6. Lhadi Merhari,Limoges France, Hybrid Nanocomposites for Nanotechnology Electronic, Optical, Magnetic and Biomedical Applications, 2009, Springer.
7. DEKKER Encyclopedia of Nanoscience and Nanotechnology, 2009, CRC Press.
8. Atsushi Muramatsu Tokuji Miyashita, of Organic-Inorganic Materials Nanohybridization, 2009, Springer.

Weekly Contact Hours: 10	**Lectures:** 5	**Practical work:** 5
Teaching Methods: Lectures, independent and demonstrational experimental work, students' seminars and within presentations carried out by students, problem sessions		
Knowledge Assessment (maximum of 100 points): 100		

Pre-exam obligations	points	**Final exam**	points
Active class participation		written exam	
Project presentation	50	oral exam	50
Preliminary exam(s)		…….	
Seminar(s)			

The methods of knowledge assessment may differ; the table presents only some of the options: written exam, oral exam, project presentation, seminars, etc.