

OPINION

Университет
"Проф. Д-р Асен Златаров"
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on a competition to occupy an academic position "Associate Professor" In field of higher education 5. "Technical Sciences", professional direction 5.2 "Electrical Engineering, Electronics and Automation", scientific specialty "Elements and devices of automation and computing (Sensors and sensor devices)", declared in the State Gazette, issue 93/26.11.2019 for the needs of the "Prof. Assen Zlatarov" University

with the candidate **Eng. Ivaylo Raychev Belovski, PhD, chief assistant professor**
Reviewer: Siya Lozanova, PhD, Professor, Institute of Robotics - BAS

1. Research, scientific and pedagogical activity, participation in projects and others of the applicant

The peculiarities of the research, scientific and educational activity of Ch. Assist. Prof. I. Belovski, Phd is determined by his professional activity in fields such as sensors, transducers and devices, and semiconductor electronics. His main areas of interest include the development and application of methods and tools to assist and improve students' learning process by studying the characteristics of basic semiconductor devices - diodes, transistors, Hall sensors, magnetotransistors, Peltier and Seebeck elements, and more. Also of decisive role are the methods developed by the applicant for testing thermoelectric refrigerators and generators using thermo-magnetic and thermoelectric effects, as well as their mode of cooling and generation of thermoelectric power units. Innovative apparatus and automated systems for the implementation of the original methods and technologies proposed by Dr. I. Belovski in the field of cooling systems have been developed. He has also developed suitable didactic approaches for synthesizing laboratory productions for use with electronic analog and digital voltmeters, low frequency measuring generators, electron beam oscilloscopes, and more with the focus of the students' educational platforms. The wide-ranging scientific style of the candidate stands out and is confirmed in a large part of his research and applied activities, which is in line with the current trends in the development of electrical engineering, electronics and automation, which are key for the country and in particular the "Prof. Assen Zlatarov" University.

In order to participate in the competition for the academic position of Assistant Professor, the applicant submitted 29 works, of which 1 monograph, 3 manuals for laboratory exercises, 7 scientific papers in editions, refereed and indexed in Scopus and 21 scientific publications in non-refereed journals, from abroad. 1, in our country 12, reports of conferences abroad 3 and in Bulgaria 5. In their communicativeness, as can be seen from the attached table, the candidate fully meets the minimum national requirements for the position of "Assistant Professor", and in some of the characteristics beat them sciatica. Therefore, the participation of Dr. Eng. I. Belovski in the competition is completely legitimate.

2. Scientific, applied and applied contributions to the applicant's writings

In my estimation, the contributions are mostly scientific and scientifically applied character

In their dominant part, they are proving new and confirmatory facts in existing scientific problems and theories. In the candidate's monograph work and publications, achievements include:

1. A series of theoretical-experimental models of thermoelectric cooling systems based on the single-stage and cascade-coupled Peltier - Seebeck modules constructed by the regression analysis method is formulated. An analytical mathematical model has been synthesized for the needs of the industry, allowing the simulation of the work of various multi-component Peltier modules. A method is proposed for calculating their basic parameters and simulating them using the MATLAB.

2. The thermal resistance of a cooling radiator in a thermoelectric pump has been optimized by the finite difference method and a user application has been created to calculate the basic thermo-physical parameters of Peltier modules.

3. For the first time, neural networks and intuitionistic fuzzy sets have been applied to thermoelectric systems. Generalized network models of neural networks and algorithms for their training have been developed. Networks with different purpose are used to predict the reactions of thermoelectric cooling and generator modules and systems.

4. A neural network for recognizing the thermoconducting interface in a thermoelectric pump is proposed. Based on these results, a thermoelectric battery was synthesized from Peltier and Seebeck modules. Using neural networks, models have been formulated to predict the generated thermoelectricity of each module as a function of temperature difference.

In my opinion, contributions 3. and 4. are the most significant in the applicant's research.

5. In the field of sensors, among the many useful results, I highlight the most significant two - a design and prototype of a multi-sensor system for reading environmental parameters is presented and a technical solution of a thermal warning device for the blind has been developed, which has a significant impact on people with specific needs.

The number of lectures given by students studying at the Bachelor of Arts in the last three years, according to the documents, is 466 hours. The average classroom teaching activity is 471 hours and the average total employment is 626 hours. For students at the Master's Degree Program, the candidate has conducted exercises for the past three years with an average classroom work of 97 hours.

Dr. I. Belovski presented papers for participation in 8 research and educational projects at NIS of the "Prof. Dr. A. Zlatarov" University and TU-Gabrovo, one external, one international, one to the National Science Foundation and three educational projects.

Reference is made to 12 citations, 10 of which are in scientific publications, referenced and indexed in the world-renowned Scopus and Web of Science databases, and 2 in monographs and non-refereed journals with peer review.

The manuals prepared with the active participation of Dr. I. Belovsky provide clear and well-substantiated material for students in the field of electronics, both theoretical and applied, by synthesizing laboratory productions for working with electronic analog and digital voltmeters, low frequency measuring generators, electron beam oscilloscopes, etc. Qualified and didactic experience of the candidate presents theoretical notes to each exercise about the nature of the processes, which is a prerequisite for successful mastery of the study material. Methods for testing thermoelectric refrigerators and generators are competently developed. For better absorption of information on this topical topic, many experimental models and prototypes have been implemented. The manuals are intended for curricula in the subjects "Electronics", "Automotive Electronics" and "Computer Systems and Technologies" of Burgas University. I believe that the pedagogical preparation and teaching activity of the applicant meet and significantly exceed the requirements of the announced competition for associate professor.

In conclusion, I commend the importance of Dr. I. Belovski's contributions and results for research and practice.

3. Critical notes and recommendations

As a recommendation, I would point out that some of the results achieved should be further developed and patent protected, which is related to the procedures for implementing the relevant original solutions in the industry. It is appropriate that the results related to thermoelectric cooling systems based on single-stage and cascade-coupled Peltier - Seebeck modules be appropriately summarized and presented as separate monograph work. The applicant's author's background should be presented in a more analytical and concentrated way, with emphasis on the original productions. I will also note that the studies are correct from the point of view of metrology.

I have no joint work with the candidate and we are not related persons.

FINAL CONCLUSION

Based on the submitted scientific papers, their originality, the scientific and applied contributions contained therein, the teaching-methodical results and the teaching-teaching activity, I consider that the applicant meets the high requirements for "associate professor", typical for the "Prof. Dr. Assen Zlatarov" University.

As a result of the above, I firmly propose to the Honorable Scientific Jury Ch. Assistant Professor Eng. Ivaylo Raichev Belovski to be offered for the choice of the academic position of "Associate Professor" in the professional field 5.2. Electrical engineering, electronics and automation, scientific specialty "Elements and Devices of Automation and Computer Engineering (Sensors and Sensor Devices)" at the "Prof. Dr. Assen Zlatarov" University.

20.02.2020
Sofia

Gave an opinion:

/Eng. S. Lozanova, PhD, Professor/