

REPORT

on the materials submitted for a competition for the academic position of associated professor in the field of higher education 4. "Natural Sciences, Mathematics and Informatics", professional field 4.3 "Biological Sciences", scientific specialty "Biophysics", for the needs of Department "Photoexcitable membranes", Institute of Biophysics and Biomedical Engineering-BAS,
announced in SG, no. 21/07.03.2023

by Prof. Dr. Maya Yaneva Velichkova,
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In the competition for academic positions "associate professor" for the purposes of section "Photoexcitable membranes" announced by the Institute of Biophysics and Biomedical Engineering - BAS (SG, no. 21/07.03.2023) participates only one candidate – senior assistant professor Dr. Martin Stefanov. All required documents are presented, which meet the requirements of ZRASRB and the Regulations for the terms and conditions for acquiring scientific degrees and holding academic positions in IBFBMI - BAS.

Brief biographical data

Senior assistant professor Martin Stefanov graduated from the Faculty of Biology of the Sofia University "St. Kl. Ohridski" as a bachelor's degree with a specialty "Biotechnology", and after a two-year master's degree, he received a master's degree with a specialty "Plant biotechnology". During his studies at the University, M. Stefanov expanded his knowledge with several additional courses in ecological biotechnology, plant ecology etc. In 2015, he was enrolled as a full-time doctoral student in the "Photoexcitable membranes" section at IBFBMI, and in 2019 he successfully defended his doctoral dissertation on the topic "Mechanisms of adaptation of the photosynthetic apparatus to salinity and light stress in two paulownia lines". Dr. Stefanov's research focuses on the primary topic of the "Photoexcitable Membranes" section, relates to the main lines of the IBFBMI's research, and is highlighted in 23 academic papers that have received more than 50 independent citations from other scientists.

Scientific metrics

Senior assistant professor M. Stefanov has presented a detailed report on the minimum national requirements for holding the academic position "associate professor", which correctly reflects his scientific output, which corresponds to and in some indicators exceeds the national requirements. For participation in the competition, Dr. Stefanov submitted 17 publications. According to indicator B - "Habilitation work - scientific publications in publications that are referenced and indexed in world-famous databases with scientific information (Web of Science and Scopus)" Stefanov includes five publications, four of which in Q1 journals and one in Q2 journal, at which scores on this indicator are 120 out of a required 100. In indicator G, 12 publications are presented, of which four in Q1, two in Q2, four in Q3, one in Q4 and one chapter of a book, where he collects 227 points in this indicator. According to indicator D - independent citations, M. Stefanov collects 106 points from 53 citations, with a requirement for 60 points. Stefanov is the first author in 9 of the published works, which unequivocally shows his role in the conducted research, analysis and preparation of the publications.

Considering his relatively not very long experience in the field of science senior assistant professor M. Stefanov presents an impressive list of participation in the development of scientific research projects. Participated in the development of 13 national and international research projects. He manages 1 project at the National Scientific Research Institute and 2 projects for young scientists at the BAS. He has reported materials from his research at 39 scientific forums in the country and abroad.

Research activity and scientific contributions of the candidate

The scientific activity of Dr. M. Stefanov is related to biophysical studies and characterization of the photosynthetic apparatus and its effective functioning in conditions of abiotic stress. A large part of the research is devoted to salt stress, but other stress factors such as heavy metals, low temperature and high light intensity are also included. The main objectives of the research are related to the study of the mechanisms of resistance and protection of the photosynthetic apparatus in economically important plants with different genotypes (maize, sorghum, peas, wheat, rice). Of particular importance are studies on the effects of different signaling molecules (nitric oxide, salicylic acid) and herbicides and nanoparticles on photosynthetic membranes under abiotic stress conditions. It should be noted that Dr. Martin Stefanov presents the actuality and significance of the topics on which he works in a very reasoned and justified manner, both from the point of view of fundamental science in the field of plant physiology and the biophysics of primary photosynthetic processes, and from the point of view of the increasingly topical problems of ecology, green economy and increasing the productivity and sustainability of agricultural crops. These studies offer new ideas and opportunities for improving photosynthetic effectiveness and, consequently, yields using genetic, biophysical, and microbiological methods.

The habilitation report on Dr. Stefanov's scientific contributions is meticulously prepared and accurately reflects the achievements of his scientific activity. Both contributions from publications related to the habilitation work and contributions from those unrelated to it are presented. The materials submitted for review include mainly research in the field of the relationship between the structural-functional organization of the photosynthetic apparatus and the resistance and adaptability of plants to salt stress, drought, and herbicides.

The contributions of the publications presented as a thesis (5 papers) are related to the in-depth study of salt stress (4 papers) and drought (1 paper).

Here I would mention following:

- A relationship was established between salt tolerance/sensitivity and differences in the structure and function of the photosynthetic apparatus and in the antioxidant activity of plants with C3- and C4-type photosynthesis (pea and maize, respectively) (Stefanov et al., 2022);
- For the first time, the role of carotenoids, flavonoids and proline in the protection of the photosynthetic apparatus and the adaptation of Paulownia to high NaCl content was evaluated. It has been established that under salt stress there are changes in the energy transfer between pigment-protein complexes and in the kinetic parameters of oxygen evolution, which affect the degree of inhibition of both photosystems in representatives of the genus Paulownia (Stefanov et al., 2021b; Stefanov et al., 2023a);

Twelve publications are included in indicator D, and here I would note the following scientific contributions:

- For the first time, a thorough examination of the effect of SNP (NO donor) on the primary photosynthetic processes in salt-stressed sorghum was conducted. It has been shown that foliar application of SNP enhanced the number of photosystem 2 active centers and increased photosystem 1 activity Stefanov et al. (2023b);

- In the first investigation on the impact of foliar application of two types of nanoparticles (ZnO (\pm Si) NPs) on the response of pea plants to salt stress, it was discovered that under control growth conditions higher concentrations of ZnO NPs were phytotoxic and caused oxidative damage in plant cells, whereas treatment with ZnO-Si NPs had a stimulating effect on the photochemical activity of both photosystems and reduce the inhibitory effect;

- It was found for the first time that salicylic acid, microalgae as well as nitrogen nutrition favorably affected the functional activity of the photosynthetic apparatus of rice plants under Cd-induced stress. The optimal concentrations for exogenously applied plant SA (10 μ M), NO₃⁻ (10 mM, 20 mM) and the optical density of *Chlorella vulgaris* (1.2) at which the inhibitory effect of CdCl₂ was minimal were determined.

The majority of the articles presented offer new scientific knowledge and innovative strategies on the defense and resistance mechanisms of the photosynthetic apparatus to abiotic stress. Several of them include methods for improving photosynthesis in challenging environment. These studies of Dr. Stefanov are original scientific achievements and have a definitely contributing character.

The future research directions proposed show that M. Stefanov is knowledgeable in the achievements and problems in the field of the biophysics of photosynthesis as well as the contemporary challenges facing plant physiology, related to overcoming the unfavorable conditions brought on by climate change. These include expanding research with new plant species with higher tolerance to salt stress and drought as well as the application of new biophysical approaches and methodologies. Future themes are expected to broaden and deepen Dr. Stefanov's knowledge and guarantee a successful development of his scientific career.


Working with Dr. Stefanov has left me with very positive personal impressions; he is a purposeful, motivated and incredibly hardworking young scientist who is always looking for new challenges and taking responsibility for his scientific activity. His participation in and leadership of scientific projects shows that he has leadership skills and the capacity to lead scientific projects and issues.

Conclusion

The presented materials convincingly show that Dr. Martin Stefanov is a scientist working in an up-to-date and significant field of modern science. With his scientific activity M. Stefanov shows skill in leading and developing a topic that is included in the main directions in the scientific strategy of IBFBMI. Most of the research presented is of an original nature and is a contribution to fundamental science, but also of significance and potential for application in practice. The scientific indicators of Dr. Stefanov completely cover and in some indicators exceed the national criteria and the criteria of IBFBMI for holding the academic position of "associate professor".

I positively assess the candidacy of senior assistant professor M. Stefanov for the academic position "associate professor" and I will vote YES. I recommend the members of the esteemed Scientific Jury to propose to the members of the Scientific Council of IBFBMI to elect Dr. Martin Stefanov for the academic position of "associate professor" in the professional direction "4.3. Biological Sciences", Scientific specialty "Biophysics".

June 23rd, 2023
Sofia

Signature: 
/Prof. M. Veličkova/