

REVIEW

for competition for taking the academic position "professor"

**in the professional field 5.2 "Electrical engineering, electronics and automation",
the speciality „Electrotechnology“,**

announced in SG 93/26.11.2019,

with candidate: Bohos Rupen Aprahamyan, Ph.D, Associate Professor

Member of a scientific jury: Iliana Marinova, D.Sc., Professor

9. General and biographical data.

Bohos Aprahamyan was born on September 28, 1961 in Varna. In 1987 he graduated VMEI-Varna (now TU-Varna) and obtained a Master degree in Electrical Machines and Apparatus and became an electrical engineer. In 1992 he defended his PhD thesis titled: "Development and research of surface heating elements on a ceramic basis" and received a scientific degree "Doctor of Philosophy". From 1990 to 1997 he was a part-time assistant at the Faculty of Electrical Engineering of TU-Varna, and in 1997 he was appointed as a chief assistant at VVMU "N. J. Vaptsarov" - Varna. In 2001 he became an associate professor and since 2009 he has been an associate professor at the ETET department of TU-Varna. Prof. Aprahamyan is fluent in English, French and Armenian.

Prof. Dr. Bohos Rupen Aprahamyan participates in a competition for the academic position of "Professor" in the professional field 5.2 "Electrical Engineering, Electronics and Automation" in the specialty "Electrotechnologies", announced in SG, issue 93 of 11/26/2019. The competition was announced on the website of TU-Varna on November 26, 2019.

10. General description of the materials presented.

In order to participate in the competition for AP "Professor", the candidate, Assoc. Prof. Aprahamyan, submitted a Declaration of Assurance of the submitted documents; Copy of the competition announcement in the SG; CV; A copy of the diploma for PhD; Copy of the diploma for AP "Docent"; Copy of higher education diploma; Reference for the fulfillment of the minimum national requirements for the acquisition of a PhD in the field of "Technical Sciences"; Reference for the fulfillment of the minimum national requirements for occupation of the academic position "Associate Professor" in field 5. "Technical Sciences"; Draft reference for the fulfillment of the minimum national requirements for the occupation of the academic position of "Professor" in the field of Technical Sciences, containing a Reference for the scientific publications submitted for participation in the competition, a Reference for the citations submitted for participation in the competition, a Reference for textbooks and tutorials, Certificate of registration of utility models submitted for participation in the competition, Reference of the lectures during the last three academic years; Service notes for PhD students; Service notes and certificates for participation in research projects; Service notes for participation in editorial boards and scientific organizations; Documents - confirmation of the usefulness of the main results of the dissertations; Monograph work with an applied separation protocol; List of publications used in the monograph; Reference to scientific, scientific-applied and applied contributions; Abstracts of the scientific publications submitted for participation in the competition in Bulgarian; Abstracts of the scientific publications submitted for participation in the competition in English; Submitted scientific publications in full text; The submitted for the competition certificates for registration of

utility models in full text.

For participation in competition for AP Professor, according the Art. 1, para. 2 from PURZAD in TU-Varna, the applicant submitted

- Monography in English: Bohos Aprahamyan, Maria Nikolova, Vanya Zaharieva, Application of thin and nanostructured PVD coatings for protection and performance improvement of current-carrying components of electrical equipment, TU-Varna, ISBN: 978-954-20-0793-7, c. 208, 2019, COBISS.BG-ID; A list of publications included in the monograph is given. A separation protocol was presented between the co-authors, according to which Assoc. Prof. Aprahamyan has a leading role. The monographic work summarizes 17 publications in which Assoc. Prof. Aprahamyan is first author.

- 9 scientific publications in publications that have been referenced and indexed in world scientific information databases; All publications were presented at international conferences held in Bulgaria.

- 29 scientific publications in non-refereed peer-reviewed journals or in peer-reviewed collective volumes. In 14 publications the candidate is first author. Thirteen articles were published in journals and 3 articles were self-published.

- 13 citations in scientific publications, abstracted and indexed in world-famous databases of scientific information or in monographs and collective volumes; 3 citations in monographs and collective volumes with scientific review; 17 citations or reviews in non-refereed scientific peer-reviewed journals;

- 5 certificates for registration of utility models.

The submitted works were developed in the period 2009-2019, are directly related to the current competition for AD "Professor" and are in the professional direction 5.2 Electrical, Electronics and Automation.

When comparing the submitted materials with the minimum national requirements for academic position Professor

Group of indicators	Indicator	Number of requirements points	Number of points of the candidate	
A	1. Presence of dissertation for PhD	50	50	
B	3. Habilitation work - Monograph	100	100	
Г	7. Submitted 9 scientific publications in journals submitted and indexed in world scientific information databases	200	116,65	369,01
	8. Submitted 29 scientific publications in non-refereed scientific peer-reviewed or peer-reviewed journals		252,36	
Д	12. Submitted 13 citations to scientific publications, referenced and indexed in world databases	100	130	173
	13. Submitted 3 citations in monographs and collective volumes with scientific review		9	
	14. Submitted 17 citations in non-refereed scientific peer-reviewed journals		34	
Е	17. Supervisor of 3 defended PhD students	150	80	368,34
	18. 3 participations in national scientific or educational projects		30	

	23. 2 published university textbooks		20	
	24. 5 university textbooks published		38,34	
	26. 5 recognized utility model requests		200	
Ж	30. A series of lectures for the last three years in TU-Varna and in the disciplines of the professional field in which the competition was announced	120		2778

it follows that the minimum requirements for AP Professor have been met and seriously exceeded.

11. A general characteristic of the applicant's research and development activities.

Assoc. Prof. Aprahamyan's research and applied activities, which is reflected in his publications and in the projects in which he has participated, is focused on electrotechnology and is entirely in the field of competition.

I accept the applicant's main areas of research, which are summarized as:

- Experimental study of electrotechnological systems (industrial and environmental) and electromagnetic and thermal phenomena in terms of management and organization of the production process - the discovery of new knowledge and the expansion of knowledge in the scientific field.
- Development of methodology for scientific and applied research in the creation of automated systems for design and modeling of electrotechnological processes and devices, including their control systems; Modeling of processes and devices for induction heating; Modeling of processes and work of electrotechnological devices - electromagnetic separators; Modeling and producing of electrotechnical devices using nanotechnology.
- Theoretical analysis of processes in electro-technological and in particular electrothermal devices.
- Investigation of the peculiarities of the operation of induction systems with flat inductors, of specialized electric furnaces for high temperature heating and melting; of elements and circuits for control of technological devices.
- Development of models of heat treatment devices; supply sources for specialized electric resistance furnaces; of electrical equipment, apparatus and equipment used in industrial technologies for environmental protection and restoration.
- Application of nanomaterials and nanotechnologies in electrical engineering.

Official service notes and certificates are presented for participation of Assoc. Prof. Aprahamyan in 3 national scientific projects; 16 state-funded research projects, 4 of which are for funded of scientific forums; 10 R&D projects.

Assoc. Prof. Aprahamyan participates as an expert in a project under the Operational Program Innovation and Competitiveness and he is a member of the editorial board of the Proceedings of TU-Varna since 2013; He was a member of Editorial Board of Scientific works of VVMU Vaptsarov-Varna in the period 2003-2010, Member of the Scientific Council of Reviewers of the Journal of Marine Technology and Environment of Constanta Marine University, Romania since 2008, Member of the National Coordination Council for Nanotechnology.

Assoc. Prof. Aprahamyan's research and implementation activities define him as a scientist with high theoretical and practical knowledge, potential and experience in order to successfully deal with research tasks and teaching. He is the holder of 5 recognized requests for utility model. His participation in editorial boards in national and foreign editor board, as well as his expert activities, shows the recognition of Assoc. Prof. Aprahamyan among the

scientific societies at home and abroad.

I believe that the research and implementation activities of Assoc. Prof. Aprahamyan fully meet the requirements for occupation of Professor AD.

12. Evaluation of the applicant's pedagogical training and activities

Assoc. Prof. Aprahamyan is a well-known lecturer at the Faculty of Electrical Engineering at TU-Varna, presenting lectures at a professional level in major disciplines such as Electrotechnology, Nanomaterials and Nanotechnology in Electrical Engineering, Electromechanical Systems, etc. for the students educated for Professional Bachelor's Degree, Bachelor's Degree, Bachelor's Degree in Bulgarian and English. He is the author of 2 university textbooks and 5 tutorials.

Assoc. Prof. Aprahamyan is a supervisor of a total of 9 PhD students, 3 of whom have defended their dissertation. One of the defending PhD students has been supervised and the other two were a co-supervised by Prof. Aprahamyan.

I consider that his activities and teaching work fully meets the requirements for occupation of AP Professor.

13. Key scientific, scientific-applied and applied contributions

The major contributions to the work of Assoc. Prof. Aprahamyan are in the category of creation of new research methods and technologies in the field of electrical technologies.

I accept the applicant's reference to the major contributions to his works, which are of a scientific, scientific-applied and applied nature and can be summarized as follows:

A. SCIENTIFIC AND SCIENTIFIC-APPLIED CONTRIBUTIONS OF MONOGRAPHY

1. A new technology for deposition of nanostructured coatings and nanostructured superlattices with different thickness, number of layers, coating composition on Ag / CdO metal alloy bodies contacting electrical appliances has been developed.
2. The technological parameters and their influence on the process of obtaining solid, wear-resistant and corrosion-resistant nanostructured coatings and superlattices of Ti / TiN, Ti / TiC and Ti / TiN / TiC types on the contacts of electrical apparatus are determined.
3. New facts have been experimentally obtained regarding the type and characteristics of the composition, structure and properties of Ti / TiN, Ti / TiC and Ti / TiN / TiC type coatings and superlattices on contacts of Ag / CdO metal alloy electric apparatus.
4. Methods have been developed and laboratory stands have been developed to study the electrical resistance, to determine the total contact resistance, to compare the temperature of the contacts in the established working condition of the test specimens of the contacts of electrical apparatus;
5. A methodology has been developed and a laboratory facility has been developed to study the time of combustion of an electric arc when opening the contacts of electromagnetic contactors.
6. Confirmation data have been obtained that thin-film and nanostructured PVD (Physical Vapor Deposition) coatings can be successfully applied to improve the corrosion resistance of conductive busbars as well as to improve the electrical resistance of electrical contacts to electrical apparatus.

B. SCIENTIFIC AND SCIENTIFIC-APPLIED CONTRIBUTIONS OF THE SUBMITTED PUBLICATIONS

1. Confirmation data were obtained on the technological peculiarities of the process of obtaining resistive coatings on a ceramic substrate by applying two different technologies - magnetron sputtering of the resistive layer and applying the resistive layer by screen printing.

(Publications Г.8.22., Г.8.28.)

2. Confirmation data were obtained and the influence of electrical parameters (current and voltage), temperature and some design parameters on the electrolysis process and the performance of generators (Brown gas) evaluated. (Publications Г.7.1., Г.8.19.)

3. Computer models have been developed for the study of inductor-detail systems for volume and surface heating for realization of technological processes with set parameters. (Publications Г.8.4., Г.8.5., Г.8.7., Г.8.8., Г.8.10., Г.8.12., Г.8.15., Г.8.16., Г.8.23., Г.8.26.)

4. Permanent magnet separators for the separation of ferromagnetic particles, of different size and shape, from products used in various fields of industry have been investigated. (Publications Г.7.2., Г.7.3., Г.7.4., Г.7.5., Г.7.6., Г.7.7., Г.8.9., Г.8.11., Г.8.20., Г.8.27.)

5. Specific methods for the study and control of electrical machines and apparatus have been developed. (Publications Г.8.1., Г.8.2., Г.8.3., Г.8.25, Г.7.9.)

6. A methodology for the selection of peristaltic pumps for use in process installations for the transportation of chemicals for the treatment of viscous products and vegetable oils is proposed. (Publications Г.7.8., Г.8.24.)

7. Photovoltaic modules and systems have been investigated. (Publications Г.8.17., Г.8.18., Г.8.21.)

8. LED systems are studied. (Publications Г.8.6., Г.8.13., Г.8.14.)

C. APPLIED CONTRIBUTIONS

1. An original surface heating element with an amorphous resistive layer having a negative temperature coefficient of change of the specific resistance and a relay characteristic of the dependence of the specific resistance on the temperature with two steady states recognized for the invention has been developed (patent No 48677/1989).

2. The possibility of applying ceramic-based surface elements with an amorphous resistive layer as resistive sensors in electronic circuits for measuring fluid velocity and temperatures up to 500 ° C was investigated. Prototypes of electronic thermometer and electronic anemometer have been developed. The originality of the developments was confirmed by a certificate for utility model No 1523, No 002037 / 15.07.2011, published in the Official Bulletin of the Patent Office, No. 1, 2012, p. 37

3. Separators have been developed and tested. A method for optimizing the technological process of purification in the treatment of products of biological character is proposed.

4. Methodological foundations for the study of new materials (nanostructured superlattices) developed with new technologies (application of nanostructured coatings and superlattices of Ti / TiN, Ti / TiC and Ti / TiN / TiC on Ag / CdO alloy contacts) have been established, evaluated qualitatively and quantitatively and suitable for creating new contacts of electrical apparatus. The originality of the developed contacts is confirmed by evidence of useful models:

- Electrical contact part of electrical apparatus, certificate for utility model. No 1438, No 001879 / 04.11.2010, published in the Official Bulletin of the Patent Office, No. 4, 2011, p. 57.

- Contact of electrical apparatus, certificate for utility model, No 2001, No 002647 / 21.10.2013, published in the Official Bulletin of the Patent Office, No. 11, 2014, p. 59.

The publications are sufficient in volume, scientific level, promotion at national and international level and fully represent the candidate's educational and research activities.

The quantitative indicators of the minimum national requirements for the occupation of the academic position of Professor are fully covered, some of which are significantly exceeded.

14. Significance of contributions to science and practice

The relevance of research in the field of electrotechnology makes teaching and research, as well as the works of Assoc. Prof. Dr. Bohos Aprahamyan significant for science, industry and education.

Opinions on the applicant's implementation activities are presented

- TK "Orgtechnica" – Silistra for tests of surface heating elements on ceramic and anodized aluminum substrates, which resulted in the creation of a new construction of an electronic product of special production;

- Technological center "CNIKA" – Plovdiv on the incorporation of ceramic - based surface heating elements into an electronic device.

Certificate from Orgtechnika AD-Silistra for the use of surface heating elements in products of TKOT-Silistra was presented.

Confirmation letters are presented from

- „Pomorie AD - Pomorie for the utility and applicability of the main results of the dissertation on "Modeling the processes of induction heat treatment" with author Eng. Mike Strelbau;

- Elika-Elevator Ltd. - Silistra for the usefulness and application of the main results of the dissertation on "Modeling of Permanent Magnetic Separators" with author Tatiana Dimova.

With the Prof. Aprahamyan's efforts, the foundations of the Research Laboratory for Electrotechnology at the Technical University - Varna, located in 102UPB and 240UPB laboratories of the Department of Electrical Engineering and Electrotechnology have been developed, and in 2013 a doctoral program Electrotechnology and nanotechnology in electrical engineering were accredited.

15. Critical remarks and recommendations

I have no general critical remarks, but I do have some formal remarks to the documents for participation in the competition as

- Attached references and documents such as declarations, etc. are not signed.

- Textbooks and teaching aids are not attached to the documents, but are presented additionally electronically.

- Autoreferat for PhD is not presented.

- It would be good to provide IF or SJR to the publications.

- The presentations of the scientific, scientific-applied and applied contributions are very detailed.

- There are some inaccuracies in the materials such as the citation of the publication D.8.30, which does not exist.

16. Personal impressions and opinion of the reviewer

I have personal impressions of the research work of Assoc. Prof. Aprahamyan. I have been a reviewer of some of his articles and research projects, as well as of his monograph work.

Over the years, he has established himself as a leading specialist in the field of electrical technology with a keen interest in seeking out innovations and incorporating them into his academic and research work.

CONCLUSION

The presented materials in the competition for AD Professor allow to evaluate the teaching and research activities and the qualities of the candidate - Assoc. Prof. Dr. Bohos Rupen Aprahamyan and to designate him as a highly qualified and recognized scientist in the field of electrical technology with national and international authority. The minimum

requirements for occupation of the academic position of "Professor" in the professional field 5.2 Electrical Engineering, Electronics and Automation at TU-Varna, which meet the minimum national requirements according to ППРАРБ are exceeded.

Based on the knowledge of the presented scientific works, their significance, the scientific-applied and applied contributions contained therein, I found it reasonable to propose

Assoc. Prof. Dr. Bohos Rupen Aprahamyan

to take the academic position "professor" in the professional field 5.2 "Electrical engineering, electronics and automation" in the specialty "Electrotechnology" for the needs of Technical University of Varna.

Date: 6.03.2020

Reviewer:

/Prof. I. Marinova/