

## STATEMENT

on the competition for the academic position of "**Associate Professor**" in the field of higher education 4. "Natural Sciences, Mathematics, and Informatics", professional direction 4.3. "Biological Sciences", scientific specialty: "Biophysics", announced in SG No. 88 of 18.10.2024.

From **Prof. Dr. Natalia Krasteva, PhD**, Institute of Biophysics and Biomedical Engineering, Bulgarian Academy of Sciences, a member of the scientific jury for the selection of an **Associate Professor**, in accordance with Order No. RD-38-667 of 06.12.2024 by the Decan of Biological Faculty, Sofia University "St. Kliment Ohridski"

### *1. A brief overview of the applicant*

The only candidate for the competition, announced in the State Gazette, Issue No. 88 of October 18, 2024, is Dr. Elitsa Lyubomirova Pavlova from the Department of Optics and Spectroscopy at the Faculty of Physics, Sofia University "St. Kliment Ohridski," Sofia.

Dr. Elitsa Pavlova completed her higher education in 2002 at the Faculty of Biology, Sofia University "St. Kliment Ohridski." She holds two master's degrees: one in Cellular Biology and Developmental Biology (2001) and another in Biology and Chemistry (2002). In 2007, she successfully defended her dissertation on "Assessment of Biomarkers of Oxidative Stress" under the supervision of Prof. Varban Savov at Sofia University "St. Kliment Ohridski," earning a Doctoral degree in the scientific specialty 01.06.17-physiology of Animals and Humans. Since 2005, Dr. Pavlova has been a permanent faculty member at the Faculty of Physics, Department of Optics and Spectroscopy, where she has progressively held the positions of chemist, assistant professor, and chief assistant professor.

### *2. General Description of the Materials Submitted for the Competition*

Dr. E. Pavlova has submitted a set of materials for the competition by the requirements of the ZRASRB and its implementation regulations, as well as the Rules for the Conditions and Procedure for the Acquisition of Scientific Degrees and the Occupation of Academic Positions at Sofia University "St. Kliment Ohridski." The submitted materials include: An application to the Rector of Sofia University for participation in the competition; CV; Diplomas for acquired degrees and academic titles; Citations and publications related to the competition; Accompanying materials such as service notes, certificates from employers, project managers, project documentation, etc. However, the competition documentation contains some errors and omissions, gaps, and incomplete documents.

### *3. Assessment of the Applicant's Scientific Work*

Dr. E. Pavlova has a total of 27 scientific publications as referred in SCOPUS. 21 publications are in journals with an IF: 6 in Q1 journals, 11 in Q2 journals, 4 in Q3 journals; 6 publications are in SJR-ranked journals (1 article is in a journal without an Impact Factor; 4 publications are in conference proceedings and one book chapter). Dr. Pavlova has 157 independent citations (excluding self-citations) in SCOPUS, with a Hirsch index (H-index) of 6. Additionally, she has listed seven other publications without an IF or SJR ranking, including one report to the WHO, in which she is not listed as a co-author. Thus, it is not recognized as her publication.

For the Associate Professor competition, Dr. Pavlova participates with 20 publications: 6 in Q1 journals, 6 in Q2 journals, 3 in Q3 journals, 5 in SJR-ranked journals.



For Scientific Field 4: Natural Sciences, Mathematics, and Computer Science, Professional Field 4.3: Biological Sciences, the candidate's contributions are assessed as follows:

Group A (Indicator 1): Dissertation for the Doctoral degree – 85 points, exceeding the required minimum of 50 points.

Group B (Indicator 4): Habilitation work or scientific publications indexed in Web of Science and SCOPUS – 117 points (covering 10 publications).

Group C (Indicator 7): Publications with Impact Factor or SJR ranking – 255 points (minimum requirement: 200 points). 250 points are recognized, as Publication G5 lacks an IF and only has an SJR ranking.

Group D (Indicator 11): Citations in scientific publications, monographs, and patents. Required: 50 points, Achieved: 147 points. 147 citations were presented, corresponding to 294 points (each citation = 2 points). The candidate significantly exceeds the minimum requirements for an Associate Professor in this category.

Group E (Indicators 14-18): Participation in scientific projects – Not mandatory, but 167 points have been achieved.

Dr. Pavlova's scientific contributions substantially exceed the minimum national requirements for the position, particularly regarding citations and indexed publications.

#### **4. Analysis of the Applicant's Scientific Achievements**

Dr. E. Pavlova's scientific research, as demonstrated by the works submitted for the competition, spans a broad range of topics, including antiviral drugs, antioxidants, nanomaterials, and biomarkers, with a particular focus on diseases such as influenza, COVID-19, and cancer. Her studies are conducted across various model systems, including *ex vivo*, *in vitro*, and *in vivo* approaches. Her key contributions can be categorized into the following research directions:

##### **1. Studies on Influenza Therapy and Antioxidants**

1.1. The superior efficacy of combined antiviral and antioxidant therapies has been demonstrated, particularly the combination of oseltamivir, isoprinosine, and ellagic acid in H3N2-infected mice. This combination improved survival, reduced lung pathology, and mitigated oxidative stress [B1].

1.2. The chelating effect of a polyphenolic extract from *Geranium sanguineum L.* against  $Fe^{2+}$  has been established [B4].

1.3. Ethanol extract of *Tanacetum vulgare L.* has demonstrated strong antioxidant activity, inhibitory effects on herpes simplex virus type 1 (HSV-1) replication, moderate antiviral activity against influenza A (H3N2), and no significant effect on coxsackievirus B1 (CVB1) [B6].

##### **2. Contributions to COVID-19 Research**

2.1. The nucleocapsid (N) and spike (S) proteins of SARS-CoV-2 have been found to effectively suppress oxidative processes, exhibiting stronger antioxidant activity than albumin. This suggests that these viral proteins may protect against oxidative stress triggered by the immune response during infection [G6].

##### **3. Contributions to Cancer Research**

3.1. Low concentrations of resistin have been found to exert significant pro-oxidant effects in breast cancer cells (MCF-7, MDA-MB-231), leading to increased levels of thiobarbituric acid-reactive substances (TBARS) and carbonylated proteins. These findings suggest resistin's potential role as a metabolic signaling molecule in inflammation and cancer progression [G7].

##### **4. Contributions to Nanomaterial Toxicity Studies**

4.1.  $TiO_2$  nanocomposite thin films exhibit stronger antibacterial effects against *Pseudomonas putida* at room temperature, whereas layers deposited at higher temperatures show only bacteriostatic effects [B5].



4.2. Iron nanoparticles demonstrate strong antioxidant properties, while TiO<sub>2</sub> exhibits a moderate pro-oxidant effect under neutral and alkaline conditions. The combination of TiO<sub>2</sub> with talicarpine enhances antibacterial activity against both Gram-positive and Gram-negative bacteria [B7].

4.3. Zinc oxide (ZnO) nanoparticles show strong antimicrobial effects and increased pro-oxidant activity across various pH levels and reactive oxygen species (ROS)-generating systems. In contrast, SiO<sub>2</sub> nanoparticles exhibit biocompatibility and antioxidant properties [G3].

4.4. Reduced graphene oxide (rGO) nanocomposites with silver, zinc, and copper exhibit strong antibacterial activity against *Escherichia coli* and *Staphylococcus aureus* and demonstrate selective cytotoxicity toward cancer cells [G4, G5].

4.5. A comprehensive review of the antimicrobial properties of copper and copper nanoparticles has been conducted, highlighting their potential as antibiotic alternatives in combating infections [G8].

4.6. Silica-polyvinylpyrrolidone (SiO<sub>2</sub>/PVP) hybrid materials, in combination with vancomycin and ciprofloxacin, significantly enhance antibacterial efficacy, including against resistant bacterial strains [G10].

4.7. A green synthesis method for biocompatible ZnO nanoparticles (ZnO-NPs) using *Heliotropium rariflorum* has been developed, demonstrating strong antibacterial, antifungal, antioxidant, analgesic, and antipyretic properties [G11].

4.8. A sol-gel-derived hybrid material based on silica (SiO<sub>2</sub>) and polyvinylpyrrolidone (PVP) has been synthesized, exhibiting promising optical properties and synergistic antimicrobial effects in combination with antibiotics against various bacterial and fungal strains [G12].

4.9. The bactericidal efficacy of silver-doped zeolites (X and ZSM-5) is proportional to silver content. High-silver AGX exhibits stronger antibacterial effects against *E. coli* than *S. aureus*. However, silver concentrations above 0.01 g/L pose potential environmental risks to *Daphnia magna* [G13].

## **5. Contributions to Biosensor Development**

5.1. A novel method for depositing thin films of hemoglobin, myoglobin, and hemin using MATRIX-ASSISTED PULSED-LASER EVAPORATION (MAPLE) has been developed. This approach preserves the biological activity of the proteins, enabling their application in gas detection (CO, CO<sub>2</sub>, NO) and enhanced sensor performance [B2, B3, G2]

## **6. Development of a Modified Rapid ATF Test**

6.1. A modified rapid ATP test has been developed to assess the viability of lyophilized BCG vaccines. Based on the Statens Serum Institute (SSI) Copenhagen protocol and aligned with WHO recommendations, this method improves vaccine viability assessment [G9, B1].

## **5. Teaching Activity**

As indicated in the provided reference, Dr. Pavlova's teaching workload over the past five years meets the requirements set by the Rules of Sofia University "St. Kliment Ohridski" for faculty workload. She has accumulated over 500 hours of total teaching activity, including more than 450 hours of direct classroom instruction. In addition to her teaching responsibilities, E. Pavlova has supervised or co-supervised 17 graduate students, all of whom have successfully defended their theses. However, no specific information has been provided regarding the topics of the courses and practical exercises she teaches.

## **6. Participation in Project Implementation and Management**

Dr. Pavlova has presented a list of 19 projects in which she has participated as either a project leader or a team member, spanning international, national, and institutional levels. According to



the provided documentation, she has served as the principal investigator (PI) on seven scientific projects, including one funded by the Research Fund, with a total budget of BGN 37,500. She has also been awarded three personal scholarships and led three internal institutional projects at Sofia University, "St. Kliment Ohridski."

#### **7. Citations of the Applicant's Scientific Works**

The impact of the applicant's scientific contributions is reflected in the number of citations. Dr. Pavlova has provided a list of 147 citations, all indexed in Scopus and Web of Science, which strongly indicates the recognition and relevance of her research within the scientific community.

#### **8. Personal Impressions of the Candidate**

I do not have personal acquaintance with the candidate.

#### **9. Critical Notes and Recommendations**

I have several remarks and recommendations regarding presenting the candidate's materials. In future applications, I suggest paying closer attention to the structure and organization of the documents. In this case, some sections appeared disorganized, certain key details were missing, and other information-such as conference participation-was repeated, making the review process more challenging. Additionally, the impact factor (IF) of the journals in which the scientific works are published was not specified for the year of publication. While this does not affect the total points in indicators B and D, which are determined by the journal quartile, it would be more precise to provide the IF for the respective publication year whenever possible. Another important note concerns the formulation of contributions. It would be beneficial to categorize them more clearly, distinguishing between: Significant contributions directly related to the habilitation work (indicator B), and Additional contributions beyond the habilitation work (indicator D). This structured approach would enhance the clarity and impact of the presented achievements.

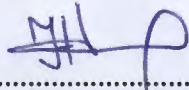
#### **10. General Assessment of the Applicant for the Academic Position of "Associate Professor"**

Dr. E. Pavlova meets all the mandatory requirements and scientometric indicators necessary for the academic position of "Associate Professor" at Sofia University. This conclusion is based on the documents submitted by the candidate and their thorough analysis, as outlined in this report. Furthermore, her qualifications align with the minimum standards for the position, as defined by the ZRASRB, the applicable rules for its implementation, and the regulations for acquiring scientific degrees and academic positions at Sofia University "St. Kliment Ohridski".

#### **11. Conclusion**

In light of the above, I recommend that the scientific jury propose to the Scientific Council of the Faculty of Biology at Sofia University "St. Kliment Ohridski" the selection of Dr. Elitsa Pavlova for the academic position of "Associate Professor" in Professional Area 4.1 Physical Sciences, Scientific Specialty Biophysics.

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Prepared by:   
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