

REPORT

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.Prof.	PhD	Katya	Nikolova	Ignatova	UCTM
№	academic position	scientific degree	name	middle name	last name	workplace

Scientific area:

4.2	Chemical Science
code	name

Professional area:

5.10	Chemical Technology
code	name

Scientific specialty:

Technology of the electrochemical production
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The competition has been announced:

102	23.12.2022	Inorganic and electrochemical productions	Chemical technologies
in SG issue	date	for the needs of the Department	Faculty

The report was written by:

Professor	PhD	Anton	Angelov	Momchilov	INN-Konsult
academic position	scientific degree	name	middle name	last name	workplace

1. Report for the candidate:

Assoc. Prof.	PhD	Katya	Nikolova	Ignatova
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.

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 actuality of obtaining alloy coatings and powders is determined by their diverse application - in magnetosensor technologies and magnetoelectronics, in supercapacitors, biotechnology, catalysis, metal-ceramic and semiconductor technologies. Electrolysis has special advantages in producing finely dispersed alloy powders compared to powder metallurgy, chemical reduction, and melt plasma sputtering, and is often the only possible method for producing some metal alloy coatings and powders. Special attention is paid to the anomalous deposition of Ni and Co from different electrolytes and the characterization

by independent electrochemical methods. The citations of the published works confirm the relevance of the research and the useful models - their innovation and application.

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

One major focus of the candidate's research is in the area of electrodeposition of alloy coatings of Ni and Co, Ni-P, Co-P and Ni-Co-P, as well as powders of the same metals. A thoroughly study of the ongoing processes during electrodeposition, as well as optimization of their production, has been carried out. Their focus is on corrosion-resistant coatings, as well as powders with application in various industries. A particular application is as ORR (Oxygen Reduction Reaction) catalysts in the cathode of metal-air systems. Another main focus of the research is the production of Sn-Ni and Sn-Co powders, as well as the optimization of the processes based on their study. These alloy powders have been investigated as negative active materials for Li-ion batteries as well as ORR catalysts in air electrodes.

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.

NiCo, NiP, CoP, NiCoP coatings

Ni-Co alloy coatings with a nanoscale structure were obtained from developed low-toxic electrolytes. It has been shown that H₃PO₃ contributes more than H₃PO₄ to the

incorporation of P into the metal matrix of the alloys. It was found that the pulsed deposition mode generally leads to a weaker manifestation of the phenomenon of "anomalous" (preferential) deposition of cobalt in the NiCoP alloy. The influence of the current mode difference on the microstructure of NiCoP alloys has been established. For the first time, data on the barrier ability and corrosion resistance of the coatings were obtained by the combined application of EIS and LVA methods.

NiCo and NiCoP alloy powders

Data on the catalytic ability of NiCo and NiCoP powders for the oxygen reduction reaction (ORR) have been obtained for the first time. The good catalytic ability of the powders at lower current loads was established.

SnNi and SnCo alloy powders

Original data on deposition kinetics and preparation conditions for SnNi and SnCo alloys were obtained. It is shown that with an increase in the frequency of the pulses, a 20% increase in the content of Ni and Co in SnNi and SnCo powders is reached. For the first time, the electrocatalytic ability of SnNi and SnCo powders in terms of ORR was investigated. A better catalytic ability of all SnNi samples compared to a reference silver catalyst was found. The catalytic performance of Sn-Co powders is better than that of the reference Ag catalyst at lower current loads.

Electrochemical characteristics of Sn-Co and Sn-Ni powders as anode materials in a real lithium-ion battery were investigated. Sn-Co powders were found to have the best performance and operational stability.

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).	8 points	X
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The work with undergraduate and doctoral students is at a high professional level.		
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
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
The scientific indicators and the results of the candidate's activity fully meet the requirements of ZRAS and the Regulations of UCTM-Sofia, therefore, with full conviction, I propose to the honorable Scientific Jury to propose to the Academic Council of UCTM to elect Associate Professor Dr. Katya Nikolova Ignatova to the academic position "Professor" in the scientific field "4.2 Chemical Sciences", professional direction 5.10 "Chemical Technologies" for the needs of the Department "Inorganic and Electrochemical Productions", Faculty "Chemical Technologies" at UCTM.

11.05.2023	The report was written by:	
date	Prof. PhD Anton Angelov Momchilov	signature