

## EVALUATION REPORT

**On competition for the occupation of the academic position “Professor” in the professional field 4.1. “Physical sciences”, announced by the Sofia University “St Kl.Ohridski”, Faculty of Physics in The State Gazette issue 24/17.03.2023**

**Applicant:** Vesseline Todorov Donchev, DSc, Associated professor at Faculty of Physics, Sofia University “St Kl Ohridski”

**Reviewer:** Maxim Ganchev, PhD, Associated professor at Central Laboratory of Solar Energy and New Energy Sources – Bulgarian Academy of Sciences

### **I. General description of the presented materials**

#### **1. Application data**

To participate in the competition, the candidate Associate Professor of Defense Vesseline Todorov Donchev submitted a list of 22 titles in total, including 16 publications in foreign scientific publications with an Impact factor and 6 others published in collections of scientific forums. In addition, there are either a general list of the candidate's publications, incl. 50 articles in scientific publications (**A1-50**), 41 publications from scientific conferences (**B1-41**), 44 announcements from scientific conferences (**C1-44**), 2 parts of monographs (**O1-2**), 3 textbooks and teaching aids (**D1 - 3**) and two popular science articles (**E1-2**). A total of 7 other documents are also presented (official notes and certificates from an employer for educational employment, work experience - academic growth, diplomas for higher education, PhD, DSc and for an academic title (Assoc.prof.), curriculum vitae (CV), Reference for the necessary contributions of the candidate, including participant and/or manager of 15 projects, scientific supervision of graduates and doctoral students (6/3), etc. The submitted documents correspond to the requirements, according to the Law of the Development of Scientific Staff in Republic of Bulgaria for the minimum national requirements, according to the Regulations for the application of the Law and the Regulations for the terms and conditions for acquiring scientific degrees and occupying academic positions at SU "St. Kliment Ohridski".

#### **2. Applicant data**

Vesseline Todorov Donchev had been born in Sofia and since 1991 has been working at the Faculty of Physics of the Sofia University “St.Kl. Ohridski”. He graduated from the 9th French Language High School, Sofia, graduated as a physicist at the Faculty of Physics, SU "St.Kl. Ohridski" in 1985, became a Doctor (PhD) in Solid State Physics in 1991 and defended a thesis

for a Doctor of Sciences in 2022 on "Surface Photovoltaic Spectroscopy of Semiconductor Optoelectronic Materials and Nanostructures". In 1993 he became a Senior Assistant, in 1997 - Chief Assistant, and in 2004 he became an Associate Professor in the Department of Condensed Matter Physics and Microelectronics at the Faculty of Physics, SU "St. Kl. Ohridski". From 2010 to 2013, he was an Administrator at the EC, Brussels, where he administered scientific projects under 7 FP in the field of nanoelectronics and micro-systems. He is fluent in French, English, German and Russian. Chairs and is a member of numerous specialized national and European councils and commissions, reviewer of two doctoral theses: Université Paris-Saclay, France, July 2022 and University of Valencia, Spain, June 2010. He is active in various extra-professional activities as alpine skiing, football, hiking, swimming, cycling, music. Married, with 2 children.

### **3. General characteristics of the scientific works and achievements of the candidate**

Associate Professor, DSc Vesseline Donchev works in the field of electronic and optical properties of semiconductor materials and structures, in particular on the development and application of photoelectric and optical methods and computer simulations. His works are focused on Surface Photovoltaic Spectroscopy of materials for photovoltaics of the A<sup>III</sup>-B<sup>V</sup> type (Ga(In)As(Sb)N, Si, Hybrid metal-organic perovskites and other semiconductor materials and nanostructures for optoelectronic applications (emitters, detectors). He also has interests in the field of research and modeling of the optical properties of these materials. He developed an approach to form record-efficient photocells of a GaAs single-junction structure with an array of InAs QDs. According to the minimum national requirements (under Art. 2b, paras. 2 and 3 of the Law of Development of Scientific Staff in Republic of Bulgaria), the applicant is fulfilling the requirements with an additional advance<sup>1</sup>. According to the data presented, the candidate meets the additional requirements of SU "St. Kliment Ohridski" for occupying the academic position of "professor" fully according to some of the indicators or with an advance according to the others<sup>2</sup>. From the reference made<sup>3</sup>, it is clear that there are no coincidences in the submitted publications for this competition with those from previous procedures. The publications submitted for the competition are from reputable scientific publishing houses, which implies peer review according to the established order and no reports of plagiarism have been noticed.

### **4. Characteristics and assessment of the candidate's teaching activity**

Associate Professor Vesseline Donchev taught General Physics (Mechanics, Molecular Physics) in the Department of Condensed Matter Physics and Microelectronics (DCMPM) from 2004 to 2009 at the Faculty of Physics, Sofia University, and Optoelectronic Instruments from the 2020. He led two master's programs (Physical bases of optoelectronics and Nanostructured materials and devices for information technologies). He is the head of a student laboratory in electricity and magnetism at the Faculty of Science of the SU. He was the supervisor of 6 and a consultant of 4 graduates; Consultant of 2 doctoral students and supervisor of 1 defended and 1 current doctoral student. Associate Professor Vesseline Donchev is a well-established scientist and teacher with many years of experience in the Faculty of Physics of the Sofia University, as well

as in a number of European universities. In the current competition, the candidate participated with 1 successfully defended doctoral student (Tsvetan Ivanov, 2010) and six successfully defended diploma students, which is an indicator of his high activity, and on the other hand, the interest of the trainees in working with him.

## **5. Comprehensive analysis of the applicant's scientific and practical achievements contained in the materials for participation in the competition**

In the publications submitted for the competition, the candidate presents a variety of research results on different materials through measurements of the surface photovoltage (SPV) and analysis of the spectral behavior of the amplitude and phase, optical properties, photoluminescence and X-ray diffraction, simulations of IR spectra, effects at diffused interfaces, theoretical calculations of electronic structure, etc. The simulations of the infrared (IR) transmission spectra ( $300\text{-}1500\text{ cm}^{-1}$ ) of  $\text{SiO}_x$  layers ( $x \leq 2$ ) containing crystalline or amorphous Si nanoparticles on Si substrates (**articles F11, K1, K2**), the original pioneering studies of InGaAsN layers obtained by liquid epitaxy (**F4,F5**), the theoretical and experimental study of  $\text{In}_{0.215}\text{Ga}_{0.785}\text{As}/\text{GaAs}$  micro-tubes (**F12**) and the theoretical study of the electronic structure of AlGaN/GaN multiple quantum wells (**F16**) can be characterized as **scientific contributions to the enrichment of existing knowledge and are accompanied by finding new facts.**

The proposal of a new experimental approach for efficient control of the charge configuration and optical properties of single quantum dots (QDs) InAs/GaAs (**F6-F10**), and also the pioneering studies of structures (**F1,F2**) in which an organometallic perovskite layer (PVK) was deposited directly on silicon and an original research methodology was developed by applying laser LEDs of different wavelengths in characteristic areas of the visible spectrum are **cutting-edge developments of new scientific-applied methods** for obtaining highly efficient photovoltaic converters.

Investigations (**F13,F14,K3,K4,K5**) on the effect of diffused interfaces on the energies of bound electronic states and wave functions of model V-shaped GaAs/AlGaAs quantum wires (QWs) lead to the establishment of new facts, and also the development of a SPV spectroscopy setup and the reported first spectral measurements with it, in the case of p-Si obtained by zone melting coated with a layer of  $(\text{Al}_2\text{O}_3)\text{TiO}_2$  lead to **establishment of new data and can be characterized as scientific - applied contributions of practical importance.**

In the competition, the applicant presents publications with 123 citations, out of a total of over 400 (according to SCOPUS), and a total impact factor for the publications from the competition = 39.122, which are an outstanding indicator of their significance and interest in them.

In their totality, the submitted publications for the competition are entirely collective, with attached documents (notification letters) defining the candidate's personal participation. For the F15 publication only, the candidate is not listed as a corresponding author.

## 6. Critical notes and recommendations

Regarding the content of the procedure's documentation, I have no remarks. On presentation, to some extent, there are difficulties in identifying the individual publications, due to the introduction of different designations for the same work.

## 7. Personal impressions of the candidate

My personal impressions of Associate Professor Vesseline Donchev are of a highly erudite scientist with a remarkable scientific and teaching practice, with a balanced lifestyle combining art, sports, science and alongside them living together in a wonderful close-knit family.

## 8. Conclusions on the application

After my familiarizing with the materials and scientific works presented in the competition and based on the analysis of their significance and the scientific and scientific-applied contributions contained in them, **I confirm** that the scientific achievements meet the requirements of The Law of the Development of Scientific Staff in Republic of Bulgaria, the Regulations for its application and the relevant Regulations of SU "St. Kliment Ohridski" for the candidate to occupy the academic position of "professor" in the scientific field and professional direction of the competition.

I declare my **positive** assessment to the application.

## II. GENERAL CONCLUSION

Based on the above mentioned, **I recommend** the scientific jury to propose to the Faculty Council of the Faculty of Physics at SU "St. Kliment Ohridski" to elect Assoc. Professor, DSc Vesseline Todorov Donchev to occupy the academic position of "Professor" in professional direction 4.1 Physical Sciences.

06.07.2023

Reviewer: .....

Assoc. Dr. Maxim Ganchev

- <sup>1-</sup> According to the submitted reference (and corresponding check out for compliance with it) for the Minimum National Requirements for the position of "Professor", points are counted according to the relevant indicators: A - 50 points (Dr. Diploma 21345 of 03.09.1991, C - 110 points. (Publications **50-54** from table **D3**), when necessary 100; D - 235 points (publications **55-60, 63-65, 69-70** from table **D3**), when necessary 200; D - 226 t from 113 citations (wrongly marked 556 t in the table from the Reference - 12.CompletionMinRequirements-cor.pdf), with 100 t required; indicator E – 282 t, with 150 t required.
- <sup>2-</sup> Regarding the additional requirements of SU "St. Kliment Ohridski" for occupying the academic position of "professor", points are calculated according to the relevant indicators: according to the groups of indicators A, B, D and E, the additional requirements of the SU coincide with the national ones and, accordingly, the candidate exceeds them with an excess; according to indicator D - citations, evidence is presented for 226 points, out of the required 200 points. Further, under indicator 21 (Successfully defended doctoral students), the candidate meets the requirement for 1 doctoral student, under indicator 22 (Successfully defended diploma students), 6 diploma students are counted, under item 23 (Number of publications from group I in the last 3 years) 3 publications are reported, with a required minimum of 1, under item 24, 13 publications are reported, with a required minimum of 9, under item 27 (Number of publications from group I in groups of indicators B and D with significant contribution of the candidate -presented against required total number) - 12/6, under item 28 - h-factor 9/at required 8, under item 29 (Golden publications) – 5/required 1, under item 31 (Educational and teaching experience, hours) - 2148.6 / required 800.
- <sup>3-</sup> The cited publication A44 is used for DSc, as a unit in indicator G, but not as D, from table D4 - from 166 - to 186 = 21 citations. The cited publication A20 was used for an associate professor under indicator group G, but not for D - from 187 to 205 = 19 citations. In the same way, it was found that: A27, used in this procedure for a professor under indicator G - was quoted from 206 to 219 = 14; A32 was used for DSc - D – from 220 to 257 = 38; A35 was used for DSc - G – from 258 to 263 = 6; A41 was used for DSc - G – from 269 to 273 = 5; A46 was used for DSc - G - from 274 to 278 = 4 => 113.