Appendix 12d

REPORT
to occupy the academic position:

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

Candidates to occupy the position:

1	Chief Assistant Professor	Ph.D.	Emil	Ivanov	Lilov	UCTM-Sofia
№	academic position	scientific degree	name	middle name	last name	workplace

Scientific area:

4.0	Natural sciences, mathematics and informatics
code	name

Professional area:

4.1	Physical Sciences
code	name

Scientific specialty:

Condensed Matter Physics

The competition has been announced:

34	11.04.2023	Physics	FCHT
in SG issue	date	for the needs of the Department	Faculty

The report was written by:

Associate Professor	Ph.D.	Ani	Anguelova	Stoilova	UCTM-Sofia
academic position	scientific degree	name	middle name	last name	workplace

1. Report for the candidate:

Chief Assistant Professor	Ph.D.	Emil	Ivanov	Lilov
academic position	scientific degree	name	middle name	last name

1.1. 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 meets the minimum national requirements specified in the Law on RASB, published in the SG, №15 of 19.02.2019, as well as those set by the University of Chemical Technology and Metallurgy (Regulations for acquiring scientific degrees and holding academic positions at UCTM, Sofia 2019) for holding the academic position "Associate Professor". The candidate's personal total number of points by groups of indicators is as follows: group A – 50 points (from a minimum of 50 points) group B – 140 points (from a minimum of 100 points) group Г – 205 points (from a minimum of 200 points) group Д– 146 points (from a minimum of 50 points) Assist. Prof. Ph.D. Lilov participates in the competition with 18 scientific publications. For B group of indicators, the candidate presents 10 articles (this is the minimum number of articles for this group of indicators according to the Rules set by UCTM), as an equivalent of a habilitation thesis. One of them is published in a journal ranked with quartile Q2, 4 in journals with Q3 and 5 in journals with Q4. For D group of indicators (indicators 7 and 8) he presented 8 articles. One of them is published in a journal ranked with quartile Q1 and the other 7 are published in journals with Q2. For D group of indicators (indicator 9 and 10) the candidate presents also a registered utility model and a patent application. The presented publications have been cited 73 times. Most cited is paper №4 of 6 г – 20 citations. A constant trend of increasing the number of citations has been observed in recent years. I have no doubt that this positive trend will continue.

1.2. 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)	8 points	
B) Research is relevant. Results from other authors are known for each of the topics and / or applications studied.	6 points	X

C) Most of the research is relevant, but also some results are presented that have no scientific and / or applied value	4 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.
A significant part of the scientific works, with which the candidate participates in the competition for occupying the academic position "associate professor", is related to the preparation of anodic antimony or zinc oxide films and exploring potential applications of this new materials. Another part of the scientific work is related to the preparation and characterization of composite materials based on bismuth containing chalcogenides or on a lead-borate glassy matrix dopped with PbMoO4 nanocrystals. In view of the broad application possibilities of the above-mentioned materials in sensor devices, catalytic reaction processes or in the optoelectronics, I consider the reported by the candidate experimental results to be of high scientific relevance. The experimental work related to the possibility of using anodically prepared thin layers of zinc oxide for purification of wastewater from the dye industry, I estimate as particularly attractive in view of the advantages of the photocatalytic technique as a method that uses solar energy for degradation of organic pollutants.

1.3. 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 main goal of most of the research (publications: 4.1, 4.3, 4.6, 4.7, 4.8, 4.9, 7.3, 7.6, 7.7 and 7.8) conducted by Ph.D. Lilov is the preparation of anodic films on antimony or zinc and demonstration of some possibilities for their application. To fulfill these tasks, the applicant studied the anodization reaction kinetics, the morphology and structure of the films, their acoustic, electrical and optical properties, the degradation rate of the azo dye methyl orange depending on the time of using anodically prepared zinc oxide films as photocatalyst, on the temperature, pH and the illumination of the solution. The main objectives of the experimental work reported in publications 7.5, 7.2, 7.4, 4.4, 4.2, 7.1 and 4.5 are related to the preparation and characterization of composite materials

based on bismuth containing chalcogenides or on lead-borate glassy matrix dopped with $PbMoO_4$ nanocrystals.

The purpose of the research conducted in publication 4.10 is to study the corrosion resistance of anodic aluminum/cerium conversion coatings on aircraft alloy substrates. The corrosion protection properties of the films were evaluated by using electrochemical impedance spectroscopy and potentiodynamic polarization.

The goals set in all publications are realistic and of interest, both from a scientific and applied point of view. The results were achieved with adequate and modern research methods.

1.4. 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.

As most significant candidate research contributions, based on the fact that the results achieved are reported for the first time in the scientific literature or their applied nature, I would list the following.

• Contributions of fundamental significance:

The conditions for reproducible formation of anodic films on antimony in aqueous solutions of oxalic acid and potassium phosphate and on zinc in aqueous solutions of oxalic acid, sodium-based aqueous solutions and aqueous borate electrolytes have been optimized.

For the first time, anodic films on antimony formed in oxalic acid were found to exhibit a resistive switching effect.

A methodology has been developed for determining the optical width of the forbidden zone of anodically prepared films.

• Contributions of applied significance:

For the first time it was demonstrated that anodically prepared zinc oxide thin layers could be used as photocatalysts for decolorization of methyl orange.

For the first time it was demonstrated that thermally sealed in an aqueous environment combined anodic aluminum/cerium conversion coatings increase the corrosion resistance of AA2024-T3 aircraft alloy.

1.5. 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.

1.6 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.

1.7. 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.
My only one negative comment to the presented from Ph.D. Lilov applicant files concerns the original scientific contributions list. Even tough, as a rule, they are accepted as a result of team work, as a colleague of the candidate in the Department of Physics at the UCTM, I have no doubt that at the core of most of the proposed conceptual experimental ideas and achieved research goals lie his knowledge, skills and persistence. I would recommend the applicant to emphasize very briefly his personal contribution.

1.8. Conclusion

A) The evaluation of the candidate's activity is **POSITIVE**	This evaluation is assigned to a total number of at least 50 points	X
B) The evaluation of the candidate's activity is **NEGATIVE**	This evaluation is assigned to a total number below 50 points	
		one of the answers given is marked with the sign "X"

To be filled in if requested by the member of the scientific jury
Based on the submitted publications, the research activity and teaching experience of Ph.D. Emil Lilov, I convincedly suggest the esteemed Scientific Jury to recommend the Faculty Council of the Faculty of Chemical Technologies at the UCTM to vote "YES" for awarding the academic position "Associate Professor" in the Professional area 4.1 Physical Science (specialty "Condensed Matter Physics") to the candidate – Senior Assist. Prof. Emil Ivanov Lilov.

01.08.2023	Assoc. professor Ani Anguelova Stoilova	
date	The report was written by:	signature