

REVIEW

of dissertation for the acquisition of:

educational and scientific degree " doctor "	X
scientific degree " Doctor of Science "	
	the true is indicated by the sign "X"

Author of the dissertation:

	MSc	Nikoleta	Dragomirova	Philipova	University of Chemical Technology and Metallurgy
academic position	scientific degree	name	middle name	last name	workplace

Topic of the dissertation:

Preparation of Antibacterial Photoactive Polymer Coatings

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
--

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. Completion of the provided documents:

A) The dissertation and the competition documents are in full compliance with the Regulations.	4 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 standards must be described if response C is marked.

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

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 REGULATIONS for ACQUISITION OF SCIENTIFIC DEGREES AND ACQUIRING ACADEMIC POSITIONS of 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). A dissertation for the acquisition of the educational and scientific degree "Doctor" is submitted.
Indicators 5 – 10: 70 pts (min 30 pts). A total of 5 scientific publications are presented under indicator 7: 2 publications falling into quartile Q2; 2 publications falling into quartile Q3 with SJR without IF; and one publication with SJR without IF, thereby exceeding the minimum required number of points.
9 is the total number of citations of scientific publications on the dissertation.

3. The relevance of the topic of the dissertation:

A) The topic is relevant and new (there are no known results on the topic by other authors)	8 points	
B) The topic is relevant and results from other authors are known	6 points	X
C) The topic is not relevant, but results from other authors are known	2 points	
D) The topic is not relevant and no results from other authors are known	1 point	
E) The topic does not correspond to the level of dissertation	0 points	
		one of the answers given is marked with the sign "X"

The evaluation of the relevance of the dissertation must be substantiated

The topic of the dissertation is related to preparation of photoactive polymer coatings with good adhesion and pronounced antibacterial properties. The development of such coatings is of increased research interest, and research is intensive. Without detracting from the research in the dissertation, which I find to be of great scientific and applied value, results on the subject by other authors are known, which is natural given the intensity of research in this field.

4. Knowledge of the problems, subject of research in the dissertation:

A) The doctoral student knows in detail the achievements of other authors on the topic of the dissertation	8 points	X
B) The doctoral student is partially familiar with the achieved results on the topic of the dissertation	4 points	
C) The doctoral student has no prior knowledge of the status of the problems in the dissertation	0 points	
		one of the answers given is marked with the sign "X"

The evaluation must be substantiated if answer C is marked.

The candidate knows in detail the achievements of other authors on the subject. This is particularly evident from the well-structured, comprehensive and informative literature overview, which can easily be prepared as a review article.

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 of dissertation	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.

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	3 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 purpose of the dissertation, for the implementation of which specific tasks are defined, is precisely and clearly formulated – development of photoactive polymer coatings with good adhesion and antibacterial properties. The goal is realistic and of both scientific and applied interest.

7. Methods of research:

A) Adequate to research and set objectives	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 set goals and objectives were achieved using modern research methods, and the results were adequately interpreted and used. The polymer coatings were obtained by the LbL technique of dip coating of stainless steel substrates in aqueous solutions/dispersions of (1) polycationic copolymer P(mDOPA)-co-P(DMAEMA) and (2) nanogel Pox(mDOPA) /PAH. The (co)polymers are typically prepared by controlled radical polymerization. For their investigation and characterization, as well as those of the coatings, modern and suitable for the respective systems techniques/methods such as FTIR, NMR, DLS, fluorescence analysis, UV-vis, TEM, AFM, QCM-D, EDX-SEM, nanomechanical analysis, scratch resistance tests, contact angle determination, etc., were used. For the biological characterization and determination of the antibacterial activity, the method of counting live cells and the disc-diffusion method were used.

8. Contributions of the dissertation:

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 research contributions of the candidate are both scientific and applied in nature. They can be defined as *complementing and enriching knowledge in existing subject areas*. I believe that they are of significant scientific and applied interest as they continue and further develop previous research. The main contribution consists of the use of photosensitizers and their combination with silver nanoparticles to obtain polymer coatings based on polymer nanogel.

9. Evaluation of the compliance of the dissertation summary with the dissertation:

A) Full compliance	4 points	X
B) Compliance of the main parts	2 points	
C) Lack of compliance of the main parts	0 points	
		one of the answers given is marked with the sign "X"

The evaluation must be substantiated if answer C is marked.

Full compliance of the dissertation summary with the dissertation.

10. Participation of the doctoral student in the achievement of the results of the dissertation:

A) The doctoral student has at least an equal participation	8 points	X
B) The doctoral student has secondary participation	5 points	
C) The participation of the doctoral student 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 B or C is marked.

The candidate is the first or the second author on the dissertation publications, so I think her participation is at least equal. My personal impressions of presentations and discussions with the candidate at scientific forums confirm this statement.

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	4 points	
D) 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 or D is marked.

The critical notes are mainly of a technical nature. Almost everywhere in the text *единици* are repeatedly used instead of units (*звена*), as well as *видове* instead of *съединения* or *производни*. Less commonly, the names of some polymers are sporadically but definitely misspelled, such as *поли*

(стирен сулфонат), поли(етиленимин) или полиакрилова киселина instead of поли(стирен сулфонат), полиетиленимин или поли(акрилова киселина), respectively.

12. Conclusion

A) The evaluation of the dissertation is POSITIVE	This evaluation is assigned to a total number of at least 65 points	X
B) The evaluation of the dissertation is NEGATIVE	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 at the request of the reviewer

Based on a critical analysis and assessment of the scientific and applied results, which represent an original contribution, the in-depth theoretical knowledge, the ability for independent research, and fulfilled and exceeded requirements set in REGULATIONS for ACQUISITION OF SCIENTIFIC DEGREES AND ACQUIRING ACADEMIC POSITIONS of the University of Chemical Technology and Metallurgy for professional field 4.2. Chemical Sciences, I give a POSITIVE evaluation of the dissertation of MSc Nicoleta Filipova.

22 Dec 2024	The review was written by:	
date	Prof. Stanislav Rangelov DSc	signature