

## REVIEW

on competition for an academic position "professor" in a professional direction 4.1. Physical Sciences (Physics of atoms and molecules), for the needs of Sofia University "St. Kliment Ohridski" , Faculty of Physics, announced in SG no. 24 of 17.03.2023

The review was prepared by: prof. DSc Kiril Borisov Blagoev - IFTT-BAS, professional direction: Physics of atoms and molecules, in his capacity as a member of the scientific jury for the competition according to Order No. RD 38-174 / 20.04.2023 of the Rector of Sofia University.

To participate in the announced competition, only one candidate, Assoc. prof. DSc Stanislav Balushev Balushev; Faculty of Physics, SU «St. Kliment Ohridski» submit documents.

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

Associate Professor Stanislav Balushev submitted the following documents for participation in the competition for the scientific position "professor": a detailed curriculum vitae; copies of the diplomas for completed higher education, acquisition of the scientific and educational degree "doctor", diploma for obtaining the scientific degree "doctor of physical sciences", diploma for the scientific position "associate professor", certificate of work experience in the specialty, certificate of management of graduates and doctoral students, reference for academic employment, complete list of publications and patents, reference from the database for the scientific activity of the SU "St. Kl. Ohridski" - THE AUTHORS, reference for the implementation of the minimum requirements of the law and the regulations of the Fac. of Phys., where the materials with which the candidate participated in previous procedures are presented, reference to the contributions of the authors in the general publications; screenshots of information about the citations, are also added.

#### **1. Applicant data**

Associate Professor Stanislav Balushev graduated from the Faculty of Physics of the Sofia University "St. Kl. Ohridski". He is an assistant at the Technical University - Sofia, and since 2009 is an associate professor in Fac. Phys. at SU "St. Kl. Ohridski". In 1998 defends a thesis for the acquisition of the scientific and educational degree "doctor" in Fac. Phys. of SU "St. Kl. Ohridski". In 2021, he defended his thesis for the scientific degree "doctor of physical sciences". Since 1998 has held various positions and was a fellow of various scientific foundations - DAAD, Feiberg, Marie Curie and visiting scientists in elite universities in Israel, Austria, Germany - the University

of Graz - Austria; the University of Karlsruhe - Germany; candidate is the head of a photophysical chemistry group at the Max Planck Institute in Mainz. He participates and is the main researcher in a number of scientific projects in Germany, including 7 framework program; participates and manages projects with the Bulgarian National Scientific Research Fund. Bulgaria. Associate Professor Stanislav Balushev gives a series of lectures at universities in Germany and Sweden. Assoc. prof. St. Balushev supervises diploma courses and doctoral studies in the Faculty of Physics. of SU" Kl. Ohridski". Associate Professor Stanislav Balushev is the author and co-author of 78 scientific publications in high rating scientific journals; three book chapters; co-author of 16 international patents. The results of his work have been reported at 43 scientific congresses and conferences. In general, the works of Assoc. prof. St. Balushev were cited 2763 times by other authors; h index is 28. He is the head of the "Organic Optoelectronics" group in Fac. Phys. at SU"Kl. Ohridski".

## **2. The application data**

The documents submitted in the competition by the candidate correspond to the requirements of the ZRASRB, PPZRASRB and the Regulations for the terms and conditions for acquiring scientific degrees and occupying academic positions at SU "St. Kliment Ohridski" (PURPNSZADSU). To participate in the competition, the candidate assoc. prof. Stanislav Balushev submitted a list of a total of 60 titles, including 25 publications in scientific journals; 1 book chapter; 34 participations in conferences, of which 14 invited reports, 2 plenary reports; a list of 154 citations from other authors, including 7 "golden" works with more than 20 citations. Also 5 other documents (in the form of official notes) relating to the applicant's work experience; pedagogical activity; guidance of graduate and doctoral students are submitted.

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

The scientific activity of Associate Professor St. Balushev is in the field of quantum optics and synthesis of molecules; their interaction with coherent light, as well as intermolecular interactions. The scientific publications submitted for participation in the competition are in the field of the synthesis of molecules and the study of their properties as well as intermolecular interaction. A blue-emitting semiconductor molecule has been synthesized. According to an original design, dye molecules have been synthesized that make it possible to register ethyl and methyl alcohol dissolved in water. A class of dye molecules have been synthesized that allow optical methods to

be used to study organic molecules such as RNA and DNA. Dye molecules have been synthesized without the presence of metal ions, which have a low excitation intensity threshold comparable to unconcentrated natural light. Molecules were synthesized and studied in which intermolecular interaction processes allow population transfer between singlet states and triplet states leading to the population of optically inaccessible triplet states. Molecular ensembles working on the principle of population transfer allow the creation of nanoparticles - capsules, suitable for the study of biological objects. The sensitivity of the population transfer process between triplet states of the molecules to external parameters makes this process convenient for optical investigation of the parameters of biological samples. The investigations of Assoc. prof. St. Balushev have a fundamental character, but as a rule, the application of the synthesized molecular ensembles and the processes taking place during interaction with light is sought for solving specific analytical tasks with optical methods. Of the works presented in the periodical scientific literature, 19 works are with Q1 and 6 works are with Q2. In 12 works the candidate has a leading role. In other works Assoc. prof. St. Balushev performed the research or processed and analyzed the experimental results. Assoc. prof. St. Balushev is a single author of presented book chapter. After the defense of the dissertation for obtaining the degree "Doctor of Sciences", 9 works were published.

The scientific works meet and significantly exceed the minimum national requirements (according to Article 2b, Paragraphs 2 and 3 of the RSARB) and, accordingly, the additional requirements of SU "St. Kliment Ohridski" for occupying the academic position of "professor" in the scientific field and professional direction of the competition. The scientific works presented by the candidate do not repeat those from previous procedures for acquiring a scientific title and academic position. There is no evidence of plagiarism in the scientific works submitted for the competition.

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

Assoc. prof. St. Balushev has the required pedagogical commitment. He supervised 5 diploma theses and 3 doctoral students dismissed with the right of defense. An official note was presented for 5 graduates and 1 doctoral student who defended, which is included in the documents for the current competition.

#### **5. Content analysis of the applicant's scientific and scientific-applied achievements contained in the materials for participation in the competition**

The candidate's scientific and scientific-applied contributions can be classified as new hypotheses, materials and methods, and application of scientific achievements in practice. As noted, the

candidate submitted 154 citations of his works by other authors. Assoc. St. Balushev is the author of a book chapter and co-author of publications in periodical literature. All papers are in journals with a high impact factor of 1.1 for Austr. J Chem. to 11.2 for Carbohydrate Polymers. The average Impact Factor is 3.8. The candidate's contribution to the work is significant.

#### **6. Critical notes and recommendations**

I have no critical remarks on the presented materials.

#### **7. Personal impressions of the candidate**

I know Assoc. Prof. St. Balushev from the time of his work as a visiting researcher at the Technical University in Graz. He is an energetic researcher with original ideas, not only proposing solutions, but also implementing them in practice, seeking the practical benefit of his research.

#### **8. Conclusion on the application**

Having familiarized myself 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 and significantly exceed the requirements of ZRASRB, the Regulations for its application and the relevant Regulations of the SU "St. Kliment Ohridski" for the candidate to occupy the academic position of "professor" in the scientific field and professional direction of the competition. In particular, the candidate satisfies the minimum national requirements in the professional direction and no plagiarism has been found in the scientific works submitted for the competition. I give my positive assessment to the application.

#### **II. GENERAL CONCLUSION**

Based on the above, I strongly recommend the scientific jury to propose to the competent authority for the selection of the Faculty of Physics at SU "St. Kliment Ohridski" to elect Associate Professor Stanislav Balushev Balushev to take the academic position of "Professor" in a professional direction. 4.1. Physical Sciences (Physics of atoms and molecules)

13.07.2023

Prepared the opinion: Prof. Dr. Kiril Blagoev