

REPORT

on the competition for occupation of the academic position "Professor" in the professional field 4.3. "Biological Sciences" and scientific specialty "Biophysics", announced in State Gazette No.41/ 21.05.2019, for needs of the Department "Biomacromolecules and Biomolecular Interactions" at the Institute of Biophysics and Biomedical Engineering - Bulgarian Academy of Sciences

By Assoc. Prof. Anelia G. Dobrikova

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For participation in the announced competition for the academic position "Professor" in the professional field 4.3. "Biological Sciences" and scientific specialty "Biophysics" for the needs of the Department "Biomacromolecules and Biomolecular Interactions" at IBPhBME-BAS has submitted documents only one candidate: **Assoc. Prof. Sashka Boychova Krumova**, PhD, from the same Department. The presented by Assoc. Prof. S. Krumova documents for participation in the competition are in full accordance with the requirements of the Act for the Development of the Academic Staff in the Republic of Bulgaria (ADASRB) and the Regulation of ADASRB at IBPhBME-BAS.

Short biography of the applicant

In 2006, Sashka Krumova defended her doctoral dissertation for the academic and educational degree of "doctor" (PhD) in the scientific specialty "Biophysics" at the Institute of Biophysics - BAS. Between 2005 and 2007, she worked as a specialist at the Biological Research Center of the Hungarian Academy of Sciences, Szeged. From 2008 to 2009 she was a postdoctoral fellow at the University of Wageningen, The Netherlands. Since 2009 until now, she has been working at IBPhBME – BAS. In 2013, she won a competition for the academic position "Associate Professor" in scientific specialty "Biophysics" at IBPhBME-BAS.

Research activities of the applicant

Assoc. Prof. Sashka Krumova has a total of 50 scientific publications, 38 of which are in peer-reviewed and indexed journals with impact factor (IF), with total citations 313 and *h*-index: 11 (database Scopus, ORCID). In the announced competition, she participates with a total of 21 scientific publications in the period 2013-2018, 18 of which are in peer-reviewed journals with IF (total IF 51.4) and 1 with SJR, 10 of them are with Q1 rank and 7 with Q2 rank (WoS or Scopus). Sashka Krumova is a leading author in 8 publications. A reference list with a total of 137 citations in scientific publications after 2013 (database Scopus) is also presented for the competition.

All publications submitted for the competition reflect significant, interdisciplinary research in the fields of: biophysics, biochemistry, physical chemistry, plant sciences, medicine and hematology, and are related to topics that develop in the Department "Biomacromolecules and Biomolecular Interactions". They also show that Sashka Krumova possesses a large set of biophysical methods for the identification and characterization of biological objects with different degree of complexity and the mechanisms of their functioning. The research competences and infrastructure of a number of national research

groups and international partner organizations have been used effectively, which defines the candidate as an enterprising and active Bulgarian scientist.

As can be seen from the habilitation reference, Sashka Krumova has participated in a total of 17 national and international research projects and has been a leader of one project with the National Science Fund (2010-2014) and one bilateral cooperation (EBR) with the Hungarian Academy of Sciences (2016-2018). She has been second supervisor of one successfully defended PhD student and currently is a supervisor of one PhD student from the Department, announced the competition.

These scientific activities fully meet the Regulations of ADASRB at IBPhBME-BAS for the academic position "Professor" and significantly exceed the minimum requirements for all groups of indicators (B, Г, Д, E).

Scientific topics and relevance of publications:

The research activities of Assoc. Prof. S. Krumova can be summarized in several scientific fields: 1) Structural stability and organization of the pigment-protein complexes of the photosynthetic apparatus in higher plants and cyanobacteria, as well as their role in the photosynthetic efficiency - 9 publications (№10-14,16,19-21); 2) Temperature stability, conformation and intermolecular interactions of the major serum proteins in hematological pathologies; Calorimetric markers for the diagnosis and monitoring of multiple myeloma and schizophrenia - 9 publications (№1-9); 3) Relationship between the structural stability of the major protein components and the changes in morphology occurring during erythrocytes' aging - 1 publication (№ 18); 4) Calorimetric characteristics of human cancer cells and their nuclei - 1 publication (№17); 5) Thermal stability and binding energetics of thymidylate synthase ThyX - 1 publication (№ 15).

Scientific results and original contributions of the research publications are very well described in detail in the expanded habilitation reference. They are of great interest for both the fundamental science and the practical application in the future.

Five scientific contributions of the habilitation work on the topic "Calorimetric markers for detection and monitoring of patients diagnosed with multiple myeloma" (publications № 1-8, group "B") have been formulated. The most significant contributions are related to the establishment of common calorimetric markers for the various secretory and non-secretory forms of multiple myeloma. Specific calorimetric markers for multiple myeloma have also been identified, which distinguish them from other hematological cancers. It is shown that calorimetry is suitable for introduction into clinical practice as a quick, non-invasive and inexpensive method complementary to the currently used conventional immunological tests.

The scientific contributions of the other publications (№9-21, group "Г") can be summarized as follows: 1) A number of factors have been characterized that regulate the structural organization and stability of the major light-harvesting pigment-protein complexes in higher plants and cyanobacteria. They provide a deeper understanding of the adaptation mechanisms of higher plants and cyanobacteria to environmental conditions; 2) The role of exogenous growth regulators for the structural organization and function of the photosynthetic apparatus in higher plants has been demonstrated; 3) It is shown the potential of differential scanning calorimetry to diagnose diseases based on the thermodynamic properties of the serum proteome in schizophrenia, as well as cancer cell lines; 4) Different factors for stabilization and destabilization of the soluble proteins thymidylate synthase and hemoglobin have also been identified.

Assoc. Prof. S. Krumova stated and guidelines for future research that will continue in two main directions: 1) nanotechnology and 2) new biophysical approaches to diagnose diseases.

Conclusion

The presented materials for the announced competition confirm that Sashka Krumova significantly exceed the minimum requirements of the Regulation of ADASRB at IBPhBME-BAS. She is an established, internationally recognized scientist with high research competencies and I confidently believe that Sashka Krumova is a very suitable candidate for the academic position "Professor" in the Department "Biomacromolecules and Biomolecular Interactions" at IBPhBME-BAS.

All of the above enables me to give my positive assessment and to recommend to the Academic Board to prepare a report proposal to the Scientific Council of IBPhBME-BAS for the election of Assoc. Prof. **Sashka Boychova Krumova** at the academic position "Professor" in the professional field 4.3. "Biological Sciences" and scientific specialty "Biophysics".

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Report prepared by:
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