

**REVIEW**

to occupy the academic position:

"Professor"	X
"Associate Professor"	
	one of the academic positions indicated shall be marked with the sign "X"

**Candidates to occupy the position:**

1	Assoc. Prof.	PhD	Rayna	Georgieva	Bryaskova	University of Chemical Technology and Metallurgy, Dept. Polymer Engineering
№	academic position	scientific degree	name	middle name	last name	workplace

**Scientific area:**

4	Natural Sciences, Mathematics and Informatics
code	name

**Professional area:**

4.2	Chemical Sciences
code	name

**Scientific specialty:**

Chemistry of High Molecular Weight Compounds
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**The competition has been announced:**

23	19.03.2024		Faculty of Chemical and Systemic Engineering
in SG issue	date	for the needs of the Department	Faculty

**The review was written by:**

Prof.	DSc	Stanislav	Miletiev	Rangelov	Institute of Polymers, Bulgarian Academy of Sciences
academic position	scientific degree	name	middle name	last name	workplace

**1. Review for the candidate:**

Assoc. Prof.	PhD	Rayna	Georgieva	Bryaskova
academic position	scientific degree	name	middle name	last name

**1.1. Completion of the provided documents:**

A) The competition documents are in full compliance with the Regulations	3 points	X
B) The documents are complete but do not fully comply with the requirements of the Regulations	2 points	
C) The documents are not completed in accordance with the requirements of the Regulations	0 points	
		one of the answers given is marked with the sign "X"

Missing documents and violated requirements must be described if response C is marked.

The documents fully comply with the Regulations. No missing documents and/or violated requirements were found.

**1.2. Meeting the minimum requirements under the Regulations:**

A) The candidate meets the minimum requirements	20 points	X
B) The candidate doesn't meet the minimum requirements	0 points	
		one of the answers given is marked with the sign "X"

It must be filled in if answer B is marked. The publication activity of the candidate is analyzed. The response of the results achieved (quoted) is analyzed.

The applicant meets the requirements set by the University of Chemical Technology and Metallurgy. The gained number of points by groups of indicators is as follows:

Indicator 1: 50 pts (min 50 pts)

Indicators 3 or 4: 115 pts (min 100 pts)

Indicators 5 – 10: 215 pts (min 200 pts)

Indicators 12 – 20: 184 pts (min 150 pts)

Total: 778 pts (min 600 pts)

Assoc. Prof. Bryaskova participated in the competition with 19 publications, which are referenced and indexed in international data bases with scientific information. 8 of them are presented in indicator 4 as the equivalent of habilitation work. The remaining publications form indicator 7 and, like those under indicator 4, exceed the minimum required number of points. 107 is the total number of citations of Assoc. Prof. Bryaskova's works, with which she participated in the competition, from which the points for indicator 11 are accumulated. The most cited work is *Georgiev, N.I., Bryaskova, R., Tzoneva, R., Ugrinova, I., Detrembleur, C., Miloshev, S., Asiri, A.M., Qusti, A.H. and Bojinov, V.B., 2013. A novel pH sensitive water soluble fluorescent nanomicellar sensor for potential biomedical applications. Bioorganic & medicinal chemistry, 21(21), pp.6292-6302. (IF-3.07) Q1* with more than 50 citations. For the group of indicators 12-20, the candidate has presented supervision of one successfully defended doctoral student, participation in and leadership of national scientific and educational projects, attracted funds for projects led by the candidate and published university manual (Райна Георгиева Бряскова, „Интелигентни полимерни системи“, 2024г., 89 стр. ISBN 978-954-465-165-7), which add another 184 points. The minimums for all indicator groups (except indicator 1) have been exceeded.

**1.3. Relevance of scientific and / or applied research:**

A) The research is relevant. Part of the research is pioneering (no results are known on the topic by other authors)	7 points	
B) Research is relevant. Results from other authors are known for each of the topics and / or applications studied.	5 points	X
C) Most of the research is relevant, but also some results are presented that have no scientific and / or applied value	3 points	
D) The smaller part of the research is relevant	2 points	
E) Research is not relevant	0 points	
		one of the answers given is marked with the sign "X"

The evaluation of the relevance of the research must be substantiated.
The research in the works presented in the competition is in the field of synthesis and characterization of polymer materials with applications in medicine, veterinary medicine and as antibacterial coatings. They are related to the development of (i) hybrid materials with incorporated silver or gold nanoparticles, (ii) polymer micelles with incorporated fluorescent compounds or biologically active drug, and (iii) photoactive nanogels. The development of such materials is a hot topic, and research for more than a decade has been particularly intensive. Although results on the topics from other authors are known, which is natural given the high intensity of research in these areas, the candidate's research is of great scientific and applied value and adds knowledge and expertise.

#### 1.4. Knowledge of the problems subject of research:

A) The candidate knows in detail the achievements of other authors on the researched topics and/or applications	6 points	X
B) The candidate is partially familiar with the achieved results on the researched topics and / or applications	4 points	
C) The candidate has no prior knowledge of the status of the researched problems	0 points	
		one of the answers given is marked with the sign "X"

The evaluation must be substantiated if answer C is marked.

#### 1.5. Type of research:

A) Theoretical	4 points	
B) Applied	4 points	
C) Theoretical with application elements	4 points	X

D) It does not correspond to the level specified in the Act for the Development of the Academic Staff in the Republic of Bulgaria and the Regulations	0 points	
		one of the answers given is marked with the sign "X"

The level of research must be substantiated if answer D is marked.

#### 1.6. Objectives of the research:

A) Realistic and of scientific and / or applied interest	8 points	X
B) Realistic, but not of scientific and / or applied interest	4 points	
C) Unattainable (unrealistic)	0 points	
		one of the answers given is marked with the sign "X"

Objectives must be specified. The type of the set objectives must be justified.

The objectives are realistic and of both scientific and applied interest. As far as the goals of the separate studies (scientific works or groups of scientific works submitted for participation in the competition) are specific, from the point of view of the scientific specialty, they can be defined as the development of hybrid polymer materials with potential applications in medicine, veterinary medicine, biotechnology and medical engineering.

#### 1.7. Methods of research:

A) Adequate to research and set scientific objectives and /or applications	8 points	X
B) Partially appropriate, enabling part of the scientific objectives and / or applications to be achieved	4 points	
C) Inappropriate methods	0 points	
		one of the answers given is marked with the sign "X"

Methods must be specified. The type of methods used is justified.

The goals were achieved using modern research methods, and the results were adequately interpreted and used. The polymers and polymeric materials were synthesized by using atom transfer radical polymerization, the *grafting on* approach, self-association and sol-gel method, and characterized by means of modern and appropriate for the investigated systems spectroscopic, chromatographic, thermal, microscopic, etc. methods such as FTIR, UV-vis, NMR, GPC, DSC, TGA, AFM, TEM, DLS, XRD, etc. Due to the interdisciplinary nature of the research, a number of methods

were used for investigation and biological characterization of the systems, such as determination of cytotoxicity and cell viability, MTT, disk diffusion method, etc.

### 1.8. Candidate research contributions:

A) With lasting scientific and / or applied response, they form the basis for new research and applications	20 points	
B) They are of significant scientific and / or applied interest, complete and / or summarize previous research	16 points	X
C) They are of scientific and / or applied interest	12 points	
D) Lack of significant contributions	8 points	
E) Lack of contributions	0 points	
		one of the answers given is marked with the sign "X"

Contributions must be specified. The type of results achieved must be justified.

The candidate's research contributions are both scientific and applied in nature. They can be defined as *complementing and enriching knowledge in existing thematic areas*. Contributions can be classified into two main areas:

- 1. Development, synthesis and characterization of polymeric materials.** They are (i) hybrid materials based on PVA with incorporated silver nanoparticles, (ii) polymeric micelles based on block copolymers of poly(ethylene glycol) and poly(4-vinyl pyridine) carrying gold nanoparticles, (iii) fluorescent polymeric micelles based on block copolymers poly(methyl methacrylate)-b-poly(methacrylic acid) and poly(acrylic acid)-b-poly(n-butyl acrylate). Their physicochemical properties have been systematically studied in order to improve and optimize them for specific applications. The new hybrid polymer materials exhibit prominent biological activity (antimicrobial activity, cytotoxicity against cancer cells, diagnostic and therapeutic properties, cellular internalization) and can find potential applications in various fields such as biomedicine, biotechnology, medical engineering, veterinary medicine, vaccine production, anticancer therapy.
- 2. Development of photoactive nanogels for antibacterial coatings.** The photoactive nanogels are based on a polycation copolymer P(mDOPA)-co-P(DMAEMA+), polymethacrylamide containing 3,4-dihydroxy-L-phenylalanine groups, and polyallylamine, whereas the coatings are formed by a *deep coating* procedure. Subsequently, a photosensitizer with good antibacterial and photobactericidal activity and silver nanoparticles can be covalently attached to the polymer coating. The physicochemical and mechanical properties of the modified polymer coatings were systematically investigated. The products can be used as light-activated antimicrobial coatings with constant/continuous activity against bacteria, viruses, fungi.

### 1.9. Participation of the candidate in the achievement of the presented results:

A) The candidate has at least an equal participation in the submitted papers	8 points	X
B) The candidate has at least an equal participation in most of the submitted papers	7 points	
C) The candidate has a secondary participation in most of the submitted papers	4 points	

D) The candidate participation is unnoticeable	0 points	
		one of the answers given is marked with the sign "X"

Critical notes must be provided if one of the items C or D is marked.

The candidate is the first, second, last, and/or corresponding author in almost all of the papers presented, which is why I consider her contribution to be leading.

#### 1.10. Pedagogical activity:

A) The candidate has effective and sufficient pedagogical activity at the university. The textbooks issued are modern and useful (they meet the requirements of the Regulations). The work with undergraduate and doctoral students is at a high professional level.	8 points	X
B) The candidate has sufficient pedagogical activity at the university. The textbooks issued satisfy the requirements of the Regulations.	6 points	
C) The pedagogical activity and / or textbooks issued are insufficient (do not meet the requirements of the Regulations)	0 points	
		one of the answers given is marked with the sign "X"

Critical notes must be provided if one of the items B or C is marked.

The candidate has an effective and sufficient pedagogical activity at the University of Chemical Technology and Metallurgy. The textbook issued is modern and useful. For the last 5 years, 9 lecture courses for Bachelor (4) and Master (5) degrees have been run by the candidate.

#### 1.11. Critical notes:

A) Lack of critical notes	8 points	
B) Critical notes of a technical nature	7 points	X
C) Critical notes that would partially improve the results achieved in a small part of the research	5 points	
D) Critical notes that would partially improve the results achieved in most of the research	3 points	
E) Significant critical notes	0 points	
		one of the answers given is marked with the sign "X"

Critical notes must be provided if one of the answers C, D or E is marked.

I find inaccuracies in the spelling of the names of some polymers in Bulgarian. For example, poly(vinyl alcohol) is spelled three different ways – поливинилов алкохол, поливинил алкохол и поливинилалкохол.

### 1.12. Conclusion

A) The evaluation of the candidate's activity is <b>POSITIVE</b>	This evaluation is assigned to a total number of at least 65 points	X
B) The evaluation of the candidate's activity is <b>NEGATIVE</b>	This evaluation is assigned to a total number below 65 points	
		one of the answers given is marked with the sign "X"

To be filled in if requested by the reviewer

Based on the overall research and teaching activity and the fulfilled and exceeded quantitative indicators from the RULES for ACQUISITION OF SCIENTIFIC DEGREES AND ACQUIRING ACADEMIC POSITIONS for professional field 4.2 Chemical Sciences of the University of Chemical Technology and Metallurgy, I believe that the only candidate for the announced competition, Assoc. Dr. Rayna Georgieva Bryaskova, fully meets the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria for acquiring the academic position of *Professor*. This gives me reason to propose that Assoc. Prof. Dr. Rayna Georgieva Bryskova be elected to the academic position of *Professor* in professional field 4.2. Chemical Sciences.

<b>July 4, 2024</b>	The review was written by:	
date	<b>Prof. DSc Stanislav Rangelov</b>	signature