**TO THE ACADEMIC COUNCIL OF THE FACULTY OF CHEMISTRY**

**UNIVERSITY OF BELGRADE**

At the regular meeting of the Academic Council of the University of Belgrade - Faculty of Chemistry held on March 15, 2018, we have been chosen as the members of Committee for scientific evaluation of the proposed PhD thesis and the eligibility of the candidate Maja V. Krstić Ristivojević, MSc. in Biochemistry. The candidate proposed the following title:

**" Monitoring the parameters of oxidative stress, bioavailability and bioaccessibility of phenols, minerals and allergens by using *in vitro* systems "**

Title of the thesis in Serbian:

**" Praćenje parametara oksidativnog stresa, biodostupnosti i biousvojivosti fenola, minerala i alergena, korišćenjem in vitro sistema "**

After reviewing the submitted documentation of the candidate Maja V. Krstić Ristivojević, MSc. in Biochemistry, we submit to the Academic Council of the University of Belgrade - Faculty of Chemistry the following

# REPORT

## A. Basic information about the candidate

### Personal data

Maja Krstić Ristivojević (born Krstić) was born on 03. 08. 1985 in Vranje.

### Education

Maja Krstić Ristivojević finished elementary and high school in Vranje. She graduated bachelor studies at the University of Belgrade - Faculty of Chemistry, Department of Biochemistry, in 2004, in 2011 with GPA of 7.79/10.00, and a grade of 10/10 for her diploma work. She started Master academic studies (MSc) at the University of Belgrade - Faculty of

Chemistry, in 2011, and graduated in 2012, with GPA 9.80/10, and a grade 10/10 for her Master thesis.

During 2012/13 she enrolled Doctoral academic studies in Biochemistry University of Belgrade - Faculty of Chemistry.

**Work experience**

In the period from 2011 to 2012, she was engaged in "FP7 RegPot FCUB-ERA" (No. 256716) project of the Faculty of Chemistry as a Dissemination Assistant.

In the period from 2012 to 2013 she was engaged at the Innovation Center of the Faculty of Chemistry on the project of the Ministry of Education, Science and Technological Development of the Republic of Serbia entitled "Molecular Properties and Modifications of Some Respiratory and Nutritional Allergens", OI172024, under the leadership of prof. Tanja Ćirković Veličković.

In the period from August 2013 until 2017, she was employed as an Associate for CD and mass spectrometry at the Department of Biochemistry of the Faculty of Chemistry.

Since January 2017 she has been employed as a Research associate.

**Professional training**

During 2012, within the COST Action FA1005 "Infogest" she spent two months at the Center for Recherche Public - Gabriel Lippmann, Luxembourg, Luxembourg as a visiting researcher.

In 2015 she received a scholarship from the European Academy of Allergy and Clinical Immunology (EAACI) and she spent a year at the Karolinska Institutet, Stockholm, Sweden as a visiting researcher.

During 2016, she is awarded with "King Gustav V Foundation" scholarship for a two-month stay at the Karolinska Institutet, Stockholm, Sweden.

During 2017, she spent three months as a Junior Researcher at the Department of Food Technology "Ghent University Global Campus", Incheon, South Korea.

She participated in the organization of several conferences, workshops and schools.

**B. Published scientific papers and papers published in the conference proceedings**

The candidate is a co-author of 10 scientific papers published in the journals of categories M21a (top 10 % of journals in the field), M21 (10-30 % of journals in the field) and M23 (60-100 % of journals in the field), while 2 are under preparation. She is the first author in two papers of category M21. The candidate is co-author of 16 international and national conference papers.

The candidate's research results so far have been published in the following scientific papers and publications.

**Scientific papers published in international journals M20**

**M21a - Papers in the international journals of exceptional values (top 10 % of journals in the field)**

1. Jelena Radosavljevic, Emilia Nordlund, Luka Mihajlovic, **Maja Krstic**, Torsten Bohn, Johanna Buchert, Tanja Cirkovic Velickovic and Joost Smit: Sensitizing potential of enzymatically cross-linked peanut proteins in a mouse model of peanut allergy. Molecular Nutrition and Food Research, (2014), 58 (3), 635-646. (Food Science and Technology; IF 2014: 4.603 (4/122)).

2. Milica Videnovic, Dejan M. Opsenica, James C. Burnett, Laura Gomba, Jonathan E. Nuss, Zivota Selakovic, Jelena Konstantinovic, **Maja Krstic**, Sandra Segan, Mario Zlatovic, Richard J. Sciotti, Sina Bavari, and Bogdan A. Solaja: Second Generation Steroidal 4-Aminoquinolines Are Potent, Dual-Target Inhibitors of the Botulinum Neurotoxin Serotype A Metalloprotease and P. falciparum Malaria. Journal of Medicinal Chemistry (2014), 57 (10), 4134-4153 (Chemistry, Medicinal; IF 2014: 5.447 (3/59)).

**M21 - Papers published in the leading international journals (10-30 % of journals in the field)**

1. **M. Krstić Ristivojević**, J. Grundström, T. A. T. Tran, D. Apostolovic, V. Radoi, M. Starkhammar, V. Vukojević, T. Ćirković Veličković, C. Hamsten & M. van Hage. α-Gal on the protein surface affects uptake and degradation in immature monocyte derived dendritic cells. Scientific Reports, (2018), vol. 8(1), Article number: 12684, DOI: 10.1038/s41598-018-30887-8. (Multidisciplinary Sciences; IF 2017: 4.122 (12/64)).

2. Apostolovic Danijela, **Krstic Maja**, Mihailovic Jelena, Starkhammar Maria, Cirkovic-Velickovic Tanja, Hamsten Carl, van Hage Marianne. Peptidomics of an *in vitro* digested alpha-Gal carrying protein revealed IgE-reactive peptides. Scientific Reports, (2017), vol. 7, Article number: 5201, DOI: 10.1038/s41598-017-05355-4. (Multidisciplinary Sciences; IF 2016: 4.259 (10/63)).

3. Simeon Minic, Dragana Stanic-Vucinic, Jelena Mihailovic, **Maja Krstic**, Milan Nikolic, Tanja Cirkovic Velickovic. Digestion by pepsin releases biologically active chromopeptides from C-phycocyanin, a blue-colored biliprotein of microalga Spirulina. Journal of Proteomics, (2016), 147:132-9. (Biochemical Research Methods; IF 2016: 3.914 (17/78)).

4. Luka Mihajlovic, Jelena Radosavljevic, Emilia Nordlund, **Maja Krstic**, Torsten Bohn, Joost Smit, Johanna Buchert and Tanja Cirkovic Velickovic. Peanut protein structure, polyphenol content and immune response to peanut proteins in vivo are modulated by laccase. Food & Function, (2016), 7(5), 2357-66. (Food Science & Technology; IF 2016: 3.247 (15/130)).

5. Dragana Mitic-Culafic, Biljana Nikolic, Natasa Simin, Nebojsa Jasnic, Dragana Cetojevic-Simin, **Maja Krstic**, Jelena Knezevic-Vukcevic. Effect of Allium flavum L. and Allium melanantherum Panc. Extracts on Oxidative DNA Damage and Antioxidative Enzymes Superoxide Dismutase and Catalase. Plant Foods for Human Nutrition, (2016), 71(1), 28-34. (Food Science & Technology; IF 2016: 2.368 (31/130)).

6. **Maja Krstic**, Marija Stojadinovic, Katarina Smiljanic, Dragana Stanic-Vucinic and Tanja Cirkovic Velickovic: The anti-cancer activity of green tea, coffee and cocoa extracts in human cervical adenocarcinoma HeLa cells depends on both pro-oxidant and anti-proliferative activities of polyphenols. RSC Advances, (2015), 5 (5), 3260 – 3268. (Chemistry, Multidisciplinary; IF 2014: 3.840 (33/157)).

7. Cristina Ileana Covaliu, Gigel Paraschiv, Sorin-Ştefan Biriş, Ioana Jitaru, Eugeniu Vasile, Lucian Diamandescu, Tanja Cirkovic Velickovic, **Maja Krstic**, Valentin Ionita, Horia Iovu, Ecaterina Matei: Maghemite and poly-DL-alanine based core–shell multifunctional nanohybrids for environmental protection and biomedicine applications. Applied Surface Science (2013), 285, 86-95. (Materials Science, Coatings & Films; IF 2013: 2.538 (2/18)).

**M23 – Paper published in the international journals (60-100 % of journals in the field)**

1. Maria-Gabriela Alexandru, Tanja Cirkovic Velickovic, **Maja Krstic**, Madalina-Marina Hrubaru, Constantin Draghici. Two complexes of Co(II) and Pd(II) formed in reaction with a mono-oxazoline derivative. Spectroscopic characterization and cytotoxic evaluation. Journal of Molecular Structure, (2013), 1041, 55-60. (Chemistry, Physical; IF 2013: 1.599 (88/136)).

**Manuscripts in preparation:**

1. **Maja Krstić Ristivojević**, Petar Ristivojević, Jelena Mutić, Marija Bodroža Solarov, Torsten Bohn, Tanja Ćirković Veličković: Bioavailability of nutrients in seed and popcorn of plant *Amaranthus cruentus* after simulated gastrointestinal digestion. *manuscript in preparation*

2. **Maja Krstić Ristivojević**, Grundstrom Jeanette, Apostolovic Danijela, Tran Thu Thi Anh, Cirkovic Velickovic Tanja, Hamsten Carl, Van Hage Marianne: α-Gal on protein surface decreases transcytosis through Caco-2 monolayer. *manuscript in preparation*

**Conference papers**

**M33 – Conference papers from the international conferences printed as proceedings**
Antigenotoxic potential of Allium flavum L. and Allium melanantherum Panč. extracts against t-BOOH induced DNA damage. Dragana Mitic-Culafic, Biljana Nikolic, Natasa Simin, Dragana Cetojevic-Simin, **Maja Krstic**, Jelena Knezevic-Vukcevic, 8th Conference on Medicinal and Aromatic Plants of Southeast European Countries - 8th CMAPSEEC, Academy of Sciences of Albania, Agricultural University of Tirana, AMAPSEEC, pp. 392 - 399, issn: ISBN 978-99956-10-66-1, Tirana , Albania, 19. - 22. May, 2014.

**M34 - Conference papers from the international conferences printed as abstracts**

1. Alpha-gal epitope on protein surface affects uptake and degradation in immature monocyte-derived dendritic cells. **Maja Krstić**, Apostolovic Danijela, Tran Thu Thi Anh, Grundstrom Jeanette, Vlad Radoi, Vladana Vukojević, Tanja Ćirković Veličković, Carl Hamsten, Marianne van Hage. EAACI Congress, 17 – 21 June 2017, Helsinki, Finland, P1611.

2. Peptidomics of α-Gal carrying protein – Stability and allergenic properties. Danijela Apostolovic, Jelena Mihailovic, **Maja Krstic**, Maria Starkhammar, Tanja Cirkovic

Velickovic, Carl Hamsten, Marianne van Hage. 4th Food Allergy and Anaphylaxis Meeting, 13 – 15 October 2016, Rome, Italy, PD04.

3. Identification and quantification of trachoma associated Chlamydia trachomatis antigens. Aleksandra Inic-Kanada, Katarina Smiljanic, Elisabeth Stein, Jelena Mihailovic, Petar Ristivojevic, H. Chalabi, **Maja Krstic**, Nadine Schuerer, Marija Perusko, Sara Trifunovic, Dragana Stanic-Vucinic, Tanja Cirkovic Velickovic, Talin Barisani-Asenbauer. Abstract Book of the 8th Meeting of The European Society for Chlamydia Research, 6 – 9 September 2016, Town Hall, Oxford, United Kingdom, pp. A24 - A24.

4. α-Gal epitope on protein surface decreases transcytosis through Caco-2 monolayer. **Krstic Maja**, Apostolovic Danijela, Grundstrom Jeanette, Tran Thu Thi Anh, Cirkovic Velickovic Tanja, Hamsten Carl, van Hage Marianne. EAACI Congress 2016, 11 – 15 June 2016, Vienna, Austria, P1504.

5. *In vitro* uptake of α-Gal containing protein by human monocyte derived dendritic cells. Tran T.A.T.1, Grundström J., **Krstic M.**., Vukojević V., Apostolovic D., Hamsten C., Gafvelin G., van Hage M. EAACI Congress 2016, 11 – 15 June 2016, Vienna, Austria, P1423.

6. Immunoproteomics of Relevant Chlamydial Antigens in Trachomatous Trichiasis Patients. Aleksandra Inic-Kanada, Katarina Smiljanic, Elisabeth Stein, Jelena Mihailovic, Hadeel Chalabi, Petar Ristivojevic, Nadine Schuerer, **Maja Krstic**, Tanja Cirkovic Velickovic, Talin Barisani-Asenbauer, Deutcher Chlamydien Workshop 2016 Abstract Book, Institute of Med. Microbiology and Hygiene, University of Freiburg, Freiburg, Germany, 16. - 18. Mar, 2016.

7. Digestion-released antioxidative chromopeptides of C-phycocyanin, a chromoprotein of blue-green alga Spirulina, exert cytotoxic effect in human cervical adenocarcinoma and colonic cancer cells. Minic S, **Krstic M**, Apostolovic D, Vesic J, Stanic-Vucinic D, Nikolic M, Cirkovic Velickovic T. EuroFoodChem XVIII, 13- 16 October 2015, Madrid, Spain, P23.

8. Pepsin digestion of C-phycocyanin releases chromopeptides with potent anticancer and antioxidant activities.Minic S, **Krstic M**, Apostolovic D, Vesic J, Stanic-Vucinic D, Nikolic M, Cirkovic Velickovic T. FEBS conference, 4 – 9 July 2015, Berlin, Germany, FEBS Journal 282, P14-023, pp 134.

9. Bioavailability of metals in seed of plant Amaranthus cruentus after simulated gastrointestinal digestion. **Maja Krstić**, Jelena Mutić, Bojana Filipčev, Marija Bodroža-Solarov, Tanja Ćirković Veličković. 7th Symposium Chemistry and Environmental Protection, 9 – 12 Jun 2015, Palic, Serbia, Book of Abstracts pp 221, P2/16.

10. Green tea, coffee and cocoa polyphenols exhibit different effects on HeLa cell viability and proliferation, **Maja Krstic**, Marija Stojadinovic, Katarina Smiljanic, Dragana Stanic-Vucinic, Tanja Cirkovic Velickovic, The 39th FEBS Congress and The EMBO Meeting 2014, 30 August – 4 September, Paris, France, Book of Abstracts pp 72, SUN-023.

11. Bioavailability of enzymatically cross-linked peanut proteins in Caco-2 cell monolayer, Jelena Radosavljevic, **Maja Krstic**, Danijela Apostolovic, Torsten Bohn, Tanja Cirkovic Velickovic, Belgrade Food International Conference - Food, health and well-being 2012, 26 - 28 November, Belgrade, Serbia, Book of Abstracts pp 93, P 2.23.

12. Catechin-enriched green tea supplements increase oxidative stress in human peripheral blood monocytes, Ognjenovic, Jana; Milosevic, Ana; Stojadinovic, Marija; **Krstic, Maja**; Stanic- Vucinic,Dragana; Cirkovic Velickovic, Tanja, Belgrade Food International Conference - Food, health and well-being 2012, 26 - 28 November, Belgrade, Serbia, Book of Abstracts pp 98.

13. Catechin-enriched green tea supplements increase oxidative stress in human peripheral blood monocytes. Ognjenovic, Jana; Milosevic, Ana; Stojadinovic, Marija; **Krstic, Maja**; Stanic- Vucinic, Dragana; Cirkovic Velickovic, Tanja. 5th Regional Biophysics Conference, 4 - 8 September 2012, Kladovo, Serbia, Book of Abstracts pp 102.

14. The mechanism of the cytotoxic and antiproliferative effects of polyphenolic green tea, coffee and cocoa extracts, **Maja Krstic**, Marija Stojadinovic, Jelena Radosavljevic, Luka Mihajlovic, Dragana Stanic-Vucinic, Tanja Cirkovic Velickovic, 2nd FCUB-ERA workshop, Belgrade, 18 - 19 October 2011, Abstract book page number 39, P-18.

15. Cytotoxic activity of coffee, green tea and cocoa ethanol extracts on HeLa cell line, **Maja Krstic**, Bojana Kravic, Luka Mihajlovic, Dragana Stanic-Vucinic, Tanja Cirkovic-Velickovic, The 1th International Congress on Cocoa Coffee and Tea, Novara, Italy, 13 - 16 September 2011, Book of Abstracts pp 151.

**M64 – Conference papers from national conferences printed as abstracts**

1. Cytotoxic activity of common beverages in human cervical carcinoma cell line. **Maja Krstic**, Bojana Kravic, Luka Mihajlovic, Dragana Stanic-Vucinic, Tanja Cirkovic Velickovic, 49th Meeting of the Serbian Chemical Society, Kragujevac, 13 - 14 May 2011, Abstract book page number 111, HTH02-P.

## C. Description of PhD theme

### 1. Scientific Field

Scientific Field: **Biochemistry**

### 1. The subject of dissertation

The planned subject of research within this doctoral dissertation is monitoring the parameters of oxidative stress, as well as the bioavailability and bioaccessibility of phenols, minerals and allergens using an *in vitro* system. In the first part of this doctoral dissertation, investigation of biological activities and bioaccessibility of food components was planned. The prooxidative effect of polyphenol extracts of green tea, coffee and cocoa was examined in the *in vitro* system – on HeLa cells. A bioaccessibility of food components during in vitro simulated gastrointestinal digestion, as the main determinant of their bioavailibility, will be investigated. Monitoring of liberation of minerals, phenols and sugars from the seed and popcorn of the plant *Amaranthus cruentus* during simulated digestion will be done.

In the second part of the study, the bioavailability and uptake of proteins that have covalently bound sugar galactose-$\alpha$-1,3-galactose ($\alpha$-Gal) on their surface were monitored. Allergy to red meat is the response of the immune system to the presence of this glyco component on the protein. Using an *in vitro* system mimicking the epithelium of the intestine, monolayer of Caco-2 cells, differences in the transport of the model proteins with and without α-Gal were studied. One of the main characteristics of allergy to red meat is the unusually delayed allergy symptoms, most often 3-6 hours after consumption. It is assumed that the subsequent appearance of the antigen in the bloodstream, as well as specific mechanism of uptake and degradation of this antigen by dendritic cells and T cells, is the cause of the later onset of symptoms of allergy. The uptake of the model proteins with and without α-Gal by dendritic cells was investigated in immature dendritic cells of healthy donors, as well as patients allergic to red meat.

### 2. Scientific objectives

The aims of this doctoral thesis are:

a) To examine the effects of polyphenol extracts on oxidative stress in cancer cell line.
b) To examine the bioaccessibility of minerals and phenols from complex food matrix during simulated *in vitro* gastrointestinal digestion.

c) To examine the effect of α-Gal sugar on the protein on their transport through a monolayer of the intestine.

d) To examine the effect of α-Gal sugar on the protein on their uptake in immature monocyte - derived dendritic cells.

**4. Methodology**

During the experimental work on this doctoral dissertation the following experimental methods were used:

**Biochemical Methods:** Electrophoretic methods of protein separation (SDS-PAGE)

**Instrumental Methods:** UV / VIS spectrophotometry to determine the concentration of total phenols, sugars, proteins, phytic acids; spectrofluorimetry for monitoring the transport of fluorescently labeled proteins; an inductively-coupled atomic emission spectroscopy (ICP-OES) for determining the amount of minerals in the samples.

**Immunological methods:** immunochemical methods for the detection of α-Gal epitopes on the protein (immunoblot).

**Digestibility tests and enzymatic assays:** sample digestion in *in vitro* simulated conditions of the gastrointestinal tract; determination of catalase activity; semicquantitative in-gel, determination of the activity of superoxide dismutase.

**Cell culture:** isolating mononuclear cells from peripheral blood; cultivation of immature monocyte derived dendritic cells; culture of HeLa cells; culture of Caco-2 cells.

**Flow cytometry:** monitoring the cell cycle, apoptosis, generation of free radical species, , reduced glutathione; transmembrane mitochondrial potential; monitoring the uptake of fluorescently labeled proteins by immature monocyte derived dendritic cells.

**Molecular Biology Methods:** Quantitative Real-Time Polymerase Chain Reaction (qRT-PCR) for monitoring the expression of enzymes involved in the defense against oxidative stress; for monitoring expression of interleukins.

**Microscopy:** confocal microscopy for monitoring the uptake of fluorescently labeled proteins by immature monocyte-derived dendritic cells.

**3. Importance of the topic**

In life sciences, for the testing of any scientific hypothesis, *in vitro* and *in vivo* systems are one of the main tools in experimental work. Coffee, cocoa and green tea are among the most consumed beverages in the world, as well they are the rich sources of polyphenols. The effect of phenolic compounds from functional foods on different cancer cell lines is the subject of a large number of studies. The main focus of this research is the examination of the mechanisms and levels at which the phenols act in cancer cells [1, 2]. Recently, a major emphasis is on the use of functional foods rich in compounds that have a beneficial effect on human health. However, attention should be paid on the way of food preparation, as well as the influence of the complex food matrix on the bioavailability of active substances from food. Amaranth (*Amaranthus cruentus*) belongs to a group of pseudo-cereals with characteristic composition, i.e. gluten-free food rich in minerals, and as such is labeled as functional foods [3].

As large number of studies show that carbohydrates are potent allergic response initiators, the allergologists invest a lot of effort to understand and explain the underlying molecular mechanisms [4]. A new type of food allergy, allergy to red meat, is characterized by a delayed IgE response to galactose-α-1, 3-galactose (α-Gal). Symptoms of severe allergic reaction in patients occur a few hours after the red meat consumption [5].

## 4. Expected Results

Within this thesis, candidate Maja Krstić Ristivojević will examine the effect of polyphenols from coffee, cocoa and green tea on the viability of HeLa cell line (cell line of the cervix cancer). Also, the cell cycle, as well as the proliferation of these cells will be monitored. In order to get insight into potential mechanism of action, the influence of polyphenol extracts of these beverages on the generation of reactive oxygen species in cancer cells will be examined. As an oxidative stress defense line, one will investigate. The activity and the level of expression of catalase and superoxide dismutase, as one of the main defense line against oxidative stress, will be investigated.

In the work on this thesis the influence of complex food matrix, as well as thermal and mechanical treatment, on bioaccessibility of food components during the simulated *in vitro* gastrointestinal digestion, will be investigated. The level of minerals, phytic acids, total polyphenols and sugar. Released from seed and popcorn of amaranth grain during simulated digestion, will be determined.

Bovine serum albumin (BSA) conjugated to α-Gal and without α-Gal will be used as a model for testing the effect of the α-Gal glyco component on the protein transport through the epithelium of the small intestine. For this purpose monolayer of Caco-2 cells (line of human epithelial colorectal adenocarcinoma) will be used, an *in vitro* cell system that mimics the epithelium of the small intestine as the first point of entry of food allergens and their contact with the immune system.

Also, BSA conjugated to α-Gal and without α-Gal will be used as a model protein to test the effect of this epitope on the uptake and degradation of proteins by the immune cells, immature monocyte derived dendritic cells. The dendritic cells will be cultivated from monocytes isolated from the blood of healthy, as well as donors allergic to red meat.

**Literature**


1. Fresco, P., et al., *New insights on the anticancer properties of dietary polyphenols.* Med Res, Rev, 2006. **26**(6): p. 747-66.
2. Béliveau, R. and D. Gingras, *Role of nutrition in preventing cancer.* Canadian family physician Medecin de famille canadien, 2007. **53**(11): p. 1905-1911.
3. Alvarez-Jubete, L., E.K. Arendt, and E. Gallagher, *Nutritive value of pseudocereals and their increasing use as functional gluten-free ingredients.* Trends in Food Science & Technology, 2010. **21**(2): p. 106-113.
4. Soh, J.Y., C.H. Huang, and B.W. Lee, *Carbohydrates as food allergens.* Asia Pacific allergy, 2015. **5**(1): p. 17-24.
5. Commins, S.P., et al., *Delayed anaphylaxis, angioedema, or urticaria after consumption of red meat in patients with IgE antibodies specific for galactose-alpha-1,3-galactose.* J Allergy Clin Immunol, 2009. **123**: p. 426–433.


## D. CONCLUSION

Based on the facts presented in this report, the Committee concludes that the proposed topic of the doctoral thesis with the title:

**" Monitoring the parameters of oxidative stress, bioavailability and bioaccessibility of phenols, minerals and allergens by using *in vitro* systems "**

is scientifically relevant and that the candidate Maja Krstić Ristivojević, MSc. in biochemistry, meets all the requirements for working on the doctoral thesis in order to obtain the academic title of Ph.D. in Biochemistry.

Therefore, the Committee recommend to the Academic Council of the University of Belgrade-Faculty of Chemistry, to accept the proposed Ph.D. topic of the candidate under the above mentioned title. We suggest Ph.D. Tanja Ćirković Veličković, a Full Professor at the University of Belgrade - Faculty of Chemistry, as supervisor of this thesis.

**Members of the Ph.D. Committee:**

Ph.D. Tanja Ćirković Veličković,
Full Professor, University of Belgrade-Faculty of Chemistry

M.D., Ph.D. Marianne van Hage,
Full Professor, Karolinska Institutet,
Department of Medicine Immunology and Allergy Unit

Ph.D. Dragana Stanić Vučinić,
Scientific councilor, University of Belgrade-Faculty of Chemistry,

Ph.D. Jelena Mutić,
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Ph.D. Lidija Burazer,
Senior scientific associate, Institute of Virology, Vaccines and Sera "Torlak", Belgrade