

OPINION

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regarding the competition for the academic position of "Associate Professor" in the professional field 4.3. Biological Sciences, scientific specialty "Biophysics," for the needs of the Department of Optics and Spectroscopy at the Faculty of Physics, Sofia University "St. Kliment Ohridski," announced in the State Gazette, issue 88 of October 18, 2024.

Only **one candidate** has submitted documents for participation in the announced competition: Res. Assistant Professor Dr. Elitsa Lyubomirova Pavlova from **the Faculty of Physics at Sofia University "St. Kliment Ohridski."**

The candidate has submitted all the required documents in accordance with the Law on the Development of the Academic Staff in the Republic of Bulgaria and the Rules on the Conditions and Procedure for Acquiring Scientific Degrees and Holding Academic Positions in Sofia University "St. Kliment Ohridski". The provided documents are inadequately prepared and arranged.

General Information on the Scientific and Professional Development of the Candidate

Research Assistant Professor Dr. Elitsa Pavlova obtained a Master's degree in "Cell Biology and Developmental Biology" in 2001 and a Master's degree in "Biology and Chemistry" in 2002 from the Faculty of Biology at Sofia University "St. Kliment Ohridski.". In 2007, she obtained the educational and scientific degree "Doctor" upon successfully defending her dissertation on the topic "Assessment of Biomarkers of Oxidative Stress" at the Department of "Animal and Human Physiology" within the same faculty. Dr. Pavlova's scientific career began in 2005 at the Faculty of Physics of Sofia University "St. Kliment Ohridski" and has progressed through various academic positions: Assistant (until November 2007), Senior Assistant (until March 2011), and currently Res. Assistant Professor at the Department of "Optics and Spectroscopy". The candidate has 20 years of experience in scientific research. Dr. Pavlova's studies are focused on the field of medical biophysics.

Research activity

Dr. Pavlova's overall publication activity includes 34 publications, 20 of which are submitted for the Associate Professor competition. Among them, 17 articles are published in peer-reviewed journals with an impact factor, and there is also one report submitted to the World Health Organization (WHO). Ten of the articles were included in the dissertation summary for obtaining

the educational and scientific degree "Doctor". The quartile distribution of Dr. Pavlova's publications submitted for the Associate Professor competition is as follows: Q1 – 6, Q2 – 6, Q3 – 4, Q4 – 1, SJR – 3. The total impact factor of the scientific publications amounts to 46.4. Dr. Pavlova is the lead or corresponding author in 10 publications. The habilitation thesis (Group B indicators from the submitted report) includes 7 articles with a total impact factor of 10.28, distributed as follows: Q1 – 1, Q2 – 3, Q4 – 1, SJR – 2. According to the report submitted by the candidate, the total score based on scientometric indicators amounts to 786 (Indicator A – 50, Indicator B – 117, Indicator G – 255, Indicator D – 294, Indicator E – 167), exceeding the required minimum of 400 points. Furthermore, within the additional requirements of the Faculty of Physics at Sofia University, the candidate significantly exceeds the required minimum number of points. As of October 31, 2024, the report includes 150 citations (according to Scopus) and 137 (according to WoS). Dr. Pavlova exceeds both the minimum national requirements and the criteria set forth in the Rules on the Conditions and Procedure for Acquiring Scientific Degrees and Holding Academic Positions in Sofia University "St. Kliment Ohridski".

The Candidate's Contributions to Scientific Research – Main Directions and Key Findings

The scientific output presented in the report is categorized into four main thematic areas:

- ✓ For the first time, a comprehensive approach is proposed for assessing the pro- and antioxidant activity of plant extracts, chemical compounds, pharmaceutical substances, and oxidative stress markers in various diseases (influenza, breast cancer, COVID-19) using *ex vivo*, *in vitro*, and *in vivo* models
 - E. Pavlova is part of an interdisciplinary team investigating the mechanisms of damage and the development of novel preventive and therapeutic strategies against influenza, COVID-19, and breast cancer, with a focus on antiviral and antioxidant therapies. She is also involved in an international collaboration with Lenox Hill Hospital, New York, for breast cancer research, and her findings have been published in reputable scientific journals.
 - Previously unexamined combinations of antiviral agents and antioxidants in the studied research highlight a synergistic approach to the treatment of viral infections. This novel strategy aims not only to suppress viral replication but also to reduce oxidative stress, which contributes to tissue damage and disease progression.
- ✓ E. Pavlova investigates the safety and toxicity of nanomaterials, assessing their potential risks and applications in medicine for diagnostic and therapeutic purposes
 - A valuable contribution of her work is the investigation of the antibacterial and antioxidant properties of nanocomposites for the assessment of cellular viability.
 - The use of luminescent analyses for characterizing nanomaterials with antibacterial and antioxidant properties, including nanocomposites of TiO₂, Fe₃O₄, ZnO, reduced graphene oxide (RGO), and hybrid materials, enables a more precise assessment of the effects of nanoparticles on cells and oxidative stress. This is of significant importance for medical applications.

- ✓ An innovative approach has been developed for the direct immobilization of biomaterials using MAPLE (Matrix-Assisted Pulsed Laser Evaporation), which preserves the activity of biomolecules, enhances the accuracy, sensitivity, and specificity of biosensors in real-time monitoring of physiological processes, detection of toxins, and other analytes. This, in turn, expands the capabilities of biosensor technologies
- Res. Assist. Prof. Dr. Elitsa Pavlova is involved in the analysis and optimization of immobilization processes, the evaluation of biosensor efficiency, and actively participates in the development of novel surface plasmon resonance (SPR) sensors based on MAPLE technology. Her work contributes to the advancement of highly sensitive biosensors with potential applications in medical diagnostics and real-time monitoring.
- As a result of these studies, the first SPR sensor based on hemoglobin (Hb) and myoglobin (Mb) has been developed, demonstrating enhanced biosensor efficiency in the detection of CO, CO₂, and NO.
- ✓ A modified ATP-based method has been developed, demonstrating high reliability in assessing the viability of the BCG vaccine, making it suitable for routine quality control in the vaccine production process
- The test results have contributed to the establishment of the first international standard for the BCG vaccine derived from the Moreau-RJ sub-strain.
- The role of /res. Assist. Prof. Dr. E. Pavlova in this research is significant and includes conducting the ATP test, analyzing the obtained data, and correlating it with the standard microbiological method for assessing the number of viable units. Her contribution has facilitated the validation of the method and its establishment as a reliable tool in the quality control of the BCG vaccine. The results of this study have been published and contribute to advancements in the field of vaccinology.

Organizational and educational activities

Dr. Pavlova has participated in the development of nineteen research projects, serving as the principal investigator in seven of them and as a team member in the remaining twelve. Her leadership in managing seven projects demonstrates her strong organizational skills. Dr. Elitsa Pavlova has supervised 12 graduate students from the Faculty of Physics (FP) at Sofia University "St. Kliment Ohridski" and 2 graduate students from the Faculty of Chemistry and Pharmacy (FCP) at the same university). Additionally, she has served as a consultant for three more graduate students from the Faculty of Physics, demonstrating her responsibility and strong management skills. Furthermore, the candidate has accumulated a significant number of teaching hours, contributing to her extensive pedagogical experience.

Critical Remarks and Recommendations

The habilitation report could be presented in a more systematized and understandable form.

Conclusion

In conclusion, Res. Assist. Prof. Dr. Elitsa Pavlova has made significant scientific contributions in the fields of biochemistry, nanomaterials, and antimicrobial therapy. Her research encompasses a wide range of topics, including pro- and antioxidant activity, nanomaterial safety, the development of novel biosensor systems, and the assessment of BCG vaccine activity. These contributions are of significant importance for advancements in medicine and science. Based on the submitted documents and reports for the competition, it is evident that Dr. Pavlova's scientific achievements and scientometric indicators fully meet, and even exceed, the recommended criteria for holding the academic position of "Associate Professor" in accordance with the Law on the Development of the Academic Staff in the Republic of Bulgaria and the Rules on the Conditions and Procedure for Acquiring Scientific Degrees and Holding Academic Positions in Sofia University "St. Kliment Ohridski". In view of the presented materials, I would like to recommend that the esteemed members of the Scientific Jury propose to the competent authority of the Faculty of Physics at Sofia University to appoint Research Assistant Professor Dr. Elitsa Pavlova to the academic position of "Associate Professor" in the professional field 4.3. "Biological Sciences," with a specialization in "Biophysics."

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Prepared the opinion:

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