

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. Professor	PhD	Desislava	Staneva	Grabcheva	UCTM-Sofia
№	academic position	scientific degree	name	middle name	last name	workplace

Scientific area:

5.	Technical sciences
code	name

Professional area:

5.10.	Chemical technologies
code	name

Scientific specialty:

Chemical technology of fibrous materials

The competition has been announced:

23	19.03.2024	Textiles, leather and fuels	Chemical technologies
in SG issue	date	for the needs of the Department	Faculty

The review was written by:

Professor	PhD	Olya	Stoilova	Stoilova	Institute of Polymers, BAS
academic position	scientific degree	name	middle name	last name	workplace

1. Review for the candidate:

Assoc. Professor	PhD	Desislava	Staneva	Grabcheva
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	
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B) The documents are complete but do not fully comply with the requirements of the Regulations	2 points	X
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.

According to the annexes to the Rules on the Conditions and Procedure for Acquiring Science Degrees and Holding Academic Positions in UCTM-Sofia, the candidate for participation in the competition must submit Annex 1z for area 5. Technical sciences, Annex 4g Reference for the points on the indicators for acquiring the academic position "Professor" and Annex 5 (5a - 5g). Assoc. Prof. Desislava Grabcheva presented these Annexes, but with a numbering different from the mentioned, which makes it difficult to find them.

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.

Assoc. Prof. Eng. Desislava Staneva Grabcheva PhD, is the only candidate on the competition for filling the academic position of "Professor" in the Scientific specialty "Chemical technology of fibrous materials", announced in SG no. 23/19.03.2024. In this review, scientific and research accomplishments of Dr. Grabcheva, which do not repeat the scientific works which the candidate used for the acquisition of the educational and scientific degree "Doctor" and scientific degree "Associate Professor", are evaluated.

In the reference of points by groups of indicators for area 5. Technical sciences, the candidate has submitted the following information for indicators 1, 4, 7, 8, 9, 12, 16, 18, 20, 22 and 23:

According to **indicator 1**, the candidate has PhD-thesis in the Scientific specialty "Chemical Technology of Fibrous Materials" (code 02.10.16) defended in 2008, which brings her the required **50 points**.

Publication activity:

According to **indicator 4**, 10 scientific publications are presented. They were published in specialized journals that are referenced and indexed in world-famous databases of scientific information (Scopus and/or WoS). In half of them, Assoc. Prof. Grabcheva is the first author, which proves her leading role and significant contribution in their development. Thus, **the score on this indicator is 112.10 points** against the minimum required 100.

In a **group of indicators from 5 to 11**, the candidate receives **321.50 points** against the minimum required 200 points. According to **indicator 7**, 30 scientific publications are presented. They were published in specialized journals that are referenced and indexed in world-famous databases of scientific information. According to **indicator 8**, 4 scientific publications are presented, which are in non-refereed journals with scientific review, and according to **indicator 9**, 2 published chapters of co-authored books, one of which is in the Encyclopedia are also presented.

The response of the results achieved (citations):

In a **group of indicators from 12 to 15**, the candidate receives **620 points** against the minimum required 100 points. Here, only by **indicator 12**, a total of 62 citations in scientific publications, referenced and indexed in world-famous databases of scientific information are presented, which are

of the scientific publications of indicator 4. The number of citations are evidence for the good scientific level and the importance of the obtained results.

In a **group of indicators from 16 to 27**, the candidate receives **182 points** against the minimum required 100 points. In this group of indicators, the co-leadership of two PhD students (indicator 16), the participation in 5 national (indicator 18) and the leader of 2 national (indicator 20) scientific projects, the attracted funds for projects led by the candidate (indicator 22) and published co-authored university textbook ("Textile materials with sensory properties and photodynamic activity" with ISBN 978-954-91951-6-3) (index 23). Here, the candidate's contribution to the management of successfully completed national research projects should be noted, which shows her leading role in the development of research in these projects, as well as the accumulated administrative experience.

The total score of all group of indicators is 1285.60 (at a minimum of 550), with which the candidate not only fulfills the minimum requirements (national and of the UCTM), but in most of them significantly exceeds them. It should be noted that this very high score reflects the diverse work of Dr. Grabcheva and fully satisfies the requirements for filling the academic position „ Professor“.

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	X
B) Research is relevant. Results from other authors are known for each of the topics and / or applications studied.	5 points	
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 is relevant, and some of it is pioneering, namely the modification of cotton fabric and viscose silk with dendrimers or their complexes with metal ions. The obtained results enrich with new knowledge and new methods for imparting useful properties to various textile materials. Moreover, the research results have a targeted applied nature, and the resulting textile materials have a marked potential for biomedical applications with their antimicrobial and antiviral activity, for water purification from various pollutants such as petroleum/oil spills and dyes, and as sensors for detection of amines and metal ions in water sources.

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.

Prof. Dr. Eng. Grabcheva participated in the competition with 44 publications and 2 book chapters in co-authorship. In each of the presented publications and book chapters, a detailed analysis of the state-of-the-art and achieved by other authors in the scientific literature is made. Given the fact that in 20 of the presented publications and in both chapters of books Assoc. Grabcheva is the first author, it gives me reason to claim that the candidate knows in detail the achievements of other authors, makes a critical analysis and successfully highlights the contributions and innovations in his own results. In addition, it also shows its leading role in a large part of research, and the achieved results are of high scientific value and contribute to the enrichment of knowledge in the field of textile materials by expanding the range of their potential applications.

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.

The conducted research is purposeful and scientifically based, and the obtained results are correctly interpreted. The research has a significant applied potential and is of interest as ready-made solutions for creating textile materials with biomedical applications, for water purification or as textile sensors. The majority of publications (36) and two book chapters are devoted to the synthesis of dendrimers/metallodendrimers and suitably modified branched polymers, which have been used to modify cotton fabrics by various methods to impart antimicrobial or antiviral activity. Only five of the publications are devoted to the creation of textile materials for the purification of waters contaminated with petroleum products or dyes, and three of the publications concern the creation of chemosensors responsive to amines or to metal ions in aqueous media.

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 of the research are realistic and, for the most part, have a practical focus. The research has a scientific and applied nature, covers a wide range of problems and is in the field of textile materials. All newly synthesized substances, dendrimers and polymers, as well as the textile materials

modified with them, are characterized in detail. Depending on their application direction, their potential properties - antimicrobial, antiviral, sorption, photocatalytic and fluorescent - have been studied.

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 methods used to characterize the obtained modified textile materials are fully adequate and meet the set scientific goals. A wide range of different physical, analytical and spectral research methods have been used to characterize the morphology and properties of these materials. A scanning electron microscope was used to observe the surface of the modified textile materials, the adhesion of different strains of microorganisms and the formation of biofilm. FT-IR, NMR, UV-Vis, XPS, EPR and fluorescence spectroscopies, as well as elemental analysis, were used to characterize the synthesized dendrimers/metallodendrimers. The color characteristics of the modified textile materials were also determined. Considering the potential biomedical application of the modified textile materials, it is quite logical that their antibacterial activity was investigated against various model Gram-positive and Gram-negative bacteria, as well as against some fungi. Studies were also conducted on their cytotoxicity and antiviral activity against human respiratory syncytial virus (HRSV-S2) and human adenovirus serotype 5 (HAdV-5). From the point of view of the potential application of the created modified textile materials for water purification, methods were used to evaluate their sorption efficiency and capacity, as well as the possibility of their repeated application. Regarding the practical application of viscose silk materials as textile sensors, the Gray scale was used to evaluate color fastness.

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, based on the scientific publications submitted for participation in the competition, in my opinion, outline three directions of research: (i) modification of cotton fabrics

for biomedical application, (ii) modification of polyamide fabric for water purification from pollutants and (iii) modification of viscose silk for application as a textile sensor. These are also the candidate's contributions to the development of the scientific field in which he works. The contributions can be summarized as follows: (i) Preparation of modified cotton fabrics with biomedical application - various fluorophore-modified dendrimer ligands of different generations and their metal dendrimers were obtained, as well as branched polymers modified with fluorophores and their complexes with metal ions, which were first used for modification on cotton fabrics to impart antimicrobial activity. Cotton fabrics modified with cross-linked chitosan with incorporated ZnO particles with antiviral activity were also obtained. (ii) Preparation of modified polyamide fabric for water purification from pollutants – by means of surface-initiated photopolymerization of polyacrylamide hydrogel and in situ synthesized ZnO particles, a modified polyamide fabric was obtained, which is suitable for photocatalytic purification/decolorization of industrial wastewater from dyes. (iii) Preparation of modified viscose silk for application as a textile sensor – a second-generation polypropylene imine dendrimer with primary amino groups modified with fluorescent benzanthrone units was used to dye viscose silk to obtain a textile sensor. The resulting textile material shows the best sensory activity in the presence of triethylamine in aqueous media, compared to the other tested amines – ammonia, methylamine and dimethylamine. The dyed viscose fabric was found to quench its fluorescence in the presence of copper and zinc ions, making it also suitable as a heterogeneous sensor for the detection of these ions in aqueous media.

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	
B) The candidate has at least an equal participation in most of the submitted papers	7 points	X
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 materials submitted for the competition show the active and at least equal participation of the candidate in most of the research. From a total of 44 scientific papers and two book chapters, Dr. Grabcheva is the first author of 22 of them. Part of the research was reported by the candidate at national (15) and international (11) scientific forums. The supervising of 4 successfully defended bachelor's degrees and 4 successfully defended master's degrees over the past five years also makes a good impression.

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

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.
<p>I have no critical remarks, but I have the following recommendations and technical remarks:</p> <p>The use of uniform numbering of the publications submitted to cover the minimum requirements and those to form the reference for scientific contributions, as well as the provision of summary data on the teaching activity, would greatly facilitate the work of the reviewers.</p> <p>In Appendix 6a (indicators 5-11), article 12 and 14 are identical, hence the reduction in points for this group of indicators.</p> <p>In a reference to scientific contributions, it would be much better and clearer to give the specific publications after the contribution description, rather than simply listing them at the beginning. Publication I11 is not included in the reference to scientific contributions, and publication I38 does not address antiviral activity. Viscose materials have only been used in the creation of textile sensors, but not in biomedical textile materials, as written in the Reference for Scientific Contributions (page 2). Given the scientific specialty applied for, I would recommend that in the scientific contributions, more emphasis be placed on the processing and modification of textile materials, their properties and their potential applications. In addition, it would be useful to explain why cotton fabric is used in some cases, polyamide in others, and viscose silk in others.</p>

1.12. Conclusion

A) The evaluation of the candidate's activity is POSITIVE	This evaluation is assigned to a total number of at least 65 points	X 93 points
B) The evaluation of the candidate's activity 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 if requested by the reviewer

The overall assessment of the pedagogical and scientific activities is POSITIVE and I would like to recommend the election of Assoc. Prof. Eng. Desislava Staneva Grabcheva PhD, at the Academic position of “Professor” in the Professional Field 5.10. Chemical technologies and Scientific specialty “Chemical technology of fibrous materials”.

27/06/2024	The review was written by:	Prof. Olya Stoilova, PhD
date		signature