

## STAND POINT

### On a competition for the academic position "Professor"

**In the field of higher education 4. "Natural Sciences, Mathematics and Informatics", professional field 4.3. "Biological Sciences", scientific specialty "Biophysics", announced in SG no. 63/30. 07. 2021 for the needs of the department "Electroinduced and adhesive properties" at the Institute of Biophysics and Biomedical Engineering, BAS**

**One candidate has submitted documents for participation in the competition - Associate Professor Dr. Biliana Pancheva Nikolova-Lefterova, Head of the Section "Electroinduced and Adhesive Properties" at the Institute of Biophysics and Biomedical Engineering, BAS.**

**Reviewer: Professor Dr. Antoaneta Vidolova Popova at the Institute of Biophysics and Biomedical Engineering, BAS.**

In 1992 Biliana Pancheva Nikolova-Lefterova graduated the Faculty of Biology of Sofia University "St. Kl. Ohridski" with a master's degree in Biochemistry and Microbiology and in the same year became a specialist in biology at the Institute of Biophysics, Bulgarian Academy of Sciences (BAS). In 2001 she received the educational and scientific degree "Doctor" after successfully defending her dissertation "Electrotransmission of DNA. Role of adsorption and mechanism of electroporation in low-frequency low-amplitude pulses" with supervisor Prof. Yana Tsoneva. In 2013 Dr. Nikolova-Lefterova became an Associate Professor at the Institute of Biophysics and Biomedical Engineering, BAS. Since 2019, Assoc. Prof. Dr. Nikolova-Lefterova is the head of the department "Electroinduced and adhesive properties" at the Institute of Biophysics and Biomedical Engineering, BAS.

Assoc. Prof. Dr. Biliana Nikolova-Lefterova participates in the current competition with 25 publications (2013-2021), 16 published in scientific journals with IF, 4 published in journals without IF and 5 - with SJR. Regarding the ranking of scientific journals in quartiles, the publications of Assoc. Prof. Nikolova-Lefterova are as follows - Q1 - 3 publications, Q2 - 9, Q3 - 5 and Q4 - 4.

Under the supervision of Assoc. Prof. Nikolova-Lefterova, three Master's and one doctoral thesis were successfully defended (with the co-supervision of Prof. Rumyana Bakalova for the PhD thesis). Assoc. Prof. Nikolova-Lefterova has been a consultant of two youth projects at the Bulgarian Academy of Sciences and of one project for future career development under the MES Program for Support of Young Scientists and Postdoctoral Fellows, "Young Scientists" module. Assoc. Prof.

Nikolova-Lefterova has participated in the implementation of 9 international and 8 national projects, and has been the leader of two research projects at the Bulgarian Academy of Sciences and two funded by the Bulgarian Science Fund. She has been a reviewer for a number of scientific journals such as the International Journal of Bioautomation, Bulgarian Chemical Communications, Optical Engineering, Scientific Journal of Biomedical Engineering and Biomedical Science and others and has been a guest editor of the journal Separations.

A completed reference for the implementation of the minimum national requirements under Art. 2b of the Law for Development of the Academic Staff of the Republic of Bulgaria (LDASRB) for scientific field 4. "Natural sciences, mathematics and informatics", professional field 4.3. "Biological Sciences", scientific specialty "Biophysics" for the academic position "Professor" demonstrating that Assoc. Prof. Dr. Nikolova-Lefterova significantly exceeds the minimum requirements – by indicator B represents 115 points at required 100, by indicator D - 247 at required 220, by indicator D - 326 at required 120 and by indicator E - 245 at required 150.

Dr. Nikolova-Lefterova submitted as well a list of participations in 28 international and 15 national scientific forums.

The research interests of Assoc. Prof. Nikolova-Lefterova are focused on the study of cell survival, redox status and other cellular parameters after treatment with classical and new generation antitumor drugs, as well as with drugs of natural origin. The main approach in the research of the different cancer cell lines is the combination of the treatment with different drugs and the action of appropriate pulses of electric field, as a result of which there is a facilitated entry of the preparations into the studied cells.

The scientific contributions of Assoc. Prof. Dr. Nikolova-Lefterova are presented in two main sections. The **first section** summarizes the contributions in the 6 publications included in indicator B of the report on the minimum national requirements, habilitation work. The **second section** of the scientific contributions summarizes the scientific significance of the achievements in published scientific papers (16), that are referenced and indexed in international databases of scientific information (Web of Science and Scopus) and are grouped in indicator D of the minimum national requirements. The contributions in the second section are grouped in 5 subsections: 1. the application of electroporation for the treatment of skin tumors in humans; 2. related to teranostics with object of study mouse models and cell lines; 3. study of the redox status and its relation with the treatment of

cancer; 4. synthesis of new antitumor substances; 5. examination of isometric contractions of mesenteric arteries.

The **first section** includes contributions from studies of the cytotoxic effects of various natural substances such as glycolipid surfactants of bacterial origin and heteropolysaccharides of red microalgae, applied alone or in combination with electroporation on various cancer cell lines. The preparations have been shown to demonstrate a significant antitumor effect, enhanced by the applied electric field, without affecting the viability of non-tumor cells. Mechanisms of action of these natural substances have been proposed. A synergistic cytotoxic effect between mono- and di-rhamnolipid of bacterial origin and cisplatin (used in chemotherapy) has also been shown and a possible mechanism of action by remodeling the cell membrane by forming endosomes has been proposed.

The **second section** presents the contributions to the application of combined treatment with electric field and antitumor drugs, electrochemotherapy, as an easy, effective and fast method for the treatment of skin tumors in humans.

Polymersomes based on chemically modified chitosan are effective drug carriers and fluorescent contrast agents predominantly in tumor tissue for lymph node mapping and drug carriers for the treatment of metastases. They are also a good matrix for the development of nano-methods with teranostic capabilities.

The combined treatment of colon cancer in mice with conventional chemotherapeutics and melatonin has a strong anti-cancer effect by altering the ratio of "oncogenic" and "onco-suppressive" reactive oxygen species.

The combination of vitamin K and C increases the sensitivity of cancer cells to conventional chemotherapy by decreasing the effective dose of drugs and minimizing the harmful side effects. The cytotoxicity of 9 newly synthesized antitumor substances against three cancer cell lines was evaluated.

The research of Assoc. Prof. Dr. Nikolova-Lefterova is relevant, up-to-date and extremely important for the application of innovative approaches in the treatment of various oncological diseases. Her research activity is related to monitoring the effects of various antitumor drugs, both conventional and new generation. Some of the results are new to science.

The significant scientific contribution of Assoc. Prof. Dr. Nikolova-Lefterova in the published articles is illustrated by the fact that she is the first author in 7 of the publications, in 7 - the second and in 3 - the last author. The relevance of the scientific problems Assoc. Prof. Nikolova-Lefterova is dealing with is also demonstrated by the citations of her publications. H-factor of Assoc. Prof. Dr. Nikolova-Lefterova by SCOPUS, after excluding auto-citations of all authors is 8.

**Conclusion:**

All submitted documents and references by Associate Professor Dr. Nikolova-Lefterova for participation in the current competition for the academic position "Professor" definitively show that Assoc. Prof. Dr. Biliana Nikolova-Lefterova is a serious researcher and significantly exceeds the minimum national requirements set out in The Law for the Development of the Academic Staff in the Republic of Bulgaria (LDASRB) in the field of higher education 4. "Natural Sciences, Mathematics and Informatics", professional field 4.3. "Biological Sciences", scientific specialty "Biophysics" and the requirements included in the Regulations for the implementation of the LDASRB in the Institute of Biophysics and Biomedical Engineering, BAS, for the position of "**Professor**".

**Based on everything listed above, I strongly recommend the members of the scientific jury to award the academic position "Professor" of "Biophysics" for the needs of the Department "Electroinduced and adhesive properties" at the Institute of Biophysics and Biomedical Engineering, BAS, to Associate Professor Dr. Biliana Pancheva Nikolova-Lefteva.**

22. 11. 2021

Sofia

Signature:

/Prof. Antoaneta Popova/