Appendix 12c

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	Associate professor	PhD	Elena	Georgieva	Koleva	BAS
№	academic position	scientific degree	name	middle name	last name	workplace
2						
№	academic position	scientific degree	name	middle name	last name	workplace

Scientific area:

5	Technical sciences
code	name

Professional area:

5.2	Electrical engineering, electronics and automation
code	name

Scientific specialty:

Automation of engineering work and systems for automated design

The competition has been announced:

74	**21.08.2020**	Automation	Chemical and System Engineering
in SG issue	date	for the needs of the Department	Faculty

The review was written by:

Professor	Doctor	Emil	Georgiev	Mihailov	UCTM, Sofia
academic position	scientific degree	name	middle name	last name	workplace

1. Review for the candidate:

Associate professor	PhD	Elena	Georgieva	Koleva
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.

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 candidate, Assoc. Prof. PhD eng. Elena Georgieva Koleva satisfies the minimum requirements for holding the academic position "Professor" according to the university and national regulations about the scientific field 5. Technical sciences Assoc. Prof. PhD eng. Elena Koleva participates in the competition for the academic position "Professor" with a total of 49 scientific publications and one monograph. 13 papers have been printed in journals, referred and indexed in world-famous databases. 34 papers are published in journals with scientific review and in edited collective proceedings. There are 39 citations in scientific articles, one dissertation and one monograph. The indicators of the candidate for the academic position "Professor" at UCTM are as follows: • A (50 points) - Dissertation "Statistical methods for modeling and quality management in electron beam welding ". • B (144 points). 10 publication in journals, referred and indexed in world-famous databases. •G (273 points at a required minimum of 200 points) – 3 scientific publications in publications referred and indexed in world-famous databases of scientific information (29 points) and 34 publications in non-refereed journals and collective proceedings with scientific review (196 points) and 2 monographs (60 points) are presented. • D (424 at a required minimum of 100 points) - 404 points by citations and reviews in scientific journals, referenced and indexed in world-famous databases with scientific information and 20 by citations and / or reviews in non-referred journals with scientific peer-review. • E (200 points at a required minimum of 100 points). One PhD student was defended at the co-supervising of Assoc. Prof. Koleva (20 points). There are 4 participations in one national educational

projects (80 points), one international educational project (20 points), managements of international educational project (40 points). 60 points were formed as results of, published university textbook and methodological instructions.

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 scientific works are mainly in the fields of mathematical modeling, statistical methods, optimization and control of technological processes, the study of physical processes, and applications of the generation of intense beams of accelerated electrons and their interaction with materials. New data have been obtained, regularities have been studied and new research methods have been proposed, models, algorithms, and computer programs have been developed for numerical and empirical modeling of processes at the generation of intense electron beams, as well as for simulation of the processes of electron beam processing of materials. Approaches and new methods for control and optimization of the operation of electron beam installations and technological processes are proposed and experimentally verified. Optimization approaches have been developed for of electron beam welding, refining using electron beam melting, as well as for the process of synthesis of biomaterials by irradiation in linear electron accelerators, computer programs for simulating the processes of exposure and development during the obtaining of submicron and nano-dimensional electron-lithographic images are developed, the properties of the obtained materials have been studied and the technological working conditions have been optimized under different requirements for the final characteristics of the materials. All areas are in the priorities in national and European research and investment programs.

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.
The candidate analyzes, interprets, cites and creatively applies the results achieved by other researchers, applied and publishing activity. Additionally she contributes to the enrichment of theoretical knowledge and information in different areas of research.

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 of the research are realistic. They are achieved via complex and adequate modern research methods. The candidate's researches have a scientific and scientifically-applied character – they are aimed at solving of real problems of the engineering practice.

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.

A wide range of methods, including mathematical modeling, industrial and laboratory experiments, have been used at the candidate's research work:

- Electron beam lithography
- Electron beam welding
- Electron beam melting and refining
- Electron beam induced grafting and cross-linking in the synthesis of biopolymers
- Pharmaceutical production - cleaning, drug production, stability
- Monte Carlo method for simulation of thermal processes
- TREM, SELID, CASINO for simulation of the electron beam lithography process
- Programming of thermal processes in Matlab environment - quasi-stationary and non-stationary thermal models
- Evaluation, validation and testing of Artificial Neural Networks
- Evaluation of kriging models
- Factor analysis
- Statistical methods for process management - histograms, control charts, etc.
- Response surface methodology - Regression analysis
- Robust engineering design - evaluation of models for the mean values and variances of the quality characteristics
- A new combined robust method for estimating models of mean values and variances in industrial experiments - with errors in the input parameters, the presence of noise, as well as heteroskedasticity and correlation of the output parameters.
- Multicriteria optimization - graphical optimization, genetic algorithm, desirability function
- Method for generalized robust optimization
- Method for analysis and control of EBW based on the collected secondary emission current by the method of coherent accumulation
- Application of industrial controllers for process control - Siemens Simatic 300 and development of ladder diagrams
- Identification of production parameters
- Model of integrated welding process control system based on ISO / IEC 62264 standard
- Development of a graphical user interface in the Matlab environment and generation of independent software applications
- Quality by design
- Survey
- UML, MySQL databases
- Products Matlab, Minitab, Qstatlab, SPSS, Visual Paradigm, Protégé, Eclipse Papyrus

The results from mathematical models are combined with experimental results. That is an evidence of mastery of different research approaches and good theoretical training. The goals set in the research are realistic and are achieved by adequate applications of modern research methods. For providing the investigation a different software products for engineering and scientific research has been mastered and actively used.

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 research activities of the candidate are developed in the following directions:

- Penetration of accelerated electrons into polymer layers
- Electron beam welding
- Electron beam melting and refining
- Synthesis and optimization of electron beam treatment of materials based on biopolymers
- Nanotechnology
- Modeling and optimization of pharmaceutical processes
- Other areas

Some of the major contributions in these areas are described below:

- The processes of exposure and development of polymer resists are simulated and the characteristics of the spatial distributions of the transmitted energy and the energy distribution of the penetrated electrons are calculated for a number of practically important cases.
- Data on the behavior of the resists used in nanolithography were obtained.
- A software application program for electron beam lithography based on estimated neural and regression models describing the dependences of the geometrical characteristics of the cross sections of positive resist polymethyl methacrylate (PMMA) after electron beam exposure and development with methyl-isobutyl ketone (MIB) parameters has been developed electron beam lithography depending on the process parameters electron beam lithography: accelerating voltage, resist thickness, exposure time and exposure dose. The program allows to determine the dose to clear of exposure, comparison of the two modeling approaches, as well as subsequent optimization based on the obtained models.
- A method of controlling the focusing mode of the electron beam has been developed. This method is based on the parameters of the secondary emission current in the plasma generated above the welding zone. This method is based on the parameters of the secondary emission current in the plasma generated above the welding zone.
- New data have been obtained by studying the collected secondary particles from the plasma generated in the process of electron beam welding.
- A model of an integrated control system for the electron beam welding process has been developed based on the development of a Master Plan system and ISO / IEC 62264 standard, providing for the inclusion of additional processes: surface modification, electron beam evaporation, selective melting and diagnostics of electron beam.
- Computer programs have been developed to simulate the processes of heat distribution and mass transfer in the liquid layer of the front of the molten sample and in the bath in the

resulting casting. It is shown that the dissolved gases are released at the beginning of the melting process, and the optimization of the process requires a properly selected distribution of energy input

- A new explanation of the roughness of the cast blocks is proposed, related to the non-stationary thermal processes in the zone of contact of the liquid metal with the water-cooled copper crystallizer. It is a basis for increasing the yield of the technological process.

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.
It is assumed that the candidate has at least equal participation in the submitted works due to the lack of distribution protocols between the authors.

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.
Assoc. prof. PhD eng. Elens Koleva has been leeded 1075 lecural hors and 405 hours exercises in 5 cources in bacalavar and 6 in master degree courses in UCTM: She is an author of 2 textbooks.

1.11. Critical notes:

A) Lack of critical notes	8 points	X
B) Critical notes of a technical nature	7 points	
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.

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
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
I give a positive assessment and propose to the scientific jury to accept and evaluate positively the candidacy of assoc. prof. PhD. eng. Elena Georgieva Koleva for the academic position "Professor" in the scientific specialty "Automation of engineering work and systems for automated design", professional field 5.2. Electrical Engineering, Electronics and Automation, field of higher education 5.Technical sciences.

Candidate ranking (in case of more than one candidate who has received a positive evaluation to occupy the academic position):

Based on the assigned points, the candidates who have received a **positive** evaluation are ranked as follows:

1	Assoc. prof.	PhD	Elena	Georgieva	Koleva	94
place	academic position	scientific degree	name	middle name	last name	points
2						
place	academic position	scientific degree	name	middle name	last name	points
3						
place	academic position	scientific degree	name	middle name	last name	points

	The review was written by:	
16.12.2020	Emil Georgiev Mihailov	signature