

## STANDPOINT

On competition for promotion of "Associate Professor" in the Scientific Field 4.3. Biological Sciences, Scientific Specialty "Biophysics" for the needs of Department "Photoexcitable membranes" at Institute of Biophysics and Biomedical Engineering,  
Bulgarian Academy of Sciences (IBPhBME-BAS)  
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IBPhBME-BAS

Member of the Scientific Jury appointed by the Director of IBPhBME-BAS

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In the announced competition for the academic position of "Associate Professor" in the Scientific field 4.3. "Biological Sciences", scientific specialty "Biophysics" participats only one candidate, Chief Assistant Dr. Martin Angelov Stefanov. Martin Stefanov completed his higher education in 2014 with a Master's degree in "Plant Biotechnologies" at the Faculty of Biology of SU "St. Kl. Ohridski". In 2013 he joined the Institute of Biophysics and Biomedical Engineering of the Bulgarian Academy of Sciences, in the Department of "Photoexcitable Membranes" as a specialist, and in 2019 Stefanov was elected as a Chief Assistant. In 2018 he defended a Doctor thesis on "Adaptation mechanisms of the photosynthetic apparatus to salinity and light stress in two Paulownia lines" with scientific supervisor Prof. Emilia Apostolova and obtained the educational and scientific degree "doctor" in Professional Field 4.3. "Biological Sciences", scientific specialty "Biophysics". Dr. Stefanov has published 22 scientific articles and one book chapter that have been cited 133 times.

In the current competition for "Associate Professor", Dr. Stefanov participates with one book chapter and 16 articles. The journals in which the scientific papers are published are with IF (14) or with SJR rank (2). According to the ranking of scientific journals by quartiles, the published articles are as follows – 8 in journals with Q1, 3 – with Q2 and 4 – with Q3. In 9 of

the publications Dr. Stefanov is the first author, which is an indication of his substantial contribution. The h-index, after excluding self-citations in SCOPUS, is 7. The citations (133) of his published scientific works show the relevance of scientific investigations. The results of Dr Stefanov were presented at 39 international and national scientific forums. Dr. Stefanov participated in the implementation of 13 research projects, being the principal investigator of 4 of them. One of the projects is bilateral with Slovakia and 2 under the Agreement between BAS and Greece and Egypt.

A completed form for the fulfillment of the minimum national requirements under Art. 2b of the Law on the Development of the Academic Staff of the Republic of Bulgaria (ZRASRB) for Scientific Direction 4. Natural sciences, mathematics and informatics, Scientific Field 4.3. Biological sciences, Scientific Specialty "Biophysics" for the academic position of "Associate Professor" is applied. For all indicators (A, B, D and D) more than the required points are presented.

An extended reference of scientific contributions of Dr. Stefanov is attached.

The scientific interests of Dr. Stefanov are focused on elucidating the effects of a number of abiotic stress factors such as salinity, drought, increased amounts of heavy metals, low and high temperature etc. on the structural organization and functional activity of the photosynthetic apparatus, the adaptive mechanisms to abiotic stress, as well as a number of factors that have the potential to reduce stress-dependent negative consequences on photosynthetic activity and productivity of agriculturally important crops. The topic of investigation is particularly relevant because the elucidation of the mechanisms of the negative impact of stress factors on the efficiency of photosynthetic processes and their adaptation strategies can contribute to the development of strategies for obtaining more productive and tolerant crops in the context of global climate changes, negative consequences of industrialization and the need to provide sufficient food products for the ever-increasing population of the Earth.

Various types of higher plants such as the agricultural crops corn, sorghum, peas, wheat, rice, the model plant Arabidopsis, and also the tree species Paulownia are the object of research. A number of modern biophysical and biochemical methods have been applied both in vivo and on isolated thylakoid membranes. The changes in the photosynthetic activity of higher

plants under conditions of abiotic stress, as well as the effects of different signaling molecules (nitric oxide, salicylic acid) and nanoparticles to mitigate the negative consequences of stress are monitored.

- The main topic of Dr. Stefanov's research is the response of higher plants to salt stress. On comparing the response of sorghum and maize to NaCl treatment, a greater sensitivity of primary photosynthetic responses was found in maize compared to sorghum, providing additional information on the stress tolerance mechanisms of these two crops. The changes in the photosynthetic activity of C3 (pea) and C4 (maize) plants at increased salt concentrations were also followed and it was shown that the components of the photosynthetic apparatus of C3 plants were more sensitive than those with C4 type of metabolism. A detailed comparison of the functioning of the photosynthetic apparatus and the levels of carotenoids and antioxidant activity of two Paulownia lines (TF and EE) that differ in their salt tolerance, contributed to the elucidation of the salt tolerance mechanisms of Paulownia with a perspective to application of these tree species for phytoremediation on saline soils.
- Application of SNP (NO donor) to sorghum under salt stress conditions has been shown to result in an increased number of active PS2 reaction centers and greater photochemical activity of PS1.
- Preliminary investigations were performed for unravelling the effect of two types of nanoparticles, ZnO ( $\pm$ Si), on pea plants under physiological conditions and under salt stress. It was established that higher concentrations of ZnO were phytotoxic and induced oxidative stress under physiological conditions, while Si-coated particles (ZnO-Si) stimulated the photochemical activity of both photosystems. Both types of nanoparticles reduced the negative effect of salt stress on primary photosynthetic reactions, more pronounced by ZnO-Si.
- The effect of salicylic acid (SA) and of microalgae *Chlorella vulgaris* on the photosynthetic apparatus of rice plants were investigated, as well as the effect of nitrogen nutrition ( $\text{NO}_3^-$ ) of wheat plants under conditions of increased Cd stress. The SA, microalgae as well as nitrogen nutrition were shown to mitigate the Cd-induced stress in respect to photosynthetic activity.
- The involvement of alternative electron flows (PGR5-dependent electron flow around PS1 and plastid terminal oxidase (PTOX)-mediated electron transfer to oxygen) was assessed in the

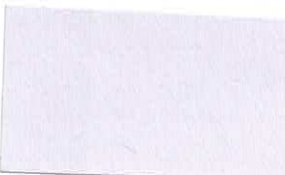
absence of lutein and in *Arabidopsis thaliana* plants treated with low temperature and high light intensity.

- It was shown that hydroethanolic extracts of *Sideritis scardica*, containing high levels of flavonoids and phenols and strong antioxidant and antiradical capacity, demonstrated cytotoxic properties when applied to cancer cells.

The habilitation reference could be presented in a more systematic way.

**In conclusion, I believe that the presented documents and scientific achievements are in agreement with the minimum national requirements for the acquisition of the academic position "Associate Professor", laid down in the Law on the Development of the Academic Staff of the Republic of Bulgaria for Scientific Area 4. Natural sciences, mathematics and informatics, Scientific Field 4.3. Biological sciences, Scientific Specialty "Biophysics". The research topic of the presented scientific achievements are in the frame of research topic of Department "Photoexcitable Membranes" of IBPhBME-BAS. I strongly support the promotion of the Chief Assistant Dr. Martin Angelov Stefanov as an "Associate Professor" for the needs of the Department "Photoexcitable Membranes" of IBFBMI - BAS**

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/Prof. Antoaneta Popova/