REPORT

Professor Violeta Borisova Velikova
Head of laboratory “Photosynthesis – activity and regulation”
Institute of Plant Physiology and Genetics – Bulgarian Academy of Sciences
Assessor, mandate No. 608 / 16.07.2019.

Regarding: Competition for academic position “professor” in 4. Life Science, mathematics and informatics, professional field 4.3. Biological Sciences, scientific specialty “Biophysics” at the Institute of Biophysics and Biomedical Engineering, Bulgarian Academy of Sciences (IBPhBME-BAS), published in the State Gazette**,** issue 41 / 21.05.2019.

One candidate, assoc. prof. Dr. Sashka Boychova Krumova, is currently taking part in the competition for the academic position of "professor" at the department “Biomacromolecules and Biomolecular Interactions, at the IBPhBME-BAS. The submitted documents have been prepared in accordance with the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria (ZRASRB), the Regulations for its implementation, as well as the regulations for the conditions and the procedure for acquiring academic degrees and occupying academic positions in the Bulgarian Academy of Sciences and IBPhBMI - BAS.

Applicant's career profile

Sashka Boychova Krumova acquired her Master Degree in Biotechnology, specializing in Molecular Biotechnology at the Faculty of Biology at Sofia University “St. Kliment Ohridski” in 2001. After finishing her higher education, she completed her specialization in Hungary (Institute of Plant Biology, Szeged - 12 months) and the Netherlands (University of Wageningen - 1 month). As a result of these specializations S. Krumova acquired skills in the fields of biophysics, lipid-protein interactions, biological membranes, photosynthesis, spectroscopic methods, as well as skills in project planning, teamwork, and time management. In 2006 she obtained her PhD degree (dissertation topic: Temperature stability of pigment-protein complexes in thylakoid membranes of higher plants. Thermo-optical effect) at the Institute of Biophysics, BAS and the Institute of Plant Biology, Biological Researcher center at the Hungarian Academy of Sciences in Szeged. A positive fact in the applicant's career development is the international specializations in leading research institutions. Dr. Krumova was a one-year postdoctoral fellow at the University of Wageningen, The Netherlands, where she acquired new skills in microspectroscopy, fluorescence microscopy, fluorescence spectroscopy. At the Institute of Organic Chemistry and Biochemistry at the Czech Academy of Sciences, she has learned computer methods in

chemistry and fluorescence spectroscopy. These specializations allow Dr. Krumova to develop as a very good scientist with extensive knowledge in the field of plant biology, biophysics, biochemistry and skills in various biophysical microscopic techniques. In the period 2010-2013, Dr. S. Krumova holds the academic position of "senior assistant" at IBFBMI-BAS, and in 2013 she was elected "associated professor" at the same institute. Currently, assoc. prof. Dr. Krumova is Scientific Secretary of IBFBMI-BAS.

Assoc. prof. Sashka Krumova is a co-author in 41 articles published in international journals and number of citations 489, her h-index is 14 (Scopus, up to 01.08.2019).

Submitted documents

In the current competition for the academic position of "professor", the applicant participates in a total of 22 scientific publications, of which 10 have been published in leading specialized scientific journals in Q1, 7 in Q2 and 2 in Q3. The presented articles are distributed as follows: in indicator B.4. "Habilitation work - scientific publications referenced in Web of Science and Scopus" - 8, 3 of them in Q1 and 3 in Q2; in indicator Г - 14, of which 1 published book on the basis of a defended dissertation work, and 13 scientific publications distributed as follows: Q1 - 7, Q2 - 4 and Q3 - 2. Evidences are provided for 137 citations, all of which are in Web of Science and / or Scopus. Assoc. prof. Krumova co-supervised one student successfully obtained PhD degree. She coordinated one project funded by the NSF and of one bilateral cooperation project between BAS and the Hungarian Academy of Sciences (HAS). Assoc. prof. Krumova was a team member of one European project under the EU 6FP, 3 international and 13 national scientific projects. The submitted information on the fulfillment of the minimum national and specific requirements shows that the number of points formed in each indicator significantly exceeds the minimum number of points.

The applicant has clearly defined scientific profile. Her research is focused on the study of current and prospective scientific problems in the fields of plant and cell biology, biophysics, biochemistry, analytical chemistry and hematology. The experimental results obtained contribute to the better understanding of the structure-function relationship at different levels of organization of biomacromolecules. The scientific achievements can be divided into two main areas. The first is related to the study of the structural organization and stability of biomacromolecules in higher plants and cyanobacteria. More important could be the defined the following achievements:

- For the first time specific structural changes in the light-harvesting complexes of photosystem I and photosystem II were defined, which relate to the photoprotective processes in higher plants have been identified.
- The role of exogenous plant growth regulators in the structure and function of the photosynthetic apparatus of higher plants has been established.

- A calorimetric approach has been developed to evaluate the structural stability of cyanobacteria light-harvesting complexes (phycobilisomes) in native cellular environments.
- The other field of investigation is focused on the study of structural stability of major protein components (hemoglobin, cytoskeleton and plasma membrane proteins, serum proteins, cancer cells / nuclei) using a variety of biophysical approaches for early diagnostic of different medical pathologies.
- For the first time, a study was performed on the calorimetric characteristics of blood serum from patients with different types of multiple myeloma and macroglobulinemia of Waldenstrom. Calorimetric classification has been developed and calorimetric markers have been defined for diagnosis and monitoring of the disease, with the potential to be used in clinical practice.
- For the first time, a comparative analysis between differential scanning calorimetry (DSC) and another biophysical technique based on the fluorescent properties of NAD(P)H reveals that the potential of DSCs to detect the malignant state is much higher than that of the fluorescence method.
- Through the combined application of atomic force microscopy and differential scanning calorimetry of erythrocytes in the course of aging, the phases through which the cells undergo this process are determined. The role of the structural and membrane proteins in the development of basic cell morphologies during aging has been investigated. This approach makes it possible to correlate specific molecular changes with the development of structural abnormalities and their effect on the functional status of erythrocytes.
- The applicant also has a clear vision for her future research. She will focus on the use of nanotechnology to support plant growth and development and to improve their photosynthetic activity under stress. New biophysical approaches for the diagnosis of human diseases will be sought.

In conclusion, the documents and materials presented at the competition show convincingly the valuable scientific achievements of assoc. prof. S. Krumova. According to the analysis and evaluation of her scientometric indicators it is clear that she completely cover and exceed the minimum national criteria for acquiring the academic position of "professor" set out in the ZRASRB, as well as the specific conditions of IBFBMI-BAS. All this gives reason to strongly support the awarding of the academic position of "professor" to assoc. prof. Dr. Sashka Boychova Krumova.

26.09.2019 Assessor:

Sofia /prof. Dr Violeta Velikova/