

Chair of Organic Chemistry and Biochemistry

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ABSTRACT

In this presentation, the following is given briefly: an overview of courses, professors and associates at the Chair of Organic Chemistry and Biochemistry at undergraduate academic studies (bachelor), at master academic studies and at doctoral academic studies; aim and brief overview of the courses within the Chair of Organic Chemistry and Biochemistry, as well as an overview of research projects “Natural products of plants and lichens: isolation, identification, biological activity and application” and “Combinatorial libraries of heterogeneous catalysts, natural products, modified natural products and analogues: The approach to new biologically active agents”, including list of researchers that are members of Chair of Organic Chemistry and Biochemistry along with their main research area and the most important achievements and/or positions.

Studies

Through numerous courses and researches, members of the Chair of Organic Chemistry and Biochemistry realize educational and scientific activity. There are ten professors, one teaching assistant and twelve PhD students which organize and carry out classes from obligatory and elective subjects in the 2017/18 academic year. Tables 1-3 display overview of courses at three different levels of study: undergraduate academic studies in Table 1 (7 obligatory and 5 elective); master academic studies in Table 2 (10 obligatory and 11 elective); and doctoral academic studies in Table 3 (13 elective). Apart from teaching, the members of the Chair are also involved in research work, which will be discussed later.

Table 1. An overview of courses, professors and associates at the Chair of Organic Chemistry and Biochemistry at undergraduate academic studies (bachelor)

N	Course	Semester	Course type ¹	L+Te+O ²	ECTS ³	Professor (L)	Professor/associates (Te+O)
1.	<i>History of Chemistry</i>	1.	E	2+0+0	3	Danijela Kostić	
2.	<i>Organic Chemistry 1</i>	2.	O	5+1+0	9	Gordana Stojanović	Gordana Stojanović
3.	<i>Experimental Organic Chemistry</i>	2.	O	1+0+4	3	Aleksandra Đorđević	Ivana Zrnzević
4.	<i>Organic Chemistry 2</i>	3.	O	4+1+0	8	Niko Radulović, Polina Blagojević	Dragan Zlatković
5.	<i>Preparative Organic Chemistry</i>	4.	O	1+0+5	3	Polina Blagojević	Sonja Filipović, Milica Stevanović
6.	<i>Chemistry of Natural Compounds</i>	5.	O	4+0+4	8	Danijela Kostić	Milica Todorovska
7.	<i>Instrumental Methods in Organic Chemistry</i>	6.	O	4+4+0	7	Olga Jovanović	Snežana Jovanović
8.	<i>Biochemistry</i>	6.	O	4+0+5	5	Ivan Palić	Jovana Ickovski
9.	<i>Nomenclature of Organic Compounds</i>	4.	E	2+1+0	4	Polina Blagojević	Polina Blagojević
10.	<i>Pharmaceutical Chemistry</i>	6.	E	2+0+2	5	Aleksandra Đorđević	Aleksandra Đorđević
11.	<i>Organic Chemistry of Food</i>	6.	E	2+0+2	4	Snežana Jovanović	Snežana Jovanović
12.	<i>Organic Chemistry in Everyday Life</i>	6.	E	2+2+0	4	Marija Genčić	Marija Genčić

¹Course type: *O* – Obligatory or *E* – Elective.

²Active teaching hours: *L* – Lectures, *Te* – Theoretical exercises, and *O* – Laboratory work and other forms of teaching.

³Number of ECTS allocated.

Table 2. An overview of courses, professors and associates at the Chair of Organic Chemistry and Biochemistry at master academic studies

N	Modules ¹	Course	Semester	Course type ²	L+Lw+O ³	ECTS ⁴	Professor (L)	Professor/associates (Lw+OMT)
1.	Ch, Ch _{RD} , Ch _T	<i>Dynamic Stereochemistry</i>	1.	O	3+2+0	7	Gordana Stojanović	Gordana Stojanović
2.	Ch, Ch _{RD} , Ch _T	<i>Organic Synthesis</i>	2.	O	3+0+4	8	Niko Radulović, Marija Genčić	Milena Živković
3.	Ch, Ch _{RD} , Ch _T	<i>Dynamic Biochemistry</i>	2.	O	2+0+2	5	Ivan Palić	Jovana Ickovski
4.	Ch, Ch _{RD}	<i>Selected Chapters of Organic Chemistry</i>	3.	O	3+2+0	7	Olga Jovanović	Olga Jovanović
5.	Ch, Ch _{RD} , Ch _T	<i>Chemistry of Secondary Metabolites</i>	2.	E	2+0+2	4	Gordana Stojanović, Aleksandra Đorđević	Gordana Stojanović, Aleksandra Đorđević
6.	Ch, Ch _{RD}	<i>Organic Structure Determination: An Advanced Course</i>	3.	E	3+0+2	5	Niko Radulović	Niko Radulović, Milan Nešić
7.	Ch, Ch _{RD}	<i>Advanced Organic Chemistry</i>	4.	E	3+0+2	5	Polina Blagojević	Polina Blagojević, Milan Nešić
8.	Ch, Ch _{RD}	<i>Advance Course</i>	4.	E	3+0+2	5	Goran	Goran Petrović, Ivan

		<i>of Instrumental Chromatographic Methods</i>					Petrović, Ivan Palić	Palić, Jelena Stamenković
9.	Ch, Ch _T	<i>School Experiments in Organic Chemistry</i>	3.	O	2+0+3	6	Danijela Kostić	Danijela Kostić
10.	Ch, Ch _T	<i>Nobel Prize in Chemistry</i>	4.	E	2+0+2	3	Danijela Kostić	Danijela Kostić
11.	Ch, Ch _T	<i>Everyday Life Chemistry – Atkins' molecules</i>	4.	E	2+0+2	3	Snežana Jovanović	Snežana Jovanović
12.	Ch _A , Ch _E	<i>Chemistry of Organic Polymers</i>	1.	O	4+0+2	7	Niko radulović	Miljana Đorđević
13.	Ch _A , Ch _E	<i>Applied Organic Chemistry</i>	2.	O	3+0+3	6	Goran Petrović	Jelena Stamenković
14.	Ch _A	<i>Synthesis of Macro-Quantity of Organic Compounds</i>	3.	O	3+0+3	7	Goran Petrović	Jelena Stamenković
15.	Ch _A , Ch _E	<i>Forensic Chemistry</i>	2.	E	2+1+2	5	Niko Radulović	Milica Stevanović
16.	Ch _A	<i>Medicinal Chemistry</i>	3.	E	3+0+2	6	Polina Blagojević	Polina Blagojević, Milan Nešić
17.	Ch _A	<i>Chemistry of Secondary Metabolites</i>	4.	E	2+0+2	4	Gordana Stojanović, Aleksandra Đorđević	Ivana Zlatanović
18.	Ch _E	<i>Biodegradation</i>	3.	E	3+0+2	5	Aleksandra Đorđević	Aleksandra Đorđević
19.	Ch _E	<i>Manipulation with Dangerous Organic Chemicals Substances</i>	4.	E	2+0+2	4	Ivan Palić	Ivan Palić
20.	Ch _E	<i>Organic Pollutants 1</i>	3.	O	2+0+1	4	Aleksandra Đorđević	Aleksandra Đorđević
	Ch _E	<i>Organic Pollutants 2</i>	4.	O	2+0+1	4	Polina Blagojević	Polina Blagojević, Milan Nešić

¹This level of academic studies is organized through modules of two accredited study programmes; for *General Chemistry* program (Ch): *Research and Development* (Ch_{RD}) and *Chemistry Teacher* (Ch_T), and for *Applied Chemistry* program: *Applied Chemistry* (Ch_A) and *Environmental Chemistry* (Ch_E).

²Course type: O – Obligatory or E – Elective.

³Active teaching hours: L – Lectures, Te – Theoretical exercises, and O – Laboratory work and other forms of teaching.

⁴Number of ECTS allocated.

Table 3. An overview of courses and professors at the Chair of Organic Chemistry and Biochemistry at doctoral academic studies

N	Course	Semester	Course type ¹	L ²	ECTS ³	Professor
1.	<i>Instrumental Analysis of Selected Groups of Organic Compounds</i>	1.	E	4	8	Olga Jovanović, Snežana Jovanović
2.	<i>The Isolation of Secondary Metabolites</i>	1.	E	4	8	Gordana Stojanović, Aleksandra Đorđević
3.	<i>Chemical Microbiology</i>	1.	E	4	8	Aleksandra Đorđević
4.	<i>Physical Organic Chemistry</i>	1.	E	4	8	Polina Blagojević, Marija Genčić

5.	<i>Identification of Natural Products</i>	2.	E	4	8	Olga Jovanović, Goran Petrović, Ivan Palić
6.	<i>Contemporary Organic Synthesis</i>	2.	E	4	8	Niko Radulović, Goran Petrović
7.	<i>Chemistry of Plant Pigments</i>	2.	E	4	8	Danijela Kostić
	<i>Asymmetric Organic Synthesis</i>	3.	E	4	8	Niko Radulović
8.	<i>Experimental Biochemistry</i>	3.	E	4	8	Danijela Kostić
9.	<i>Two-dimensional Nuclear Magnetic Resonance Spectroscopy (2D-NMR)</i>	3.	E	4	8	Niko Radulović
10.	<i>Selected Chapters of Supramolecular Chemistry and Chemistry of Macromolecules</i>	4.	E	4	8	Goran Petrović
11.	<i>Secondary Metabolites as Biomarkers</i>	4.	E	4	8	Gordana Stojanović
12.	<i>Molecular Modeling in Organic Chemistry</i>	4.	E	4	8	Polina Blagojević
13.	<i>Conformational Analysis of Biomacromolecules</i>	4.	E	4	8	Ivan Palić

¹Course type: E – Elective.

²Active teaching hours: L – Lectures.

³Number of ECTS allocated.

Table 4. The purpose and brief overview of the courses within the Group of Organic Chemistry and Biochemistry

No.	Course	Purpose and brief overview
1.	<i>Organic chemistry 1</i>	Gaining knowledge about the structural representations, systematic nomenclature, structure, properties and reactivity of hydrocarbons (alkanes, alkenes, alkynes, cycloalkanes, and aromatics) and heterocyclic aromatic compounds.
2.	<i>Experimental Organic Chemistry</i>	This course aims to introduce students to basic experimental techniques used in laboratory for organic chemistry. The main goal is developing the necessary skills to address the challenges of the experimental work.
3.	<i>Organic Chemistry 2</i>	This subject deals primarily with the basic principles to understand the structure and reactivity of organic molecules. Emphasis is on the substitution and elimination reactions and chemistry of the carbonyl group. Standard synthetic transformations are discussed from a structural, stereochemical and mechanistic points of view.
4.	<i>Preparative Organic Chemistry</i>	Upon completion of this course, students should acquire a solid foundation of essential skills and knowledge associated with organic lab techniques as well as communication and teamwork skills. Specifically, at the end of the course, students should be able to a) safely plan and carry out common organic synthetic reactions, b) work safely and effectively in an organic chemistry lab and c) write clear, concise, and correct lab reports that include appropriate citations of the relevant literature.
5.	<i>Chemistry of Natural Products</i>	This course introduces students with the most important natural products, their structure, physical and chemical properties, and their isolation and biological activities: amino acids, proteins and enzymes, carbohydrates, lipids, alkaloids, and natural phenolic compounds.
6.	<i>Instrumental Methods in Organic Chemistry</i>	This subject covers both theoretical knowledge and practical work of modern chromatographic, instrumental and combined methods for separating organic mixtures and structural analysis of different classes of organic compounds.
7.	<i>Biochemistry</i>	The course aims to introduce students with answers to questions related to biological systems at the molecular-chemical level: a) What do you mean by biomolecules? b) How do they occur? c) What and how they work?
8.	<i>Nomenclature of Organic Compounds</i>	The aim of the course is to introduce the general principles and rules for the naming of organic compounds (IUPAC nomenclature). Students will learn how to name a complex polyfunctional organic compound, or to draw its structure from the name (including stereochemistry).
9.	<i>Pharmaceutical Chemistry</i>	The aim of the course is to introduce students with the classification, nomenclature, physical and chemical properties of pharmacologically active molecules and reactivity of their functional groups.
10.	<i>Organic Chemistry in</i>	The aim of this subject is to teach students not only to memorize

	Everyday Life	chemical facts, but also to understand them and to make connections among them. A number of phenomena in our everyday life will be explained using the basic principles of organic chemistry. Upon completion of this course students will gain interesting and highly applicable knowledge of organic chemistry that allows them to observe the world around them as a large reaction vessel.
11.	Dynamic Stereochemistry	Acquiring knowledge about the chirality, stereoisomer nomenclature, prochirality, conformation, stereoselective and stereospecific reactions, influence of steric effects on the reactivity of organic compounds and pericyclic reactions.
12.	Organic Syntheses	The course introduces the student to the disconnection approach to organic synthesis, <i>i.e.</i> retrosynthetic analysis. According to this approach a chemist will start with the structure of their target molecule and progressively cut bonds to create simpler molecule; in reverse, this process gives a synthetic route to the target molecule from simpler starting materials. Lectures on the synthesis of given types of molecules alternate with strategy lectures in which the methods just learnt are placed in a wider context. The synthesis lectures cover many ways of making each type of molecule starting with simple aromatic and aliphatic compounds with one functional group and progressing to molecules with many functional groups. The strategy lectures cover questions of selectivity, protection, stereochemistry, and develop more advanced thinking <i>via</i> reagents specifically designed for difficult problems.
13.	Dynamic Biochemistry	This course provides students overview of those aspects of chemistry that are most significant in the understanding of biological systems. It aims to familiarize students with biochemical principles, processes and methods based on modern understanding of the structure and function of molecules as well as on the dynamics of biological systems.
14.	Selected Chapters of Organic Chemistry	Within this course students gain theoretical knowledge of photochemical and electrochemical reactions as well as structure, properties, procurement and reactions of organic compounds of sulfur, phosphorus and silicon. Also, the aim is acquiring of knowledge by students about properties, procurement and reactions of heterocyclic organic compounds.
15.	Chemistry of Secondary Metabolites	Within this course students gain knowledge about classification and biosynthesis of plant secondary metabolites as well as their biological role, physico-chemical properties, pharmacological activity and application of plant heterosides including saponosides.
16.	Organic Structure Determination: An Advanced Course	The purpose of this course is to provide the student with a thorough understanding of the theory and use of two spectral techniques (NMR and MS) used to identify organic compounds and to identify organic compounds by interpretation of spectral data. Proton and carbon-13 nuclear magnetic resonance spectroscopy (1D and 2D) will be studied and performed on a variety of organic compounds. The course will also cover several

		advanced NMR techniques like NOESY, ^1H - ^1H COSY, HSQC, and HMQC. The goal of this course is also to emphasize the instrumental and practical nature of mass spectrometric instrumentation within the field of organic and bioanalytical chemistry. The topics of the course include fundamentals of ion motion, mass spectrometric instrumentation, applications to chemistry and biochemistry.
17.	Advanced Organic Chemistry	The aim of the course is to introduce the basic principles of the physical organic chemistry, <i>i.e.</i> the application of structure and theory to the study of organic reaction mechanisms: stereochemical features including conformation and stereoelectronic effects, reaction dynamics, isotope effects and molecular orbital theory applied to pericyclic and photochemical reactions, and special reactive intermediates including carbenes, carbanions, and free radicals. Upon completion of this course, students should be able to predict outcome of organic reactions, suggest reasonable reaction mechanisms and apply gained knowledge in planning organic synthesis.
18.	Advanced Course of Instrumental Chromatographic Methods	This course deals with the theoretical contents on HPLC and GC-MS and GC-MS-MS techniques and includes intensive practical work on the preparation and detailed analysis of the selected samples.
19.	School Experiments in Organic Chemistry	This subject introduces students to the principles of planning and executing school experiments in organic chemistry and biochemistry, codes of practice at work in organic chemistry laboratory, and the functional groups analysis – testing solution and characteristic chemical reactions.
20.	Nobel Prize in Chemistry	Introduction to the history of the development of chemistry in the 20th century, and the most important achievements in the field of chemistry. Alfred Nobel and its Foundation. Nobel Prize for Chemistry – general notes.
21.	History of Chemistry	History of chemistry and significant achievements in the field of chemistry.
22.	Everyday Life Chemistry – Atkins' Molecules	The course aims to introduce students with the molecules responsible for the experiences of our everyday life related to fabrics, drugs, plastics, explosives, detergents, fragrances, tastes, and hormones.
23.	Organic Chemistry of Food	This course introduces students with the chemical composition of food products and beverages, and possibilities for the determination of their physical and chemical properties using chromatographic and spectroscopic methods of analysis.
24.	Chemistry of Organic Polymers	This course gives a general overview of the most common types of polymers with the main focus on how they are made and how their structures govern their general properties and uses. Students will be introduced with the mechanisms and kinetics of two basic types of polymerization: (i) chain-reaction (or addition) and (ii) step-reaction (or condensation), as well as with some specific types of polymerization, and with the syntheses of elastomeric materials.
25.	Applied Organic	The aim of this course is the acquisition of knowledge about

	Chemistry	industrially important organic compounds and reactions (oil industry, pharmaceutical industry, production of polymers, etc.).
26.	Synthesis of Macro Quantities of Organic Compounds	Theoretical knowledge of the principles of industrial syntheses of organic compounds which allows students to independently choose the principle and to suggest the methodology of organic industrial syntheses.
27.	Forensic Chemistry	This course helps the student to develop approaches to understand, correctly use and further develop current chemical tools that are used in the forensic sciences. Upon the completion of the course, students should be able to independently investigate and solve different kind of theoretical and practical problems in forensic laboratory.
28.	Medicinal Chemistry	This course explores the basic principles of the design and action of drugs. Concepts presented are applied in discussing principles of drug discovery, drug development, drug/receptor interactions and structure/activity relationships. Total synthesis of selected pharmaceutical products will also be discussed.
29.	Biodegradations	This course helps students to understand biodegradation processes as a way nature is recycling wastes or breaking down organic matter into nutrients that can be used and reused by other organisms. The role of microorganisms and their importance in the protection of the environment from anthropogenic pollution will be discussed.
30.	Manipulation with Dangerous Organic Chemicals	Within this course students learn the Law on Chemicals regarding the storage, transport, safe handling and destruction of hazardous organic matter in order to make them capable to safely handle hazardous organic substances.
31.	Organic Pollutants 1	The aim of this course is acquiring of knowledge about the structure, physical, chemical and ecotoxicological properties of organic substances-pollutants of the environment, which belong to the group of dangerous and harmful substances.
32.	Organic Pollutants 2	The main purpose of this course is the introduction of students with the properties of organic compounds that are classified as environmental hazards. Upon the completion of this course student should be able to perform a rough assessment of physical, chemical and ecotoxicological properties of organic pollutants based on their structures, as well as to propose the effective way for the removal or disposal of these substances.
33.	Instrumental Analysis of Selected Groups of Organic Compounds	The course aims to introduce students with the latest theoretical knowledge in the field of contemporary chromatographic, instrumental and combined methods for the identification of structures of selected organic compounds from different areas of the economy and the environment. It qualifies candidates for the identification of structures of selected organic compounds from different fields of application.
34.	The Isolation of Secondary Metabolites	Introduction to the nature and importance of plant secondary metabolites. Screening of the plant material regarding appropriate group of secondary metabolites, choice of methods for the isolation of target group. Characteristics of selected isolation

		methods. Crystallization and other final purification methods. Production of larger quantities of natural products.
35.	Chemical Microbiology	This course reveals the basics of chemical microbiology: characteristics of microorganisms, microbial metabolism, ability of growing organisms to change the chemical composition of their environment by removing some compounds and excreting others as well as techniques of work in microbiological laboratory.
36.	Physical Organic Chemistry	This course represents an overview of the basic principles in physical organic chemistry in order to train the students to independently: (i) discuss the relationships among the structure, stability, reactivity and physical properties of organic compounds; (ii) write down all mechanistic steps of certain organic reaction; (iii) propose an experiment that could corroborate proposed mechanism and to discuss obtained results.
37.	Identification of Natural Products	This subject tells about modern methods for the identification and characterization of natural products based on chromatographic methods and combinations of chromatographic and spectroscopic methods.
38.	Contemporary Organic Synthesis	This course is designed to be an intensive survey of the chemical methods, strategies and controls utilized in modern synthetic organic chemistry. Upon completion of this course students should be able to propose and accomplish synthesis of a given organic molecule using herein learned contemporary synthetic methodologies.
39.	Chemistry of Plant Pigments	Basic ideas, concepts and results of plant pigments: classification, physiological roles, methods for the isolation and purification of plant pigments, instrumental methods for their identification, application and development of scientific and technical knowledge in the field of chemistry of plant pigments.
40.	Asymmetric Organic Synthesis	This course aims to give the student an overview of modern strategies and methods employed in asymmetric organic synthesis. Students will learn how it is possible to control stereochemical outcome of organic reactions either by introduction of new chiral center(s) (by use of chiral auxiliaries, reagents, catalyst, <i>etc.</i>), or by the utilization of available starting material that provide the appropriate chirality for reaching the target molecule. Upon completion of this course student should be able to plan and accomplish asymmetric synthesis of organic molecule with multiple chiral centers.
41	Experimental Biochemistry	Basic ideas, concepts and results of theoretical knowledge of methods for the isolation and purification of proteins and nucleic acids. Application and development of scientific and technical knowledge in the field of experimental biochemistry.
42.	Two-dimensional Nuclear Magnetic Resonance Spectroscopy (2D-NMR)	This course is primarily designed for PhD students who will use nuclear magnetic resonance as a routine tool in their research in order to obtain structural characterization of chemical compounds. Students will be introduced with basic 1D- and 2D-NMR techniques and trained to independently run NMR facility.
43.	Selected Topics in	The course covers selected theoretical knowledge (chapters) which

	<i>Supramolecular and Macromolecular Chemistry</i>	cover(s) and display(s) implementation of the findings from organic chemistry in materials, solid-state and polymer sciences, reflecting many and varied applications of supramolecular structures in modern chemistry.
44.	<i>Secondary Metabolites as Biomarkers</i>	The aim of this course is the use of secondary metabolites in the systematics of plants based on the distribution of alkanes, fatty acids, polyacetylenes, terpenes, aromatic and aliphatic volatile compounds, sulfur compounds, alkaloids, cyanogenic glycosides, and flavonoids.
45.	<i>Molecular Modeling in Organic Chemistry</i>	This is an introductory course in computational chemistry with emphasis on tools that enable the study of organic reactions and compounds. Students will learn: (i) to choose appropriate theoretical model to solve certain problems in organic chemistry; (ii) to optimize geometry and to simulate NMR, IR and UV-Vis spectra of organic molecules; and (iii) to estimate suitable physical and chemical properties of organic compounds that will enable them prediction of differences in reactivity/activity among the members of the chosen set of organic compounds.
46.	<i>Conformational Analysis of Biomacromolecules</i>	Theoretical knowledge in the field of conformational analysis of polysaccharides, proteins and nucleic acids related to their biological function in living organisms.

Research

An overview of the research project “Natural products of plants and lichens: isolation, identification, biological activity and application”

Research project “Natural products of plants and lichens: isolation, identification, biological activity and application” (Project Number 172047) is financed by Ministry of Education, Science and Technological Development. It gathers researchers (professors, research assistants and PhD students) from a number of faculties and institutes (University of Niš: Faculty of Medicine, Faculty of Science and Mathematics, Faculty of Technology, Faculty of Occupational Safety, and University of Priština: Faculty of Science and Mathematics). Research Coordinate Organization is Faculty of Science and Mathematics (University of Niš). Project leader is dr Gordana Stojanović.

The total number of researchers for the period from 2011 to 2018 varied (2011-22; 2012-24; 2013-29, 2014-31, 2015-31; 2016-13; 2017-30 and 2018-31). Of the total number of researchers, the number of PhD students was 2011-9; 2012-8; 2013-8, 2014-10, 2015-9; 2016-8; 2017-8 and 2018-9. There are 15 doctoral dissertations that have an acknowledgement to the project. As shown below in Table 5, twelve researchers involved in this research project are the members of the Chair of Organic Chemistry and Biochemistry: two full professors, four associate professors, one assistant professor, and four PhD students.

Table 5. List of researchers within the frame of the Project N^o 172047 that are members of the Chair of Organic Chemistry and Biochemistry alongwith their main research area and the most important achievements and/or positions

PROFESSORS



Dr Gordana Stojanović

Full Proffesor

- Main research area: Chemical analysis of essential oils and extracts of selected plant species and lichens
 - The most important achievements and/or positions: Head of the Chair for organic chemistry and biochemistry; Project leader
-



Dr Danijela Kostić

Full Professor

- Main research area: Chemical analysis of extracts of selected plants and their antioxidant activity, chemistry education



Dr Olga Jovanović

Associate Professor

- Main research area: Isolation, separation and chemical analysis of plant secondary metabolites



Dr Goran Petrović

Associate Professor



Dr Ivan Palić

Associate Professor

- Main research area: Chemical analysis of essential oils and extracts of selected plant species
- The most important achievements and/or positions: Deputy of Center for Chemistry; Lecturer for course of Chemical consulting



Dr Aleksandra Đorđević

Associate Professor

- Main research area: Chemical analysis of essential oils and extracts of selected plant species and examination of antimicrobial activity
 - The most important achievements and/or positions: Awards for achieved success during the studies of chemistry; participant of the project "Researchers' Night"
-

Dr Snežana Jovanović



Assistant Professor

- Main research area: Chemical analysis of essential oils and extracts of selected plant species for chemotaxonomic purposes
 - The most important achievements and/or positions: Secretary of the Department of Chemistry; Lecturer at the Pedagogical Faculty in Vranje (University of Niš)
-

PhD STUDENTS



Ms Jelena Stamenković

Research Assistant



Ms Ivana Zrnzević

Research Assistant

Main research area: Chemical analysis of lichen extracts and testing their biological activity



Ms Ivana Zlatanović

Research Assistant

Main research area: Analysis of lichen extracts



Ms Jovana Ickovski

Research Assistant



Ms Katarina Stepić

Research Trainee

Research within the project include the determination of composition of essential oils, extracts, head space components, biological activity and mineral composition for a selected type of plants, mushrooms, lichens and products obtained from them. By statistical processing of the results, the validity of the examined secondary metabolites as biomarkers for chemotaxonomic purposes and their correlation with biological activity have been examined. It is also being explored optimization of sample preparation and validation of the GC-MS method for the analysis of polycyclic aromatic compounds (PAH), as well as investigation of the effect of extracts or grounded samples of mushrooms on rheological characteristics and antioxidant activity of wheat flour dough.

Gas chromatography-mass spectrometry (GC-MS) analysis, High Pressure Liquid Chromatography (HPLC) analysis, isolation of extracts and/or essential oils constituents and antimicrobial activity are performed in the laboratory of the Chair of Organic Chemistry and Biochemistry.

Other assays are performed in the laboratories of our collaborators:

- Chair of Analytical Chemistry (antioxidative activity, determination of mineral composition, sample preparation and validation methods for PAH analysis);
- Department of Biology and Ecology (identification and deposition of vouchers, testing sets of chemotaxonomic markers at different taxonomic levels);
- Department of Physiology, University of Niš, Faculty of Medicine (effect of secondary metabolites on structural kidney damages);
- Faculty of Technology, University of Niš (the influence of extracts or grounded mushroom samples on the rheological characteristics and the antioxidant activity of wheat flour dough);
- Biochemical Laboratory, General Hospital, Health Center, Pirot (cholinesterase activity);
- Nuclear Objects of Serbia, Institute for Radiological Health Care, Vinča, Belgrade (cytokinesis-block micronucleus test).

The capital laboratory equipment available to the researchers refers: 7890/7000B GC-MS-MS triple quadrupole system (Agilent Technologies, USA) equipped with a Combi PAL auto sampler and a HP-5 MS fused-silica cap. column; HPLC Agilent, Zorbax Eclipse XDB-C18, equipped with a diode array detector (DAD), Alpha 1–2 LDplus freeze-dryer (CHRIST), MPLC Chromatography system (BÜCHI). The Ministry of Education, Science and Technological Development of the Republic of Serbia provides funds for all the above-mentioned equipment.

One part of the results of all performed studies was carried out within the project No 172047 and have been published in the form of chapters (monographs), original research papers, review articles, short communications in international journals and/or in national scientific journals. Furthermore, numerous papers were presented at conferences in Republic of Serbia and abroad, including plenary and invited lectures.

Table 6. An overview of research work (three selected papers, overall N° of citations and *h*-index)

Name	N° of publications ¹	N° of conference presentations	Overall N° of Citations ²	<i>h</i> -index ³
<i>Gordana S. Stojanović</i>	142	113	1105	18
1. Stojanović, G. S., Đorđević, A. S., & Šmelcerović, A. A., (2013). Do Other <i>Hypericum</i> Species Have Medical Potential As St. John's Wort (<i>Hypericum perforatum</i>)? Current Medicinal Chemistry, 20, 2273-2295.				
2. Stojanović, G. S., Stojanović, I. Z., & Šmelcerović, A. A., (2012). Lichen Depsidones as Potential Novel Pharmacologically Active Compounds. Mini-Reviews in Organic Chemistry, 9, 178-184.				
3. Stojanović, G. S., Radulović, N. S., Hashimoto, T., & Palić, R. M., (2005). <i>In vitro</i> antimicrobial activity of extracts of four <i>Achillea</i> species: The composition of <i>Achillea clavennae</i> L. (Asteraceae) extract. Journal of Ethnopharmacology, 101, 185-190.				
<i>Danijela A. Kostić</i>	66	55	277	11
1. Kostić, D. A., Dimitrijević, D. S., Mitić, S. S., Mitić M. N., Stojanović G. S., & Zivanović A. V., (2013). A survey on macro- and micro-elements, phenolic compounds, biological activity and use of <i>Morus</i> spp. (Moraceae). Fruits, 68, 333-347.				
2. Dimitrijević, D. S., Kostić, D. A., Stojanović G. S., Mitić, S. S., Mitić M. N., & Đorđević, A. S., (2014). Phenolic composition, antioxidant activity, mineral content and antimicrobial activity of fresh fruit extracts of <i>Morus alba</i> L.. Journal of Food and Nutrition Research, 53, 22-30.				
3. Randjelović, S. S., Kostić, D. A., Arsić, B. B., Mitić, S. S., Rasić, I. D., Mitić M. N., Dimitrijević, D. S., & Stojanović G.S., (2015). Chemometric Analysis of Grapes. Open Chemistry, 13, 675-682.				
<i>Olga P. Jovanović</i>	21	>20	59	5
1. Jovanović, O. P., Radulović, N. S., Stojanović G. S., Palić, R. M., Zlatković, B. K., & Gudžić, B. T., (2009). Chemical Composition of the Essential Oil of <i>Centaureum erythraea</i> Rafn (Gentianaceae) From Serbia. Journal of Essential Oil Research, 21, 317-322.				
2. Jovanović, O. P., Zlatković, B. K., Simonović, S. R., Đorđević, A. S., Palić, I. R., & Stojanović G. S., (2013). Chemical composition and antibacterial activity of the essential oils isolated from leaves and fruits of <i>Peucedanum austriacum</i> (Jacq.) WDJ Koch. Journal of Essential Oil Research, 25, 129-137.				
3. Jovanović, S. Č., Jovanović, O. P., Mitić, Z. S., Golubović, T. D., Zlatković, B. K., & Stojanović, G. S., (2017). Volatile profiles of the orpines roots: <i>Hylotelephium telephium</i> (L.) H. Ohba, <i>H. maximum</i> (L.) Holub and <i>H. spectabile</i> (Boreau) H. Ohba x <i>telephium</i> (L.) H. Ohba. Flavour and Fragrance Journal, 1-5.				
<i>Ivan R. Palić</i>	12	29	107	6
1. Stojanović G. S., & Palić, I. R., (2008). Antimicrobial and Antioxidant Activity of <i>Micromeria</i> Benthham Species. Current Pharmaceutical Design, 14, 3196-3202.				
2. Reddy, C. M., Eglinton, T. I., Palić, R. M., Benitez-Nelson, B. C., Stojanović G. S., Palić, I. R., Đorđević, S. M., & Eglinton, G., (2000). Even Carbon Number Predominance of Plant Wax n-Alkanes: A Correction. Organic Geochemistry, 31 331-336.				
3. Palić, I. R., Ursić-Janković, J., & Stojanović G. S., (2010). Essential Oil Composition of Three Balkan <i>Micromeria</i> Species. Journal of Essential Oil Research, 22, 40-44.				
<i>Aleksandra S. Đorđević</i>	38	29	123	5
1. Đorđević, A. S., Lazarević, J. S., Šmelcerović, A. A., & Stojanović, G. S., (2013). The case of <i>Hypericum rochelii</i> Griseb. & Schenk and <i>Hypericum umbellatum</i> A. Kern. essential oils: Chemical composition and antimicrobial activity. Journal of Pharmaceutical and Biomedical Analysis, 77, 145-148.				
2. Stojanović, G. S., Đorđević, A. S., & Šmelcerović, A. A., (2013). Do Other <i>Hypericum</i> Species Have Medical Potential as St. John's Wort (<i>Hypericum perforatum</i>)? Current Medicinal Chemistry, 20, 2273-2295.				
3. Jukić, M., Đorđević, A. S., Lazarević, J. S., Gobec, M., Šmelcerović, A. A., & Anderluh M., (2013). Antimicrobial activity and cytotoxicity of some 2-amino-5-alkylidene-thiazol-4-ones. Molecular Diversity, 17, 773-780.				
<i>Snežana Č. Jovanović</i>	16	18	9	2
1. Mitić, Z. S., Jovanović, B., Jovanović, S. Č., Mihajilov-Krstev, T., Stojanović-Radić, Z. Z., Cvetković, V. J., Mitrović, T. Lj., Marin, P. D., Zlatković, B. K., & Stojanović, G. S., (2018). Comparative study of the essential oils of four <i>Pinus</i> species: Chemical composition, antimicrobial and insect larvicidal activity. Industrial Crops & Products, 111, 55-62.				
2. Jovanović, S. Č., Jovanović, O. P., Mitić, Z. S., Golubović, T. D., Zlatković, B. K., & Stojanović, G. S., (2017). Volatile profiles of the orpines roots: <i>Hylotelephium telephium</i> (L.) H. Ohba, <i>H. maximum</i> (L.) Holub and <i>H. spectabile</i> (Boreau) H. Ohba x <i>telephium</i> (L.) H. Ohba. Flavour and Fragrance Journal, 1-5.				
3. Jovanović, S. Č., Zlatković, B. K., & Stojanović, G. S., (2016). Chemotaxonomic Approach to the Central Balkan				

¹ According to KoBson databases

² Data are taken from Scopus data base (accesion date 10/04/2018). The self-citations of all authors are excluded.

³ According to Scopus database (accesion date 10/04/2018). The self-citations of all authors are excluded.

Sedum Species Based on Distribution of Triterpenoids in Their Epicuticular Waxes. Chemistry and Biodiversity, 13, 459-465.				
Jelena G. Stamenković	5	9	9	2
1. Petrović G. M., Stamenković, J. G., Kostevski, I. R., Stojanović, G. S., Mitić, V. D., & Zlatković, B. K., (2017). Chemical composition of volatiles; antimicrobial, antioxidant and cholinesterase inhibitory activity of <i>Chaerophyllum aromaticum</i> L. (Apiaceae) essential oils and extracts. Chemistry & Biodiversity, 14(5), e1600367.				
2. Stamenković, J. G., Petrović, G. M., Stojanović, G. S., Đorđević, A. S., Zlatković, B. K., (2016). <i>Chaerophyllum aureum</i> L. Volatiles: Composition, Antioxidant and Antimicrobial Activity. Records of Natural Products, 10(2), 245-250.				
3. Kostevski, I. R., Petrović, G. M., Stojanović, G. S., Stamenković, J. G., & Zlatković, B. K., (2016). Essential Oil Chemical Composition and Headspace Volatiles Profile of <i>Achillea coarctata</i> from Serbia. Natural Product Communications, 11(4), 543-545.				
Ivana S. Zrnzević	5	7	4	1
1. Zrnzević, I. S., Stanković, M., Stankov Jovanović, V. P., Mitić, V. D., Đorđević, A. S., Zlatanović, I. G., & Stojanović, G. S., (2017). <i>Ramalina capitata</i> (Ach.) Nyl. acetone extract: HPLC analysis, genotoxicity, cholinesterase, antioxidant and antibacterial activity. EXCLI Journal, 16, 679-687.				
2. Zrnzević, I. S., Jovanović, O. P., Zlatanović, I. G., Stojanović, I. Z., Petrović, G. M., & Stojanović, G. S., (2017). Constituents of <i>Ramalina capitata</i> (Ach.) Nyl. Extracts. Natural Product Research, 31 (7), 857-860.				
3. Stojanović, G. S., Zlatanović, I. G., Zrnzević, I. S., Stanković, M., Stankov Jovanović, V. P., & Zlatković, B. K., (2017). <i>Hypogymnia tubulosa</i> extracts: chemical profile and biological activities. Natural Product Research, 32 (3), 222-224.				
Ivana G. Zlatanović	5	5	4	1
1. Stojanović, G. S., Zlatanović, I., Zrnzević, I., Stanković, M., Stankov Jovanović, V., & Zlatković, B., (2017). <i>Hypogymnia tubulosa</i> extracts: chemical profile and biological activities, Natural Product Research, 32 (3), 222-224.				
2. Zrnzević, I. S., Stanković, M., Stankov Jovanović, V. P., Mitić, V. D., Đorđević, A. S., Zlatanović, I. G., Stojanović, G. S., (2017). <i>Ramalina capitata</i> (Ach.) Nyl. acetone extract: HPLC analysis, genotoxicity, cholinesterase, antioxidant and antibacterial activity. EXCLI Journal, 16, 679-687.				
3. Zlatanović, I. G., Stanković, M., Stankov Jovanović V. P., Mitić, V. D., Zrnzević, I. S., Đorđević, A. S., & Stojanović, G. S., (2017). Biological activities of <i>Umbilicaria crustulosa</i> (Ach.) Frey acetone extract. Journal of Serbian Chemical Society, 8, 141-150.				
Jovana D. Ickovski	1	6	12	1
1. Kostić, D. A., Dimitrijević, D. S., Stojanović, G. S., Palić, I. R., Đorđević, A. S., & Ickovski, J. D., (2015). Xanthine Oxidase: Isolation, Assays of Activity, and Inhibition. Journal of Chemistry, article ID: 294858, 8 pages.				
2. Palić, I. R., Ickovski, J. D., Đorđević, A. S., Mitić, V. D., Stankov-Jovanović, V. P., & Stojanović, G. S., (2015). Antioxidant and antimicrobial activities of the essential oil and solvent extracts of <i>Mentha pulegium</i> L.. Facta universitatis - series: Physics, Chemistry and Technology, 13(2), 109-119.				
3. Ickovski, J. D., Palić, I. R., Đorđević, A. S., Stankov-Jovanović, V. P., Mitić, V. D., & Stojanović, G. S., Antimicrobial activities of various extracts of <i>Origanum heracleoticum</i> L., In: Programme and Book of Abstracts of the 23 rd Congress of Chemists and Technologists of Macedonia, Ohrid, Macedonia, October 8-11, 2014, BC-001.				

An overview of the research project “Combinatorial libraries of heterogeneous catalysts, natural products, modified natural products and analogues: The approach to new biologically active agents”

Research project “Combinatorial libraries of heterogeneous catalysts, natural products, modified natural products and analogues: The approach to new biologically active agents” (Project Number 172061) gathers more than 30 researchers from seven Faculties and Institutes belonging to five different Serbian Universities. Twelve researchers involved in this research project are the members of the Chair of Organic Chemistry and Biochemistry: one full professor, one associate professor, one assistant professor, one postdoctoral fellow and eight PhD students (Table 7). Principal investigator of the project is dr Niko Radulović.

Table 7. List of researchers within the frame of the Project N° 172061 that are members of the Chair for Organic Chemistry and Biochemistry along with their main research area and the most important achievements and/or positions

Professors



Dr Niko Radulović

Full Professor

Main research area: organic chemistry, phytochemistry, organic synthesis, NMR, mass spectrometry, biologically active compounds, structure-activity relationship, gas chromatography, chemotaxonomy

The most important achievements and/or positions: 2017 – Member of the Editorial Advisory Board of *Chemistry & Biodiversity*; 2016 – Medal as the merit member of the Serbian Chemical Society; 2015 – Member of the permanent scientific board of the *International Symposium on Essential Oils (ISEO)*; 2014 – Among the most cited researchers in Serbia in all scientific disciplines; 2012 – The award of the Outstanding Research Award of Serbian Chemical Society for the Best Young Scientist; 2011 – The Scopus Young Researcher Awards (Serbia); 2010 – Editor-in-chief of *Facta Universitatis section Physics, Chemistry and Technology*; 2001/2002 – The award for the Best Graduated Student of the University of Niš (*Silver sign of the University of Niš*)



Associate Professor

Main research area: Development of new methods for the comparison of complex mixtures of organic compounds; ^1H full spin analysis of natural products

The most important achievements and/or positions: *L'Oréal-UNESCO for Women in Science* national scholarships (2011); postdoctoral stay at *Max Planck Institute for Chemical Physics of Solids* (Dresden, Germany; 2011) and *University of British Columbia*

(Vancouver, Canada; 2017); Medal of the Serbian Chemical Society for endeavour and success in science (2014)

Dr Marija Genčić

Assistant Professor



Main research area: Synthesis of bioactive ferrocene-containing molecules; Development of new methods for structure elucidation of natural products in inseparable complex mixture.

The most important achievements and/or positions: *L'Oréal-UNESCO for Women in Science* national scholarships (2017); Postdoctoral stay at *Faculty of Bioscience Engineering, Ghent University* (Belgium, 2016); *Silver Sign* of the University of Niš, as the Best Graduate of the University in 2008/2009.

Postdoctoral fellow



Dr Marko Mladenović

Research Assistant

Main research area: Chemical composition and biological activity of essential oils; Design and synthesis of combinatorial libraries of selected natural products and their analogs.

The most important achievements and/or positions: *Special Award of the Serbian Chemical Society* for outstanding success during the studies in 2011; Prince Karađorđević Annual Award for outstanding success in high school in 2006.

PhD students



Ms Dragan Zlatković

Research Assistant

Main research area: New organic transformations of *Biginelli* and *Hantzsch*-derived compounds; New developments in iodoform reaction.

The most important achievements and/or positions: “*Ana Bjeletić i Ivan Marković*” award for the Best Graduated Student at the Department of Chemistry in 2011/2012.

Ms Miljana Đorđević

Research Assistant



Main research area: Solventless reactions in green chemistry; Biotransformations; Synthesis of iodinated analogs of natural products.

The most important achievements and/or positions: “*Ana Bjeletić i Ivan Marković*” award for the Best Graduated Student at the Department of Chemistry in 2010/2011; IUPAC Poster Prize Certificate at the 50th Meeting of the Serbian Chemical Society (2012); EYCN poster award for the best poster at the *First Conference of Young Chemists of Serbia* (2012).



Ms Milena Živković
Research Assistant

Main research area: Chemical composition and eco-physiological role of plant surface waxes; Development of new methods for the determination of stereochemistry of natural products in inseparable mixtures; Lipidomic study of *Streptomyces* spp.

The most important achievements and/or positions: “*Ana Bjeletić i Ivan Marković*” award for the Best Graduate Student at the Department of Chemistry in 2012/2013; *Travel to Europe* grant for 70 best final-year students at the universities in Serbia in 2011 awarded by “*European movement*”.



Ms Sonja Filipović
Research Assistant

Main research area: Isolation, structure elucidation and screening of biological activities of the secondary metabolites from liverworts.

The most important achievements and/or positions: *Young Scientist Fellowship Award* at 47th *International Symposium on Essential Oils* (2017).



Ms Milica Todorovska
Research Trainee

Main research area: Isolation, synthesis and biological activity testing of autolysis products from the order Brassicales.

The most important achievements and/or positions: The Best Student of integrated academic studies at pharmacy at Faculty of Medicine in Niš in 2010, 2011 and 2013; *Commendation of the Royal House of Karađorđević* for expressed extraordinary success in secondary education (2009); *Young Scientist Fellowship Award* at 47th *International Symposium on Essential Oils* (2017).



Ms Milan Nešić
Teaching Assistant

Main research area: Development of new methods for the syntheses of derivatives of carbonyl compounds useful as protecting groups; Structure elucidation of components in inseparable complex mixture using NMR simulations.

The most important achievements and/or positions: *Silver Sign* of the University of Niš, as the Best Graduate of the University in Niš in 2012/2013; Annual Award of the Serbian Chemical Society for outstanding success during the studies (2013); Award – “The Best Graduated Master Student at Faculty of Science and Mathematics in 2015” given by The City of Niš.



Ms Milena Krstić

Research Trainee

Main research area: Chemical composition of essential oils from *Tordylium* species and their chemotaxonomic importance.

The most important achievements and/or positions: Award for one of the Best Students in 2015/2016 given by Youth Organisation of Leskovac.



Ms Milica Stevanović

Research Trainee

Main research area: Isolation, structure elucidation and synthesis of polyacetylene compounds in plants; Determination of stereochemically precise structures of odor-active compounds in plants.

The most important achievements and/or positions: *Special Award of the Serbian Chemical Society* for outstanding success during the studies in 2014; “*Ana Bjeletić i Ivan Marković*” award for the Best Graduate Student at the Department of Chemistry in 2014/2015; “*Dositeja*” *Scholarship for Young Talents* given by the Ministry of Youth and Sport (in 2012/2013 and 2015/2016).

The main focus of this research project is on the detailed analysis of the chemical composition of essential oils and/or extracts of plant species, lichens, liverwort species and bacteria with the aim to detect new potentially bioactive natural products (lead compounds) that might have an application in pharmacy and agriculture. Alongside the standard method based on the isolation of pure compounds by various chromatographic methods, within this project it is also frequently applied combinatorial library approach for the identification of novel secondary metabolites. For example, if the target metabolite could not be isolated from the complex matrix and some tentative structure(s) could be inferred from available data (MS, RI, derivation reactions), the only comprehensive approach in this situation would be to create a small library of all possible compounds (in most cases isomers) that would eliminate/corroborate originally proposed structure(s). Due to the existence of detailed spectral data of all library members, the combinatorial library approach could often make possible the detection and identification of non-target compounds in the studied extracts, as well. The synthetic work also gives the desired compounds in amounts that allow the screening of biological activities of all library members in a number of assays and the establishment of structure-activity/properties relationship, thus providing important data for future investigations. Furthermore, compounds that showed the best activity/selectivity could be used as leads for the synthesis of new libraries of compounds that contained unnatural structural fragments (*e.g.* ferrocene core) that could plausibly enhance the

activity/selectivity. In this way, dozens of compounds with strong antimicrobial, antioxidant, anti-inflammatory, cytotoxic, analgesic, hepato-, nephro- and gastroprotective activity (with potential application in medicine/agriculture) have been discovered within the frame of project N° 172061 in the last seven years.

Other research work on this project is closely associated with the above described primary research interests, and includes:

- (i) development of multivariate statistical approaches for the interpretation of data connecting the chemical composition and biological activities, which enable fast and impartial location of active compounds in essential oils/extracts and their mutual comparison;
- (ii) investigation of *in silico*, *in vitro* and *in vivo* mechanisms of action of the most potent mixtures of natural products (*e.g.* essential oils or extracts) and newly discovered natural products and analogs;
- (iii) development of new NMR based methods using lanthanide chemical shift reagent and application HiFSA-ASIS-GIAO NMR-based methodologies for the determination of the structure and the stereochemistry of metabolites directly from mixture;
- (iv) discovery, optimization and mechanistic studies of new chemical reactions that could be useful in the synthesis of diverse (lead) compounds;
- (v) development of new types of GC-MS, NMR and IR-derived variables, suitable for the fast and reliable comparison/characterization of complex mixtures of organic compounds, *etc.*

Results of all studies carried out within the project N° 172061 in the last seven years have been published in over 150 peer-reviewed papers in international journals, then 17 PhD thesis were defended (7 of them at the Chair for Organic Chemistry and Biochemistry) and more than 200 abstracts were presented at conferences, including plenary and invited lectures at international level (Table 8). It is worth mentioning here that several conference presentations have been awarded with the Best Poster Award (Table 9). Moreover four PhD students, Miljana Đorđević, Milica Todorovska, Sonja Filipović, and Milan Nešić received *Young Scientist Fellowship Award at International Symposium on Essential Oils* (ISEO 2012 in Lisabon (Portugal) and ISEO 2017 in Pécs (Hungary)). The procurment of new capital equipment in the last few years (like 400 MHz NMR, UV-Vis, semipreparative HPLC, *etc.*), funded by the Ministry of Education, Science and Technological Development of the

Republic of Serbia, has greatly facilitated and improved the quality of the mentioned research work.

Table 8. An overview of the research work (three selected papers, overall N^o of citations and *h*-index)

Name	N ^o of publications	N ^o of conference presentations	Overall N ^o of citations ^a	<i>h</i> -index ^a
Niko Radulović	205	more than 200	1962	19
1. Radulović, N. S., Miltojević, A. B., Stojanović, N. M., & Randjelović, P. J., (2017). Distinct urinary metabolite profiles of two pharmacologically active <i>N</i> -methylantranilates: Three approaches to xenobiotic metabolite identification. <i>Food and Chemical Toxicology</i> , 109, 341-355.				
2. Radulović, N. S., Blagojević, P. D., Stojanović-Radić, Z. Z., & Stojanović, N. M., (2013). Antimicrobial plant metabolites: structural diversity and mechanism of action. <i>Current Medicinal Chemistry</i> , 20(7), 932-952.				
3. Radulović, N., Quang, D. N., Hashimoto, T., Nukada, M., & Asakawa, Y., (2005). Terrestriins A-G: <i>p</i> -Terphenyl derivatives from the inedible mushroom <i>Thelephora terrestris</i> . <i>Phytochemistry</i> , 66(9), 1052-1059.				
Polina Blagojević	48	more than 60	393	9
1. Radulović, N. S., & Blagojević, P. D., (2013). Average mass scan of the total ion chromatograms: A new gas chromatography-mass spectrometry derived variable for fast and reliable multivariate statistical treatment of essential oil compositional data. <i>Journal of Chromatography A</i> , 1301, 190-199.				
2. Radulović, N. S., & Blagojević, P. D., (2012). The most frequently encountered volatile contaminants of essential oils and plant extracts introduced during the isolation procedure: Fast and easy profiling. <i>Phytochemical Analysis</i> , 23(2), 131-142.				
3. Pejović, A., Denić, M. S., Stevanović, D., Damljanović, I., Vukićević, M., Kostova, K., Tavlinova-Kirilova, M., Randjelović, P., Stojanović, N. M., Bogdanović, G. A., Blagojević, P., D'hooghe, M., Radulović, N. S., & Vukićević, R. D., (2014). Discovery of anxiolytic 2-ferrocenyl-1,3-thiazolidin-4-ones exerting GABA _A receptor interaction via the benzodiazepine-binding site. <i>European Journal of Medicinal Chemistry</i> , 83, 57-73.				
Marija Genčić	18	34	77	5
1. Genčić, M. S., & Radulović, N. S., (2015). Lanthanide-induced shift reagents enable structural elucidation of natural products in inseparable complex mixtures – The case of elemenal from <i>Inula helenium</i> L. (Asteraceae). <i>RSC Advances</i> , 5(89), 72670-72682.				
2. Radulović, N. S., Denić, M. S., & Stojanović-Radić, Z. Z., (2014). Synthesis of small combinatorial libraries of natural products: Identification and quantification of new long-chain 3-methyl-2-alkanones from the root essential oil of <i>Inula helenium</i> L. (Asteraceae). <i>Phytochemical Analysis</i> , 25(1), 75-80.				
3. Radulović, N., Đorđević, N., Denić, M., Martins Gomes Pinheiro, M., Dias Fernandes, P., & Boylan, F., (2012). A novel toxic alkaloid from poison hemlock (<i>Conium maculatum</i> L., Apiaceae): Identification, synthesis and antinociceptive activity. <i>Food and Chemical Toxicology</i> , 50(2), 274-279.				
Marko Mladenović	12	27	60	5
1. Mladenović, M. Z., & Radulović, N. S., (2017). The essential oil of <i>Achillea ageratifolia</i> (Sm.) Boiss. Subsp. <i>Serbica</i> (Nyman) Heimerl (Asteraceae) revisited: the stereochemical nomenclature issues, structural elucidation and synthesis of (new) sabinylesters. <i>Flavour and Fragrance Journal</i> , 32, 5-23.				
2. Radulović, N. S., Mladenović, M. Z., Randjelović, P. J., Stojanović, N. M., Dekić, M. S., & Blagojević, P. D., (2015). Toxic essential oils. Part IV: The essential oil of <i>Achillea falcata</i> L. As a source of biologically/pharmacologically active transsabinyl esters. <i>Food and Chemical Toxicology</i> , 80, 114-129.				
3. Radulović, N. S., Mladenović, M. Z., Stojanović-Radić, Z., Bogdanović, G. A., Stevanović, D., & Vukićević, R. D., (2014). Synthesis, characterization and antimicrobial evaluation of a small library of ferrocene-containing acetoacetates and phenyl analogs – the discovery of a potent anticandidal agent. <i>Molecular Diversity</i> , 18, 497-510.				
Dragan Zlatković	10	25	11	2
1. Zlatković, D. B., & Radulović, N. S., (2016). Reduction of Biginelli compounds by LiAlH ₄ : a rapid access to molecular diversity. <i>RSC Advances</i> , 6, 115058-115067.				
2. Radulović, N., Zlatković, D., Mitić, K., Randjelović, P., Stojanović, N., (2014). Synthesis, spectral characterization, cytotoxicity and enzyme-inhibiting activity of new ferrocene-indole hybrids. <i>Polyhedron</i> , 80, 134-141.				
3. Radulović, N. S., Zlatković, D. B., Randjelović, P. J., Stojanović, N. M., Novaković, S. B., & Akhlaghi, H., (2013). Chemistry of spices: bornyl 4-methoxybenzoate from <i>Ferula ovina</i> (Boiss.) Boiss. (Apiaceae) induces hyperalgesia in mice. <i>Food and Function</i> , 4, 1751-1758.				
Miljana Đorđević	5	27	5	1

	1.	Radulović, N. S., Đorđević, M. R., & Blagojević, P. D., (2016). Structural revision of aristol: a fresh look at the oxidative coupling of thymol under iodination conditions. <i>RSC Advances</i> , 6(73), 69067-69082.		
	2.	Radulović, N. S., Đorđević, M. R., Dekić, M. S., & Blagojević, P. D., (2016). Chemical composition of the essential oil and diethyl ether extract of <i>Trinia glauca</i> (L.) Dumort. (Apiaceae) and the chemotaxonomic significance of 5-O-methylvisamminol. <i>Chemistry and Biodiversity</i> , 13(4), 403-415.		
	3.	Radulović, N. S., & Đorđević, M. R., (2014). Chemical composition of the tuber essential oil from <i>Helianthus tuberosus</i> L. (Asteraceae). <i>Chemistry and Biodiversity</i> , 11(3), 427-437.		
Milena Živković	1	15	2	1
	1.	Ilic-Tomic, T., Genčić, M. S., Živković, M. Z., Vasiljevic, B., Djokic, L., Nikodinovic-Runic, J., & Radulović, N. S., (2015). Structural diversity and possible functional roles of free fatty acids of the novel soil isolate <i>Streptomyces</i> sp. NP10. <i>Applied Microbiology and Biotechnology</i> , 99(11), 4815-4833.		
	2.	Živković, M. Z., Radulović, N. S., & Stojković, M. B. Configuration assignment of internal double bonds with almost isochronous protons via cyclopropanation and NMR, In: <i>Programme and Book of Abstracts of the 19th Central and Eastern European NMR Symposium & Bruker Users' Meeting</i> (CEUM 2017), Timisoara (Romania), September 5-8, 2017, pp. 26.		
	3.	Živković, M. Z., Radulović, N. S., & Genčić, M. S., Methyl 2-methylalkanoates from the essential oil of <i>Humulus lupulus</i> L., In: <i>Programme and Book of Abstracts of the 47th International Symposium on Essential Oils</i> (ISEO 2016), Nice (France), September 11-14, 2016, pp. 128.		
Sonja Filipović	2	9	1	1
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Milica Todorovska	1	7	-	-
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Milan Nešić	2	8	-	-
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	3.	Radulović, N. S., Nešić, M. S., & Stevanović, M. D.; NMR spectra assignment of tetrahydrofuranyl acetals directly from mixtures of diastereomers by spectral simulation, In: <i>Programme and Book of Abstracts of the 18th Central and Eastern European NMR Symposium & Bruker Users' Meeting</i> (CEUM 2016), Sofia (Bulgaria), September 18-20, 2016, pp. 54.		
Milena Krstić	1	4	-	-
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	2.	Radulović, N. S., Krstić, M. Lj., Stojanović, N. M., & Randjelović, P. J. Cytotoxicity of octyl esters from the essential oil of <i>Tordylium maximum</i> L. (Apiaceae) towards rat peritoneal macrophages, In: <i>Programme and Book of Abstracts of the 47th International Symposium on Essential Oils</i> (ISEO 2016), Nice (France), September 11-14, 2016, pp. 129.		
	3.	Krstić, M., Milojević, A., & Radulović, N. Wax alkanes of <i>Galanthus nivalis</i> L. (Amaryllidaceae) In: <i>Programme and Book of Abstracts of the 12th Symposium on the Flora of Southeastern Serbia and Neighboring Regions</i> , Kopaonik (Serbia), June 16-19, 2016, pp. 115-116.		

Milica Stevanović	-	5	-	-
<ol style="list-style-type: none"> 1. Nešić, M. S., Stevanović, M. D., Fuchs, T. A. K., & Radulović, N. S. Essential-oil components of <i>Bupleurum praealtum</i> L. Synthesis and spectral characterization of a rare perillyl ester, In: <i>Programme and Book of Abstracts of the 48th International Symposium on Essential Oils</i> (ISEO 2017), Pécs (Hungary), September 10-13, 2017, pp. 121 – 121. 2. Nešić, M. S., Stevanović, M. D., & Radulović, N. S. The first report on the chemical composition of the inflorescence essential oil of <i>Eupatorium cannabinum</i> L. from Serbia, In: <i>Programme and Book of Abstracts of the 48th International Symposium on Essential Oils</i> (ISEO 2017), Pécs (Hungary), September 10-13, 2017, pp. 122. 3. Radulović, N. S., Stevanović, M. D., & Nešić, M. S. Mosher esters of α-hydroxyesters: Absolute configuration via NMR, In: <i>Programme and Book of Abstracts of the 19th Central and Eastern European NMR Symposium & Bruker Users' Meeting</i> (CEUM 2017), Timisoara (Romania), September 5-8, 2017, pp. 27. 				

^aData are taken from Scopus data base (accesion date 10/04/2018). The self-citations of all authors are excluded.

The scientific achievements of several researchers have been recognized at national level. Niko Radulović and Polina Blagojević were awarded with the *Medal of the Serbian Chemical Society for endeavour and success in science* in 2012 and 2014, respectively. Afterwards, in 2016 Niko Radulović was elected as an honorary member of the Society. According to Ivanović and Ho (*Scientometrics* (2014) 101:603–62) Niko Radulović is one of the seven most cited Serbian researchers in all disciplines in the period from 2006 to 2012. Polina Blagojević and Marija Genčić won *L'Oréal-UNESCO for Women in Science national scholarships* in 2011 and 2017, respectively.

The above-mentioned researchers were on several postdoctoral stays abroad supported by the Ministry of Education, Science and Technological Development of the Republic of Serbia within the programme of postdoctoral fellowships for young scientists:

- (i) Niko Radulović was for two months at *Max-Planck-Institut für Chemische Physik fester Stoffe* in Dresden (Germany, 2011) and for six months at *Institut de Chimie de Nice, Université de Nice-Sophia Antipolis* in Nice (France, 2017);
- (ii) Polina Blagojević also spent two months at *Max-Planck-Institut für Chemische Physik fester Stoffe* in Dresden (Germany, 2011) and six months at *University of British Columbia* in Vancouver (Canada, 2017);
- (iii) Marija Genčić was for six months in *SynBioC Research Group* at *Faculty of Bioscience Engineering, Ghent University* (Belgium, 2016).

In 2004, Niko Radulović also spent 6 months in Prof. Yoshinori Asakawa group at *Faculty of Pharmaceutical Sciences, Tokushima Bunri University* (Japan). Moreover, Polina Blagojević received in 2016 scholarship of the *Institute Francais* (Serbia) for short research stay in France at *Institut de Chimie de Nice, Université de Nice-Sophia Antipolis* in Nice. Milan Nešić spent two months at *Technical University of Ilmenau* (Germany, 2017) within IAESTE exchange program. Herein, it is worth mentioning that Milica Stevanović has been a

president of the local IAESTE committee for the last three years promoting and coordinating the exchange of students between University of Niš and universities and scientific research institutions worldwide.

Since 2010, Niko Radulović is editor-in-chief of the journal *Facta Universitatis, section Physics, Chemistry and Technology* (published by University of Niš), while Polina Blagojević is the second editor in the same peer-reviewed scientific journal (since 2013). Niko Radulović is also a member of the Editorial Advisory Board of the journal *Chemistry & Biodiversity* (SCIE journal published by Wiley & Sons; since 2017) and a member of the Permanent Scientific Board of the *International Symposium on Essential Oils* (ISEO; since 2015). Polina Blagojević is a participant of the international TEMPUS MCHM programme - *Modernisation of Post-Graduate Studies in Chemistry and Chemistry Related Programmes* (4/2012 to present).

Table 9. Conference presentations awarded with the poster awards

No	Conference	Presentation	Award
1	19 th Central and Eastern European NMR Symposium & Bruker Users' Meeting, Temisoara (Romania), September 5 – 8, 2017	Radulović, N. S., Mladenović, M. Z., & Blagojević, P. D. Having trouble with overlapped and/or second-order multiplets? Try the hybrid HIFSA-GIAO-(A)SIS approach.	Best poster award (3 rd place)
2	18 th Central and Eastern European NMR Symposium and Bruker Users' Meeting, Sofia (Bulgaria), September 18 – 20, 2016	Blagojević, P., Genčić, M., & Radulović, N. Interactions of four regioisomeric methylcamphorquinoline ligands with a lanthanide NMR shift reagent, Eu(fod) ₃ .	Poster prize „Prof. Valentin Dimitrov“ (3 rd place)
3	18 th Central and Eastern European NMR Symposium and Bruker Users' Meeting, Sofia (Bulgaria), September 18 – 20, 2016	Radulović, N. S., Nešić, M. S., & Stevanović, M. D. NMR spectra assignment of diastereomeric tetrahydrofuranyl acetals directly from mixture of diastereomers using spectral simulation.	Special poster prize „Prof. Valentin Dimitrov“ (1 st place)
4	2 nd International Conference on Natural Products Utilization: From Plants to Pharmacy Shelf, Plovdiv (Bulgaria), October 14-17 2015	Stojanović, N. M., Radulović, N., Randelović, P. J., Ilić, I., Miltojević, A. B., Mitić, K., Krstić, V., & Blagojević, P. D. Effects of methyl and isopropyl <i>N</i> -methylantranilates from <i>Chosiya ternata</i> Kunth (Rutaceae) in rat models of different diseases.	Teva award for the best poster
5	51 th Meeting of the Serbian Chemical Society, Niš (Serbia), June 5 – 7, 2014	Miltojević, A. B., Radulović, N. S., Živković, M. Z., Vukićević, R. D. Simple and efficient one-pot solvent-free synthesis of <i>N</i> -methyl imines of aromatic aldehydes.	IUPAC poster prize certificate
6	1 st Conference of Young Chemists of Serbia, Belgrade (Serbia), October 19 – 20, 2012	Radulović, N. S., & Đorđević, M. R. Chemical composition of the tuber essential oil from <i>Helianthus tuberosus</i> L. (Asteraceae).	EYCN poster award
7	50 th Meeting of the Serbian Chemical Society, Belgrade (Serbia), June 14 – 15, 2012	Radulović, N. S., & Đorđević, M. R. Synthesis of mono- and diiodo-derivatives of <i>N</i> -(4-methoxyphenethyl) amide as model compounds of tyramine metabolites of marine organisms of the genus <i>Didemnum</i> .	IUPAC poster prize certificate

Alongside research work, professors and PhD students are also involved in teaching. Courses for undergraduate students aim to introduce students with the classification, structure, and reaction mechanism of organic compounds, as well as with the basic methods of their preparation and purification, and their importance in everyday life. Master's and PhD studies courses intend to broaden the knowledge of students about modern synthetic methods and NMR-based identification methods of organic compounds, as well as to introduce the students with the interdisciplinary character and applicability of chemistry in everyday lives, encompassing such as field like medicinal chemistry, forensic chemistry, organic polymers and pollutants. All courses include laboratory and/or theoretical exercises.

Since 2011, Chair members actively take part in the organization of state (and/or regional) competitions in chemistry and Serbian Chemistry Olympiad for high-school pupils, as well as in training of Serbian high-school team for the International Chemistry Olympiad (IChO). Niko Radulović is a permanent co-mentor of the Serbian teams at IChO (2012-present) and International Junior Science Olympiad (IJSO, 2011-present). In the last five years, Serbian teams won more than 20 medals in total, frequently besting teams from Germany, France and similar countries. Alongside this work with the gifted high-school pupils, members of the Chair also give efforts in the popularization of chemistry within young people through participation in science festivals and similar events.

It is noteworthy that Marija Genčić received *Nenad M. Kostić Foundation Award* for the best master's thesis in chemistry at the universities in Serbia for the 2009/2010 school year, while Milan Nešić took the second place at the mentioned contest in 2014/2015. Both master's theses were supervised by dr Niko Radulović. All of them were also awarded, in their own classes, with *Silver Sign of the University of Niš*, as the Best-Graduated Student of the University in the field of mathematics and natural sciences, and with *Annual Award of the Serbian Chemical Society*, for outstanding successes during the studies.