Course Unit Descriptor

Study Programme: Doctoral Academic Studies in Chemistry

Course Unit Title: Biologically active fullerenes

Course Unit Code: DSH-720

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 get students familiar with chemical, physical and biological properties of biologically active fullerene derivatives and fullerene nanocomposites, nanobiological and nanomedicine research as well as potential application in human medicine and pharmacy.

Learning Outcomes:

To acquire all the necessary theoretical and practical knowledge from the chemical and biological properties of active fullerene derivatives and fullerene nanocomposites.

Syllabus:

Theory

Within theoretical teaching the following thematic units will be processed: The division of biologically active fullerenes by chemical and biological properties; Chemical syntheses and physicochemical characterization of the biologically active fullerene C_{60} and higher fullerenes; New Approaches to the Application of Fullerene Derivatives and Nanocomposites in Nanobiology, Nanomedicine and within Nanopharmaceuticals.

Practice

The experimental work will be based on synthesis and physico-chemical characterisation methods and techniques (FTIR, UV / VIS, NMR, X-ray, SEM, DLS, TG, Raman spectroscopy, GPC / SEC), potentially biologically active C_{60} derivatives and biologically active nanocomposites. Biological investigation of C_{60} derivatives and nanocomposites on *in vitro* and *in vivo* models

Required Reading:

1. Franco Cataldo and Tatiana da Ros, Medicinal Chemistry and Pharmacological Potential of Fullerenes and Carbon Nanotubes (Carbon Materials: Chemistry and Physics), 2013. Springer
2. Periodic Nanostructures (Developments in Fullerene Science), Mircea V. Diudea and Csaba L. Nagy Springer, 2007.Berlin
3. Fullerenes, chemistry and reaction, Hirsch A., Brettreich M. Wiley VCH, Verlag, 2005.Weinheim,
4. Advanced carbon materials and technology(Advanced Materials Book Series) Aleksandar Djordjevic, Rade Injac, Danica Jović, Jasminka Mrđanović, Mariana Seke, Bioimpact of carbon nanomaterials 2014, WILEY-Scrivener Publishing
5. Neelkanth M. Bardhan, 30 years of advances in functionalization of carbon nanomaterials for biomedical applications: a practical review, 2016.Materials Research Society.
6. Mei Zhang , Rajesh R. Naik , Liming Dai, Carbon Nanomaterials for, Biomedical Applications, 2016, Springer

Weekly Contact Hours: 10	**Lectures:** 5	**Practical work:** 5
Teaching Methods: Lectures, indipendent 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.