

**REVIEW**

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:****Scientific area:**

5	Technical Sciences
code	name

**Professional area:**

5.10	Chemical Technologies
code	name

**Scientific specialty:**

Chemical resistance of materials and corrosion protection
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**The competition has been announced:**

61	02.08.2019	Inorganic and electrochemical technologies	Chemical Technologies
in SG issue	date	for the needs of the Department	Faculty

**The review was written by:**

Associate Professor	PhD	Boriana	Rangelova	Tzaneva	Technical University of Sofia
academic position	scientific degree	name	middle name	last name	workplace

**1. Review for the candidate:**

Senior assistant professor	PhD	Dimka	Ivanova	Ivanova
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	2 points	

requirements of the Regulations		
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"

### 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"

A note is mandatory if B answer is marked. The publication activity of the candidate and quotations in articles of other authors (Citations) should be analyzed.

Totally 24 scientific publications are presented by the candidate. The publications related to the PhD thesis of the candidate as well as publication 23 will not be reviewed.

In accordance with law requirements 10 publications are organized as habilitation work (the total score is 102,85 points). The problems covered by the publications are different and related to new material synthesis and corrosion of metals. Although most of them were published in the last three years, six of them already have been cited, which shows interest towards the published results.

In addition to the publication organized as a habilitation work, the candidate presents 14 articles with total score over 200 points and therefore the minimal requirements of the law are satisfied.

The citations search reveals 41 citations and the corresponding scores related to the requirements 12, 13, 14 and 15 are 309, hence the minimal requirements (50 points) are satisfied in excess.

### 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"

Evaluation of research developed and relevance of the results.
<p>The articles presented cover some actual and attractive thematic directions, among them:</p> <ul style="list-style-type: none"> <li>• Conversion coatings on steel, zinc and aluminum. What leaves a good impression is the use of non-toxic and green chemicals for the electrolyte solutions developed by substitutions of the convention Chromium VI by molybdates, phosphates, combined additives etc. All articles covering this direction of the candidate researches are relevant to contemporary topics studied worldwide and have contributions to knowledge.</li> <li>• Synthesis of materials applicable for catalysts, bio-materials as implants, materials for Li-ion batteries electrodes as well as materials allowing hypochlorite production.</li> </ul> <p>The topics covered by the presented scientific publications are contemporary hot which is supported by the amount of citations. The list of citations indicates 41 citations (32 verified by SCOPUS and Web of Science) and supports the aforementioned standpoint.</p>

#### 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	
B) The candidate is partially familiar with the achieved results on the researched topics and / or applications	4 points	X
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"

Explanation notes are compulsory if answer C is marked.
The amount of contemporary references (from the last 10 years to the date of publication of the given scientific work) in the candidate's publications is relatively small given the significance of the topics and the substantial number of publications on similar studies in the global database.

#### 1.5. Type of research:

A) Theoretical	4 points	
B) Applied	4 points	X
C) Theoretical with application elements	4 points	
D) It does not correspond to the level specified in the <i>Act for the Development of the Academic Staff</i> 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 investigations are oriented to direct technological applications. The main topics are : <ul style="list-style-type: none"> <li>• Formation of conversions coatings,</li> <li>• Synthesis of new materials and their characterization.</li> </ul>

#### 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"

Objective specifications with relevant standpoints related to the scientific problems are compulsory
Doctor Ivanova performs investigations in several scientific directions, among them: <ul style="list-style-type: none"> <li>• Optimal experimental conditions for conversion coating formations on surfaces of steel, zinc and aluminum in regards to their corrosion resistances</li> <li>• Corrosion behavior of materials, mainly steels in different corrosion environments</li> <li>• Synthesis of new materials based in intermetallic compounds, among them: Co-Sn, Ni-Sn и Co-Ni, MnO<sub>2</sub>-spinel, alloyed lithium cobaltates, different oxides of zirconium, cerium and yttrium, hybrid nanostructures of sol-gel coatings.</li> </ul>

#### 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"

Specification of the research methods is compulsory with relevant justifications. .
A large set of scientific methods have been applied, among them: <ul style="list-style-type: none"> <li>• Kinetic studies related to the coating formations with gravimetric and chrono-potentiometric techniques.</li> <li>• Characterizations of electrolytes with respect to pH, density, electroconductivity, IPC , etc.</li> <li>• Methods as optical and scanning electron microscopy, BET, EDS, XRD, FTIR, XPS, AFM, TEM have been used for structural, chemical and morphological analyses.</li> <li>• Studies on corrosion resistance and corrosion products by applications of:             <ul style="list-style-type: none"> <li>- Mossbauer spectroscopy</li> <li>- Gravimetric and electrochemical methods (potentiodynamic, galvanostatic, open circuit potential) .</li> </ul> </li> </ul>

**1.8. Candidate research contributions:**

A) With relevant scientific and / or applied significance allowing development of new studies and applicable results	20 points	
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	X
D) Lack of significant contributions	8 points	
E) Lack of contributions	0 points	
		one of the answers given is marked with the sign "X"

The contributions should be outlined and result justified.

**Scientific and applied contributions of Dr Ivanova** can be outlined as :

- Conversion coatings - New approaches for synthesis of amorphous and crystalline phosphate coatings on carbon steel, zinc and aluminum. Water soluble alkali concentrates containing a different compounds of nickel, calcium, manganese, molybdenum, as well stabilizing and buffer substances have been applied. The coatings studied are characterized with sufficient details oriented to practical applications.
- Syntheses of hybrid nanostructures related to sol-gel coatings and investigations of their corrosion stability in model solutions of 0.5 M Na<sub>2</sub>SO<sub>4</sub> have been developed.
- Syntheses of intermetallic particles based on Co-Sn, Ni-Sn and Co-Ni by chemical reductions in aqueous solutions have been developed. Moreover, the MnO<sub>2</sub>-spinel structure, different alloyed lithium cobaltates as well as zirconium, cerium and yttrium oxides were obtained.

**Contributions allowing new knowledge and scientific approaches in the corrosion resistance of metals:**

- Corrosion stability studies on the new low-level alloyed steel KP-355 with regards to widely applied carbon steel 25 have been performed.
- The corrosion behavior of low-alloyed (2%Cr) steel after plastic deformation as well as the one of the low-carbon steels in solution of liquid fertilizers have been studied.
- Studies on applications austenitic steels (Cr18Ni9 and Cr18Mn12N) as bio-implants in models solution of saliva have been performed.

It is worth noting the significant orientation of research on the crystalline and amorphous phosphate coatings of steel, zinc and aluminum towards the industry.

**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 publications presented by Dr. Ivanova allow to say that the results and contributions are her one to a greater extent with authorships with other authors.

- There are 2 publications with a sole.
- From the 28 scientific publications, in 4 of them the name of Dr. Ivanova is at first position, and in 9 publications at second or at third position.

#### 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.

Dr Ivanova has long time experience teaching different courses in UCTM. Their main lectures are in field of corrosion and corrosion protection of metals.

- Since 2010 Dr Ivanova is assistant professor performing experimental laboratory works with students.
- For the last 4 years she teaches 5 lecture courses for student of bachelor and master degrees (for 8 specializations in the full-time and part-time education)
- She is a lecturer in English performed course on „Environmental Failure and Protection of Materials“.

Dr. Ivanova is a co-author in textbook, evaluated for final publication.

#### 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	3 points	

the research		
E) Significant critical notes	0 points	
There are no critical notes.		one of the answers given is marked with the sign "X"

Critical notes are compulsory if answers C, D or E are marked.

#### 1.12. Conclusion

A) The evaluation of the candidate's activity is <b>POSITIVE</b>	This evaluation is assigned to a total number of at least 65 points	<b>X</b>
B) The evaluation of the candidate's activity is <b>NEGATIVE</b>	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 optionally by the reviewer
In accordance with the rules of UCTM and the law of academic promotions the materials presented by the candidate and the scientific results obtained allow to suggest senior assistant professor Dimka Ivanova Ivanova, PhD, to be promoted to the position of Associate Professor in Scientific area 5. Technical sciences, Professional area 5.10. Chemical technologies, Scientific specialty "Chemical resistance of materials and corrosion protection".

<b>27.11.2019</b>	Reviewer:	
date		/Assoc. Prof. Boriana Tzaneva/