REVIEW

by Anna Vladova Stoynova, PhD, Professor at the Technical University - Sofia

of the materials submitted for the competition

to occupy the academic position of 'Associate Professor'

at Paisii Hilendarski University of Plovdiv

in the field of higher education 5. Technical sciences, professional field 5.2 Electrical engineering, electronics and automation, (Electronic Circuit Theory and Electronic Circuitry)

In the competition for 'Associate Professor', announced in the State Gazette, issue 31 of 12th April 2019, and on the website of the Paisii Hilendarski University of Plovdiv for the needs of the Faculty of Physics and Technology (FPT), at the Department of Electronics, Communications and Information Technology, Assistant Professor Sotir Ivanov Sotirov from Paisii Hilendarski University of Plovdiv, **who meets the relevant minimum national requirements, participates as a candidate.**

1. General presentation of the materials received

With Order No. P33-2887 of 11.06.2019 of the Rector of Paisii Hilendarski University of Plovdiv (PU) I was appointed for a member of the scientific jury of the competition for the occupation of the academic position of **Associate Professor in PU** in the field of higher education 5. Technical sciences; professional field 5.2 Electrical engineering, electronics and automation (Electronic Circuit Theory and Electronic Circuitry), **announced for the needs** of the Department of Department of Electronics, Communications and Information Technology at the Faculty of Physics and Technology. By decision of the Meeting of the Scientific jury, Minutes No. 1 21.06.2019 I was appointed as a reviewer in this competition.

The presented set of materials in paper and electronic form, prepared by Senior Assistant Professor, PhD, Sotir Sotirov *is in compliance* with the Rules for Development of the Academic Staff of PU, and includes the following documents:

- Application form addressed to the Rector for admission to the competition;
- CV (European format);
- Copies of the Master's Degree Diploma and the Doctor of Philosophy Degree Diploma;
- List of scientific papers (including copies of 25 publications and a monograph: S. Sotirov, Computer Measurements of Physical Quantities, P., Koala Press, p. 170, 2019);

- Reference for compliance with the national minimum requirements for field 5. Technical Sciences (including points of the candidate per indicators from 5 to 11 (group D) and from 12 to 15 (group E), respectively;
- Abstracts of the works for participation in the competition in Bulgarian and English, including self-assessment of contributions;
- Declaration of originality and authenticity of the attached documents;
- Copies of protocols of the Departmental Board, Faculty Board and Academic Board in connection with the competition;
- Copy of SG with the announcement of the competition;
- Certificate of length of service;
- Documents for academic work (ensuring teaching work in Professional field 5.2 Electrical Engineering, Electronics and Automation);
- Documents for research work (participation in teams of 5 scientific and research projects).

The candidate Senior Assistant Professor Sotir Ivanov Sotirov, PhD submitted a total of 25 scientific works, a monograph, and a certificate for participation as a team member in 5 scientific and research projects (respectively: 1 - under the Faculty Projects Competition of PU Paisii Hilendarski; 2 - under the Scientific Research Fund competition; 1 - under OP "Increasing the Competitiveness of the Bulgarian Economy" competition; 1 - under the FP7 Program competition). I accept for review all submitted scientific works and the monograph, as well as the applicant's participation in 5 scientific and research projects.

2. Short biography of the candidate

Sotir Sotirov was born in 1977. In 2003, he graduated Bachelor's degree in the specialty Engineering physics, and in 2006 he graduated with honours Master's Degree in Electronic and Laser Engineering from PU Paisii Hilendarski. During the period 2004-2006 he worked as a physicist in the Radiation Control Department at Regional Inspectorate for Public Health Protection and Control - Plovdiv, and afterwards until 2010 he held the post of Physicist methodologist at the Laboratory for Spectral Analysis at the Central factory laboratory of KCM-AD. In the period 2010-2012 he was appointed as a physicist expert to work with specialized equipment for AFM under the project Biosupport at the PU Paisii Hilendarski. Until 2012 he is an assistant professor, and since 2015 till presently he is a Senior Assistant Professor at the ECIT department of the same university. In 2015, he was awarded a Doctoral Degree from the PU Paisii Hilendarski, in professional field 4.1 Physical sciences, after having successfully defended his Doctoral thesis entitled "Pulse laser deposition of organic dyes and examination of the resulting thin layers. Of his overall almost 14 years of work experience, 7 years comprise of his pedagogical experience in the department of ECIT, during which

he participated in 5 scientific and research projects and presented laboratory exercises and lectures in disciplines such as Analogue circuitry, Digital Circuit Technology, Optoelectronics, and "Electrical Engineering and Electronics. He is fluent in English, has skills in programming microcontrollers and working with specialized software for designing, analysing and simulating electronic circuits.

The professional biography of senior Assistant Professor Sotir Ivanov Sotirov convincingly proves that he has appropriate education and has accumulated an extensive scientific and teaching experience and contribution in the field of the competition.

3. General description of the candidate's work

3.1. Evaluation of the teaching and pedagogical work and grounds of the candidate

The candidate has been conducting classes for more than 3 years at PU Paisii Hilendarski, leading classes (lectures and laboratory exercises) in the following disciplines in the scientific field of the competition: Analog Circuits, Digital Circuits, Optoelectronics, Electrical Engineering and Electronics. His joint research with scientists from various organizations and educational institutions is impressive. This confirms his good communication skills and teamwork skills. I think the teaching qualification of Senior Assistant Professor Sotir Ivanov Sotirov, PhD is undoubted and he covers the necessary requirements to engage in pedagogical activity. It should not be underestimated also the experience gained by the candidate during his work in different companies. This is often the missing detail in the professional development of many university professors, so necessary to build a balance between the sought by and offered knowledge and skills to the students.

2.2. Evaluation of the research and applied scientific work of the candidate

The allocation of the 25 scientific papers is as follows:

- 4 in Bulgarian and 21 in English language;

- 9 in referenced journals (such as IEEE Transactions on Dielectrics and Electrical Insulation with SJR (2018) = 0.682, Q1; Optical Materials with SJR (2013 and 2018) = 0.758 and 0.503, Q2; Journal of Physics: Conference Series with SJR (2016 and 2017) = 0.24, Q3; Bulgarian Chemical Communications with SJR (2015-1pc and 2016-3pc) = 0.15, Q4);

- One chapter of a collective monograph, published by Nova Science Publishers, New York;

- 5 in collections of conference reports included in the RB reference list;

- 5 in serial collections with reports from international conferences such as, Proc. of SPIE and AIP Series;

- 1 in a collection of review articles, published by PU Paisii Hilendarski;

- 2 in collections of reports from International conferences abroad;

- 2 in referenced collections of reports from International conferences abroad;

The main scientific, applied and methodological contributions of Sotir Sotirov, PhD are in the field of:

- Specialized measurements - morphology, topology and chemical composition, characterization and analysis, by means of atomic force microscopy and infrared, optical, scanning electronic, energy-dispersive X-ray and Raman spectroscopy, of:
    - polyelectrolyte multilayer structures of natural polymer [1-4, 6-8, 10, 22, 23] for development and improvement of methods for obtaining and modifying their properties and creating new opportunities for obtaining structures with controlled adhesion and prolonged release of medicines;
    - metal oxide layers (MOx, M: titanium, magnesium) and diamond-like carbon (DLC) synthesized by pulsed laser deposition at room temperature and low vacuum [19]. The effect of the substrate on the structure of the DLC layers was investigated;
    - Mg-paclitaxel hybrid nanocomposite coatings deposited on 316LVM stainless steel stents by a new laser adaptive ablation (LAAD) method to create active cardiovascular implants [21] ;
    - inorganic-organic nanocomposite coatings through a new modification of the LAAD process [20]. Investigation of the functional properties of the organic component before and after the process and identification of the presence of Mg in the resulting coatings of hybrid nanocomposites. Deposition of materials with different physicochemical properties, as well as synthesis of complex hybrid nanocomposites was achieved.
- Design of a new type of nanocomposite PANI/PDLA ammonia sensor [5] with high response/recovery rate, high sensitivity, good reproducibility and stability in the concentration range from 10 ppm to 1000 ppm.
- Investigation of the effect of gamma irradiation on the electret stability of polymer films of polypropylene and polyethylene terephthalate [9]. As a result of the study, the dependence of the surface potential on factors such as crown polarity, material type, and radiation dose was determined.
- Development of advanced computer devices:
    - for accurate measurement of the piezoelectric coefficient d_{33} in thin layers several μm thick [11, 12] for educational and scientific purposes;

- wireless microprocessor-based system for measuring voltage-current and power characteristics of PV with voltage up to 22V and maximum output current up to 1A in both laboratory and field conditions, with measurement accuracy of voltage of 4 mV and of the current 1mA [13 , 14];
- a microprocessor system for measuring surface potential with sensor EFS-22D [15, 18] having a measuring range from 0V to 900V, at a distance between the sample and the probe surface from 1mm to 3.5 mm and creating a user software to be applied in the university education in physics and electronics;
- a wireless system [17] for measuring temperature in the range from -40°C to +80°C and relative air humidity in the range from 0% - 99% for server rooms and information centers, with accuracy of humidity measurement +/- 2% and of the temperature of +/- 0,5°C, with the possibility of mounting the measuring module on any place for optimizing the operation of air-conditioning and ventilation systems;
- a wireless microprocessor-based system for measuring temperature in the range from 0°C to + 1023.75°C [24] with a sensitivity of 0.25°C, with a wireless bluetooth interface for transmitting information, which extends the possibility of using the system in larger number of industrial applications;
- an on-board vehicle diagnostics system [25] in which the digital data from the vehicle electronic unit is transmitted to a smartphone via a Bluetooth module, where they are visualized in a user-friendly manner, with the possibility of using the device as an additional measuring device to the available vehicle equipment.

- Methodological research and implementation of mobile technologies in education - development of an approach for the implementation of QR codes in the teaching of electronics in higher education [16], to adapt the learning process to the speed of work of each student, which creates greater flexibility and convenience in the teaching process.

In "Computer Measurements of Physical Quantities", presented as a monograph, the author Sotir Sotirov examines the basic theoretical and practical aspects in the development of computerized measurement systems. Particular attention is paid to the role of microcontrollers in measuring devices and the main digital interfaces for communication between them and specialized digital ICs. Special software developed by the author for visualization and mathematical processing of the obtained results and their user interfaces are presented. An in-depth analysis of the design and sizing of the main

units and modules has been carried out. 75 literary sources are quoted, in five of which Sotir Sotirov, PhD is a co-author. The monograph includes 5 chapters related to the measurement of photovoltaic panel characteristics, the spectral characteristics of electromagnetic radiation, the piezoelectric coefficient d_{33} and the microprocessor system for measuring electrical current and temperature. The content is relevant to the theme of the competition.

2.2. Contribution and quotations

I accept the contribution, which Senior Assistant Professor Sotir Sotirov, PhD has a claim on, and I characterize them as of predominantly scientific and applied character. They are expressed in the following:

- use of modern high-tech and specialized measuring equipment and original methods for proving new properties and dependencies for technological and structural optimization of nano- and nanocomposite coatings;

- formulation and justification of new problems and hypotheses;

- demonstration by new means of substantial new aspects of already existing scientific fields;

- creation of new structures and methods for measuring and obtaining confirmatory facts, as well as designing and developing microprocessor measuring systems with increased accuracy, advanced speed and wireless communication of various physical quantities with real practical application in the educational process and for updating and developing the scientific university infrastructure;

- methodological contribution related to the implementation of modern mobile technologies in the university education process.

Senior Assistant Professor Sotir Sotirov, PhD has worked on 5 research projects, 1 of which is international, 3 are national, and 1 within the university. I am convinced that here his contribution again is the personal work of the candidate. In this respect, I recommend that Sotir Sotirov, PhD continue to "dig" in this perspective sphere and not lose the accumulated momentum.

A list of 8 noticed quotations of all works of the candidate has been presented (1 quotation of a work [6], 3 quotations of a work [19]), 7 of which are in referenced editions and 1 in a journal published abroad. One of the quotes is by a Bulgarian and the rest are by foreign authors. All quotes are in publications after 2016, inclusive. Considering that only 4 of the submitted scientific works by the candidate are in the period 2012-2013, and all the remaining 22 are from 2016 to 2019 inclusive, it is logical to expect more quotations.

2.2. Implementation work

There are no documents demonstrating implementation work of the candidate.

4. Evaluation of the candidate's personal contribution

23 of the 25 scientific papers presented are co-authored. As there are no separation protocols for the common publications, as well as due to the lack of a declaration signed by the candidate on his participation in the common publications, I allow the participation of all co-authors is equal. The candidate used the same assumption in his self-assessment for the group of indicators **'D'** and **'E'** of the requirements for **Academic Position "Associate Professor**". Two of the candidate's publications are by himself only; 2 have 11 co-authors; 5 with 10 co-authors; 1 with 7 co-authors; 1 with 6 co-authors; 4 with 5 co-authors; 3 with 4 co-authors; 5 with 3 co-authors; 2 with 2 co-authors. Sotir Sotirov is the first author in 4 scientific papers (SP) (with 3, 2, 4 and 2 co-authors, respectively), the second author in 9 SP (with 4, 4, 2, 3, 4, 1, 2 and 1 co-authors, respectively), third author in 3 SP (with 6, 9 and 9 co-authors, respectively), fourth author in 4 SP (with 9, 9, 10 and 3 co-authors, respectively), fifth author in 1 SP with 6 co-authors, ninth in a SP with 9 co-authors, and 10th author in aa SP with 10 co-authors. The co-authors are from different institutes of BAS, from Sofia University Kliment Ohridski, UFT-Plovdiv, Medical University-Plovdiv, different faculties of PU Paisii Hilendarski, and from different countries: Bulgaria, Germany, Poland, France, and Morocco. These statistics show two things: the multidisciplinary nature and scale of the research in which the candidate was engaged, and the personal contribution to the results obtained. The candidate exceeds the minimum number of 200 points required under the "D" indicator for area 5. Technical sciences. He has an h-index = 3. The total score for Group "E" indicators also exceeds the minimum requirements**.**

I accept the contributions formulated by the candidate and the results described for a personal merit.

5. Critical comments and recommendations

There are no materials available for the implementation of research results and developments in companies and organizations, if there are such, including in the Paisii Hilendarski, as well as official notes certifying the teaching and pedagogical activity and grounds of the candidate: instructed graduates, course projects or assignments, academic work in the disciplines for the exercise classes and possibly assigned lectures, participation in the development of exercise classes, co-authorship in the preparation of the materials, as well as for extracurricular social activity at the Plovdiv University. The set of documents also lacks reference to the specific activities and results of the candidate as a member of scientific teams in research projects. Publications lists miss data on: ISBN, ISSN, impact factor/impact rank, SCOPUS referencing, Web of Science, or the National Reference List

6. **Personal impression**

I do not personally know the candidate, and my impression is based entirely on the papers, publications, and feedback presented by his colleagues. The impression from the presented materials gives me grounds to claim that the candidate has the necessary teaching and research experience, contributions and potential for the academic position of **Associate Professor** in the announced competition.

CONCLUSION

The documents and materials presented by **Senior Assistant Professor Sotir Ivanov Sotirov**, PhD meets all the requirements of the Academic Staff Development Act of Republic of Bulgaria (ASDARB), the Rules for the implementation of ASDARB, and the relevant Rules of Paisii Hilendarski University of Plovdiv.

The candidate has submitted a **sufficient** number of scientific papers published after the materials used in the defence of the Doctoral Degree. The candidate's works have original scientific and applied, and methodological contributions that have received international recognition, as a representative part of them have been published in journals and scientific collections published by international academic publishers. His research developments are of practical use, some of which are directly oriented to the academic work and the academic community at home and abroad. The scientific and teaching qualification of **Senior Assistant Professor Sotir Ivanov Sotirov, PhD** is undoubted.

The results achieved by **Senior Assistant Professor Sotir Ivanov Sotirov, PhD** in the academic and research activities, **fully** comply with the specific requirements of the Faculty of Physics and Technology, adopted in connection with the Rules of the Plovdiv University for the application of Academic Staff Development Act of Republic of Bulgaria.

After getting acquainted with the materials and scientific works presented in the competition, analysis of their importance and their contributions, I find it justifiable to give my **positive** assessment and **to recommend** to the Scientific Jury **Senior Assistant Professor Sotir Ivanov Sotirov, PhD** to be elected as **"Associate Professor"** at PU Paisii Hilendarski in professional field 5.2 Electrical Engineering, Electronics and Automation, (Electronic Circuit Theory and Electronic Circuitry).

5th August 2019

Reviewer:
Professor Anna Stoynova, PhD