

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	Assistant professor	PhD	Christian	Assenov	Girginov	CTMU, Sofia
№	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:

Physical Chemistry

The competition has been announced:

108	22.12.2020	Physical Chemistry	Faculty of Chemical Technologies
in SG issue	date	for the needs of the Department	Faculty

The report was written by:

Professor	PhD	Nikolai	Stoyanov	Boshkov	IPC - BAS
academic position	scientific degree	name	middle name	last name	workplace

1. Report for the candidate:

Assistant professor	PhD	Christian	Assenov	Girginov
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
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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.

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

The research realized by the candidate in the mentioned scientific areas is topical, which is confirmed by their response in the world scientific literature, i.e. citations. So far, there is information available on a total of 63 citations, almost all of them - in international journals with high scientometric indicators (IF, Q). For example, Article 7.6, describing the synthesis, composition, structure and thermal behavior of a compound widely used for medical purposes, there are 13 citations established so far, including in the last few years.

Another predominantly environmental article (application of Ag-doped nanocrystalline TiO₂ aimed to degrade organic pollutants such as methyl orange) - 7.7 - has been cited a total of 18 times so far, including in the past year. As well known, nanocrystalline TiO₂ is widely used for photocatalytic decomposition of water, for solar cells, etc., which is the reason still to be investigated.

In addition, most of the articles are well cited, especially in recent years - for example 4.6, 7.21, 7.22 and others. These facts clearly confirm the relevance of the scientific areas covered by the candidate, as well as of the experimental data obtained and published so far.

Other evidence is the Utility Model Certificate (Reg. No. 3080 U1) published by the Patent Office of the Republic of Bulgaria entitled "Installation for disposal and recycling of waste batteries and accumulators" from 2019, in which the applicant is one of the co-authors.

It can be seen that the candidate has received also a total of five awards. Two of them are first prizes - for participation in a poster session of students, PhD students, young teachers and scientists at UCTM (2006) and for the excellent presentation of the exhibition of printed and electronic publications from lecturers from the University of Ruse "A. Kanchev" (2013). Assistant Professor Girginov has also two second prizes - from the Union of Chemists in Bulgaria ("Shimadzu" competition for the best

diploma work - 2008) and with a prepared and presented textbook at "A. Kanchev" University of Ruse (2015). Separately, the applicant received a plaque in the name of Professor Yanko Dimitriev for scientific achievements of doctoral students and young scientists in the field of materials science, chemical technology and nanocomposite materials - UCTM, 2018.

In addition to all the above, attention should be paid to the fact that the topics of the candidate are of great interest to the students themselves. From the attached reference it can be seen that in the last seven years, student groups have been formed annually, which have conducted research under his leadership.

In support of the assessment of the relevance of the research is the SCOPUS-data, which shows that the h-factor of the applicant is 7, i.e. it is clear that the research on the covered topics is of interest to a large number of researchers from the scientific community.

Other evidence can be established from the number of projects in which the applicant has participated. It can be seen that the latter is the leader of the basic organization of a project under the Scientific Research Fund, of the other 5 was the leader of the team by the participant (UCTM), and in the other 4 was a member of the team. In addition, Assistant Professor Girginov also participates as a leader of 7 University (UCTM) projects, and separately is a member of the teams of 12 other projects of UCTM, Sofia. In addition, he participates as a team member in 2 more projects - of "A. Kanchev" University of Ruse and of its branch in Razgrad.

Evidence of his participation in three EU-funded research projects, as well as three participations in European research programs, is also attached. Based on all these facts, I can earnestly conclude that the topics covered by the candidate are extremely relevant.

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 candidate has carried out research in certain scientific fields, which are comprehensively described in the attached materials. Objectives can be reduced to:

1 /. Preparation under different electrochemical conditions of porous anodic oxide films on Al with improved corrosion protection, as well as with very good adhesion and barrier properties. Study of process kinetics. Influence of thickness, composition and alloying elements (7.3; 7.13; 7.16, 7.18; 8.2).

2 /. Incorporation of selected metals (Ni, Cu, Ni/Cu, Co, Ag) in porous anodic films to obtain functional layers with specific properties with a very wide application - good decorative appearance (coloring), anti-corrosion properties, for solar collectors. (4.1; 4.2; 4.3; 4.4; 4.7; 4.8; 4.9; 4.10; 8.4),

3 /. Preparation of cerium conversion coatings for improved corrosion resistance and influence of some elements on their characteristics (4.5; 4.6; 7.14).

4 /. Improving the corrosion protection of Al and its alloys under different electrochemical conditions - main trends and approaches, including options for production and characterization. (7.19; 7.20; 8.3; 8.5).

5 /. Study of electronic conductivity in some systems related to the technology of production and operation of capacitors, some sensors (based on Bi), as well as the conditions of anodic polarization. An additional aim is to study the breakdown phenomena during the anodizing of Al in order to control the processes for obtaining coatings with improved dielectric properties. (7.1; 7.2; 7.5; 7.8; 8.1).

6 /. Preparation of anodic films on other metals such as antimony and zinc for improved corrosion resistance and application as alternative energy sources, monitoring sensors, catalysts for removing contaminants and others. (7.4; 7.9; 7.21; 7.23; 8.1).
7 /. Creation of efficient supercapacitors for storage of energy from renewable energy sources and selection of suitable active materials. (7.12; 7.15; 7.17; 7.22).
8 /. Synthesis of antitumor and antimicrobial substances for medical use. (7.6; 7.10; 7.24).
9 /. Development of suitable organic inhibitors against the corrosion of low carbon steel in acidic media (7.11).
10 /. Investigation of the possibility of using silver-doped nanocrystalline TiO ₂ for photocatalytic applications (7.7).

1.4. Candidate research contributions:

A) With lasting scientific and / or applied response, they form the basis for new research and applications	20 points	X
B) They are of significant scientific and / or applied interest, complete and / or summarize previous research	16 points	
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.
<p>During his previous scientific activity the candidate has conducted his research in selected scientific fields and has established the following contributions:</p> <p>1 /. Anodic oxide films on Al and its alloys were obtained. The kinetics of anodizing and the composition of the films, the influence of the alloying elements, the increase of the thicknesses and the filling of the pores were studied. Reliable protective anti-corrosion layers with very good adhesion and barrier properties have been developed. A model is proposed explaining the processes of film construction and those during immersion in a corrosive environment.</p> <p>2 /. Selected metals (Ni, Cu, Co, Ag) and a combination of them (Ni/Cu) were incorporated in porous anodic films and functional layers with specific properties and wide application for decorative purposes, corrosion protection and application in the solar system were obtained. A model describing the correlation between the conditions of incorporation (Ag) and the characteristics of the layers has been created.</p> <p>3 /. Cerium conversion coatings with improved corrosion resistance in a model medium containing chlorine ions as corrosion activators were obtained. The influence of some elements on their protective and other characteristics has been determined.</p> <p>4 /. The main tendencies and approaches for improvement of the corrosion protection of Al and its alloys at different electrochemical conditions by using of functional coatings are reviewed. It has been found that cerium compounds can be successfully used as inhibitors due to the formation of insoluble compounds.</p> <p>5 /. The processes of electronic conductivity have been studied and the breakdown phenomena in selected systems have been studied with a view to the application of the obtained data in practice.</p> <p>6 /. Anodic films on antimony and zinc with improved corrosion resistance and possibility of application as alternative energy sources, monitoring sensors, catalysts for removal of contaminants and others were obtained.</p>

7 /. Different variants for supercapacitors are assembled, which have a high specific capacity, good reproducibility in cycling, performing a large number of cycles.
8 /. Substances with antitumor and antimicrobial properties have been synthesized and the conditions for the formation of products with reproducible characteristics have been determined.
9 /. Appropriate organic inhibitors against the corrosion of low carbon steel in acidic media have been developed and their effectiveness has been determined.
10 /. Nanocrystalline TiO ₂ doped with Ag was obtained and the possibilities for effective degradation / decomposition of some types of dyes (methyl orange) were tested.

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	X
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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.

1.8. 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
<p>I know Assistant Professor Dr. Kristian Girginov in connection with our research on a joint project with Scientific Research Fund. In my opinion, he is an example of a correct and responsible colleague. I have excellent impressions from his scientific activity - his research was conducted competently and at a high professional level. I accept that they are predominantly his personal work given his place in the author teams of publications and reports at scientific forums - in most of them he is the first or second co-author. The analyzes made and the interpretation of the experimental data in his scientific works, as well as the conclusions and contributions are logical and well-founded. The number of established citations from his publications categorically confirms the interest of the scientific community in them. The relevance of the scientific topics, in the research of which he actively participates, is obvious and leaves no doubt. With all this in mind, I am pleased to propose to the respected Scientific Jury to give a positive assessment of the scientific production and pedagogic activities of the candidate and to choose Assistant Professor Dr. Christian Assenov Girginov for "Associate Professor" in Professional Field 4.2. Chemical Sciences (Physical Chemistry).</p>

09.04.2021	The report was written by:	
date	Professor PhD Nikolai Stoyanov Boshkov	signature