

SCIENTIFIC REVIEW

on a contest for the occupation of an Academic Position 'Professor' in professional field: **5.2. Electrical Engineering, Electronics and Automation**, scientific specialty: "**Electro-technology**", published in the **State Gazette No 93 / 26.11.2019** with the candidate **Assoc. Prof. Dr. Eng. Bohos Aprahamyan**
Member of the Scientific Jury: **Prof. Dr. Vencislav Cekov Valchev**

1. General information and biography background

The competition for AP "Professor" is announced based on the proposal of the Departmental Council of the ETET Department, confirmed by a decision of the Faculty Council of the Faculty of Electrical Engineering of TU-Varna and later by the Academic Senate of TU-Varna. The only candidate submitting an application set is Assoc. Prof. Dr. Bohos Aprahamyan. After consideration of the submitted documents, the applicant is admitted to the competition.

Prof. Dr. Eng. Bohos Aprahamyan received his secondary education at the Frederic Joliot-Curie IV HS in Varna in 1980 with excellent marks. He was enrolled at VMEI- Varna in 1982 and graduated with a Master's degree in Electrical Machines and Appliances in 1987. He was awarded two gold badges – in 1984 and 1985.

He starts a full-time doctoral degree at VMEI - Varna. In 1992 he successfully defended his doctoral dissertation in the scientific specialty "Electro-technologies" with the title: "Development and research of surface heating elements on a ceramic basis".

During the period 1990 - 1997 he worked as a part-time lecturer in various departments of the Faculty of Electrical Engineering at VMEI- Varna. The candidate is Associate Professor since 2001 - in "Electro-technology". He was elected by the Higher Attestation Commission according to the Law on Scientific Degrees and Scientific Titles and was appointed as a full-time lecturer with a permanent contract - associate professor at Varna Navy School - VVMU. In 2009 he was elected as an Associate Professor at the Technical University of Varna, Department of Electrical Engineering and Electro-technology, Technical University of Varna.

Assoc. Prof. Eng. Bohos Aprahamyan was elected for Dean of the Faculty of Electrical Engineering at TU Varna for a mandate from 2019 to 2023. He is also the administrative director of the Lifelong Learning Directorate (LLD).

He is a member of the Academic Senate of TU Varna for the term of 2019-2023.

2. General description of the presented materials

Meeting of the minimum national requirements for applicants for the Academic Position 'Professor', by groups of indicators:

Indicator A: Presence of a dissertation work for awarding the Doctoral Academic Degree: B. Aprahamyan, "Development and study of surface heating elements on a ceramic basis", TU-Varna, 1992. Dissertation for the Doctoral Academic Degree.

Indicator group B. At least 100 points (*B.3 or the sum of the points under B.4*)

Monograph book is presented:

Bohos Aprahamian, Maria Nikolova, Vanya Zaharieva, Application of thin and nanostructured PVD coatings for protection and performance improvement of current-carrying components of electrical equipment, monograph, TU-Varna, ISBN: 978-954-20-0793-7, p. 208, 2019.

The monographic book has a volume of 208 pages and is on the subject of the competition. It was co-authored with two other co-authors. The separation protocol regulates the participation of all authors. Prof. Dr. Eng. Bohos Aprahamyan has 55% participation. The subject and material, presented in the monographic book, is related with 17 previous publications.

Indicator group Г. At least 200 points (*Sum of Г.5 to Г.11*)

Indicator Г.7. Scientific publications that are referenced and indexed in world-renowned scientific information databases. There are 9 publications in Scopus databases, with a total of 117 points.

Indicator Г.8. Scientific publications in non-refereed peer-reviewed journals or in edited collective volumes. 29 publications were presented, totally 252 points.

Indicator group Д. At least 100 points (*Sum of Д.12 to Д.15*)

Indicator Д.12. Citations or reviews in scientific publications, referenced and indexed in world-renowned databases. There were 7 publications presented, with 13 citations, totally 130 points.

Indicator Д.13. Citations in monographs and collective volumes with scientific reviews. 3 publications were presented, totally 9 points.

Indicator Д.14. Citations or reviews in non-refereed scientific peer-reviewed journals, out of 9 publications with 17 citations - 34 points.

Totally 173 points for group of indicators Д.

Indicator group E. At least 150 points (*Sum of E.16 to E.28*)

Indicator E.17. Mentorship of a successfully defended a PhD student. There are 3 students presented, 2 of which are shared with another mentor, with a total score of 80.

Indicator E.18. Participation in a scientific or educational project. There are 3 entries, with a total score of 30.

Indicator E.23. Presenting a published textbook. 2 textbooks were presented, with a total score of 13.3.

Indicator E.24. Tutorial published. 5 teaching tutorials were presented, with a total count of points 38.3.

Indicator E.26. Published patent or utility model. There are 5 items submitted, with a total number of points equaling 200.

A total of 368 points for the group of indicators E.

After reviewing the publications provided, **I accept for review all of the applicant's publications, patents, models and monograph book.**

The candidate has participated in numerous scientific projects on the subject of the competition: in 3 national and 12 others, financed specifically by the state budget (internal for TU Varna projects), of which 2 doctoral projects. Assoc. Prof. Dr. Bohos Aprahamyan has been the leader of 9 projects in total. It is noteworthy, however, that the share of international and national projects is relatively small.

After reviewing the applicant's publications, citations and other activities, I submit the following report on the fulfillment of the conditions for acquisition of the AP "Professor" by the AHE (Area of High Education) "5. Technical Sciences ", Table 1.

Table 1. Report on Assoc. Prof. Dr. Bohos Aprahamyan, PhD, on Covering the Minimum Conditions for Acquisition of "Prof." JSC by the Indicator Groups for the AHE "5. Engineering Sciences"

Group of indicators	Content by indicators	Minimum requirements for acquisition of AP Professor	Points of Assoc. Prof. Bohos Aprahamyan
A	Indicator 1	50	50
Б	Indicator 2	---	---
B	Indicator 3 or 4	100	100
Г	Sum of Indicators from 5 to 11	200	369
Д	Sum of Indicators from 12 to 15	100	173
E	Sum of Indicators from 16 to 28	150	368
Ж	Indicator 29	120	200

In conclusion, after comparing with the requirements: the candidate Assoc. Prof. Dr. Eng. Bohos Aprahamyan meets all groups of indicators for AP "Professor" of the minimum national requirements.

3. General characteristics of the applicant's scientific activities and scientific-implementation activities

The applicant has participated in over 13 scientific research projects to date.

He has over 140 publications in total, of which over 80 are in English.

Prof. Dr. Eng. Bohos Aprahamyan has been an active member of the National Nanotechnology Coordination Council - since 1999; he is a member of the EUEB; of the Federation of Scientific and Technical Unions in Bulgaria (FSTUB) - Varna Branch and of the Union of Scientists in Bulgaria (USB) - Varna Branch.

The applicant's scientific research and scientific implementation activity is in the field of electro-technology and is entirely in the field of competition - the field of electro-technology.

The main areas of research in which the applicant works are:

1. Modeling and simulations of the processes and the structure of electro-technological devices;
2. Experimental study of electro-technological systems and their control and place in the organization of the production process;
3. Research and improvement of elements, circuits and devices for control of technological processes;
4. Theoretical modeling, simulations and analysis of thermal and electromagnetic objects and processes;
5. Modern applications of nanomaterials and nanotechnology in electrical engineering, electro-technology and in electrical apparatus.

Assoc. Prof. Dr. Bohos Aprahamyan has actively participated in the organization of scientific forums. He has been chairman and member of organizing committees of over 15 international conferences. The conference ELMA2019 stands out, organized by TU Varna under the aegis of IEEE with the main organizer being the candidate.

My overall assessment of the applicant's scientific and scientific - implementation activities is excellent.

4. Assessment of the candidate's pedagogical experience, ability and activities

Prof. Dr. Eng. Bohos Aprahamyan is an experienced lecturer with many years (29 years) of teaching at two universities (TU Varna and Navy School VVMU Varna).

The teaching activity of the applicant is in the field of Electro-technology (i.e. the same as the competition field). These are the disciplines: "Electro-technical devices for environmental purposes", "Electro-technologies", "Nanomaterials and nanotechnologies in electrical engineering" "Special course in electro-technology".

In recent years he has given in 2 disciplines at the Professional Bachelor's Degree, 9 courses at the Bachelor's Degree, and 6 at the Master's Degree. These disciplines far exceed the requirements of national minimum metric indicators.

The presented information about the published teaching tutorials and materials on the subject of the competition (2 textbooks and 5 teaching tutorials) is a good attestation for candidate's work as a leading lecturer at the Faculty of Electrical Engineering at TU Varna.

Textbooks:

1. Angelov N., Aprahamyan B., etc, "Electrical Engineering", textbook, VVMU "N. Vaptzarov, Varna.

2. Aprahamyan B., etc, "Electrotechnical Materials and Elements", VVMU "N. Vaptzarov, Varna.

Assoc. Prof. Eng. Bohos Aprahamyan has supervised 10 PhD students, 9 of which are from the Technical University - Varna and one from the VVMU "NY Vaptzarov". The applicant already has 3 successfully defended PhD students. So far, the candidate has over 30 successfully defended graduates. These facts show that the applicant has a perspective built his own group in the scientific field.

My overall assessment of the applicant's pedagogical preparation and activity is excellent.

5. Basic scientific and scientifically-applied contributions

The submitted scientific work of the applicant is mainly focused on the field of electro-technology (i.e. the same as the competition).

Scientifically-applied contributions contained in the monograph work:

1. A number of studies and planned experiments have been carried out and scientific conclusions have been drawn for proposed new coatings in electrical technology. Scientific experiments have been conducted to prove the proposed approaches for:
 - innovative technology for deposition of nanostructured coatings and nanostructured super-lattices of different thickness, number of layers, coating composition (Ti / i, i / TiC) on Ag / CdO on body contacts made of metal alloy Ag/CdO at electrical appliance contacts. A vacuum installation was used for verification;
 - innovative wear-resistant and corrosion-resistant nanostructured coatings and super-lattices of Ti / TiN, Ti / TiC and Ti / TiN / TiC types on contacts of electrical appliances;
 - the influence of thin-film and nanostructured PVD coatings to improve the corrosion resistance of the respective electrical apparatus;
2. Laboratory experimental systems have been set up and methodologies have been proposed to investigate the parameters and characteristics of:
 - the process of burning an electric arc after opening the contacts of electromagnetic contactors;
 - the influence of the qualities of a protective coating of current- leading parts on the change of the surface layer of the material;
 - when examining test specimens of contacts of electrical appliances (electrical wear resistance, total contact resistance, contact temperature in the established operating state).

Scientific and implementation contributions of the publications, submitted for participation in the competition:

1. Multi-physical mathematical models (both experimentally and through 2-D models) have been developed, analyzed and applied for:
 - study of inductor-part systems for volume and surface heating for realization of technological processes with set parameters;
 - permanent magnet separator devices for separating ferromagnetic particles of different size and shape.
 - control of electrical appliances through a smartphone and introduction of new technologies in the control process (web based applications).
2. Confirmatory data is received on major dependencies and specific applications of:
 - photovoltaic modules and systems;
 - LED systems;
 - peristaltic pumps, used in technological installations;
 - resistive coatings on a ceramic substrate by two different technologies - magnetron sputtering of the resistive layer and applying the resistive layer by screen printing;
 - defective-arc protective devices in the ship's electrical systems;
 - some electrical machines.

Application and implementation contributions:

1. An innovative surface heater with an amorphous resistive layer has been developed and proposed (Copyright certificate N48677 / 1989).
2. The possibility for applying of surface elements as resistance sensors for high temperatures (up to 500 C) was investigated. (utility model patent 1523)
3. Innovative heating elements have been implemented (opinions of TC Orgtecnica - Silistra and CNIKA - Plovdiv).
4. Innovative heating elements have been implemented, formed by magnetron sputtering of the resistive layer (opinion of Chrom, Silistra).
5. The foundations of an innovative laboratory for "Electrotechnologies" at the Technical University of Varna have been laid, providing:
 - Vacuum installation for cathodic sputtering;
 - Plasma coating system;
 - Induction system GI-25;
 - Electric resistance furnace;
 - Complex of laboratory stands for nanoscale research and more.

My overall assessment of the applicant's contributions is that they are completely sufficient and fully meet the requirements of the AP Professor, in AHE "5. Technical Sciences".

6. Importance of the contributions for science and practice

The importance of contributions for science can be judged by the number of publications in the SCOPUS database (20 items visible on 2/24/2020), as well as the Hirsch index in SCOPUS (h-index = 2, on 2/24/2020).

The importance of the contributions to the practice can be directly judged by the applicant's strong implementation and patent activity (utility models).

The quantitative indicators of the criteria for occupation of AP 'Professor' in the AHE 'Technical Sciences' have been met.

7. Critical notes and recommendations

I have no significant comments on the materials provided in the competition for AP "Professor".

I recommend to Assoc. Prof. Dr. Eng. Bohos Aprahamyan, as a future professor:

- To concentrate on publishing in valuable impact journals with impact factor. This will improve the candidate's citation and prominence as well as support TU-Varna for better ranking in rating systems;
- To concentrate on setting up his own scientific group, consisting of his PhD students, defended and still running, graduate students, i.e.
- To be the leader of this scientific group and to work with it to attract funds for TU Varna from national and international projects.

8. Personal impressions and opinion of the reviewer

I have known Assoc. Prof. Aprahamyan from my student years and later as a colleague at TU Varna. I am also familiar with his scientific research and teaching activities, and partly with the projects he works on. My complex impression is that over the years, Assoc. Prof. Dr. Bohos Aprahamyan has shown his high responsibility and diligence in performance of the academic and scientific tasks and teamwork.

CONCLUSION

The submitted scientific and academic production and the preparation of the applicant's documents are in accordance with the LDACRB and the Rules for its application in the section for 'Professor' AP. Applicant's contributions and science-metric data are sufficient for Professor AP in the AHE 5. Technical Sciences.

My personal impressions and information about the applicant's work are sufficient to consider that his scientific contributions are his main work.

Based on the detailed acquaintance with the submitted scientific works, the declared scientific-applied and scientific contributions, the active organizing activity in scientific forums and the fulfillment of the minimum national requirements, I find it justified to propose Assoc. Prof. Dr. Bohos Aprahamyan **to take up an academic position 'Professor'** in Professional Degree 5.2 Electrical Engineering, Electronics and Automation, Department ETET, Faculty of Electrical Engineering, Technical University - Varna.

24 Feb. 2020
TU - Varna

Member of the Scientific Jury:
/ prof. Dr. Eng. Vencislav Cekov Valchev /