

REVIEW

About the competition for "Associate Professor"
in professional management 4.3. "Biological Sciences",
specialty "Animal and Human Physiology",
announced in SJ no. 88 of 18.10.2024
for the needs of Department "Optics and Spectroscopy"
Faculty of Physics, Sofia University "St. Kliment Ohridski"

Reviewer: Prof. Hristo Stefanov Gagov, PhD

Faculty of Biology, Sofia University "St. Kliment Ohridski "

Candidate: Elitsa Lubomirova Pavlova, the only candidate

Brief professional biography of the candidate. Elitsa Lyubomirova Pavlova obtained a master's degree in "Cell Biology and Developmental Biology" at the Faculty of Biology, Sofia University "St. Kliment Ohridski" in 2001 and a teaching MD in "Biology and Chemistry" in 2002. Her CV lacks data on her work activities in the period 2002 - 2005, except various short-term training abroad that are mentioned. In 2005, she began working successively as a chemist (October 2005 - July 2007), assistant (August 2007 - November 2007), senior assistant (November 2007 - March 2008) and chief assistant (from April 2008 - to date) at the Department of "Optics and Spectroscopy" of the Faculty of Physics at Sofia University "St. Kliment Ohridski". For several months in 2008, she worked as researcher at "Bull Bio - NCZPB" Ltd. In 2007, she was awarded with "PhD" degree in the professional field 4.3. "Biological Sciences", scientific specialist "Animal and Human Physiology" for a PhD thesis entitled "Assessment of biomarkers of oxidative stress". Her scientific supervisor was Assoc. Prof., DSci. Varban Minkov Savov. Dr. Elitsa Pavlova has acquired additional qualification with 12 courses in the field of biomedical research and physiology. In 2021, she won a grant from the Fulbright Foundation for a visit of Lenox Hill Hospital, New York, USA. This institution was visited for a month in 2024.

Characteristics of its scientific and applied scientific production

I accepted for review all submitted works by Elitsa Pavlova as scientific publications in the field of the competition. Assistant Professor Dr. Elitsa Pavlova has submitted 34 publications under this competition. Of these, 10 are in connection with the acquisition of the ONS "doctor", with 4 having an impact factor (IF) (3 in journals with Q2 and one with Q4), a book chapter and 5 others. Four other papers have been added, 3 of them with an IF (1 with Q1 and 2 with Q2). The NACID criteria under indicator C are covered by the attached 5 articles with IF (1 with Q1, 3 with Q2 and 1 with Q4) and two in collections with SJR. They collected 117 points. Under indicator D, 13 scientific publications are included, 12 of them with an IF (5 with Q1, 3 with Q2 and 4 with Q3) and one is from a conference collection with SJR. With them, she scores 255 points. Thus, under indicators C and D, a total of 20 publications were applied, of which 17 are with IF and are grouped with Q1 - 6, Q2 - 6, 4 with Q3 and 1 with Q4. All publications are in the field of the competition. The publications are generally precisely crafted and of significant scientific value, which is confirmed by the large number of citations.

I notice 156 citations of publications by Assist. Prof. Elitsa Pavlova in the Scopus system after eliminating self-citations. 106 of them are citations from 2020 to date, and 31 (the most for a single year for her career) are from 2024 (checked on 31.01.2025). These data testify to her increasing scientific recognition and the relevance of her research topics. Her individual h-index in Scopus is 6. A total of 147 citations are included in this competition, which is about six times more than required for the academic position of "associate professor". Assist. Prof. Elitsa Pavlova has participated in 60 conferences and congresses. Across the entire group of scientometric indicators, the candidate for the academic position of "associate professor" has presented data exceeding the minimum requirements under the Regulations for the Implementation of the Law on the State of the Republic of Bulgaria on the Promotion of Research and Development, including the most important ones - the publications necessary to meet indicators "C" and "D", and the number of citations in Scopus.

In terms of participation in scientific projects, she has been particularly active. She has participated in seven projects with Sofia University "St. Kliment Ohridski", of which she was the leader in 3 and a member in 4. In addition, she has 3 projects that are named scholarships, 2 of which are with the Fulbright Foundation, and the remaining nine are with the Scientific Research Fund and with the Ministry of Education and Science/Ministry of Education, Science and Technology, as the ministry was called over the years. She has led one national project, the contract for which began on 20.12.2020, entitled "SYNTHESIS AND RESEARCH OF THE

PHYSICOCHEMICAL CHARACTERISTICS OF LOFIN AND ITS DERIVATIVES AS NEW CHEMILUMINESCENT ACTIVATORS IN MEDICAL-BIOLOGY RESEARCH".

Main contributions to the candidate's scientific, applied scientific and teaching activities

Assist. Prof. Elitsa Pavlova has presented 4 pages of contributions, all of which are in the scientific field of the competition. It is emphasized that for more than two decades she has been a researcher in an interdisciplinary team that studies the effects of the application of new combinations of antiviral and antimicrobial drugs and various antioxidants. In addition, she has evaluated biomarkers for COVID, and has also clarified the mechanisms of damage from influenza and COVID in order to reduce the severity of these diseases and prevent their complications. As a result of these studies, it was found that the nucleocapsid (N) and spike (S) proteins of SARS CoV-2 exhibit significant antioxidant activity towards reactive oxygen species (ROS).

Some of the studies are aimed at establishing the effects of different plant extracts. It has been found that a polyphenolic extract from *Geranium sanguineum* L. (blood (red) geranium) has the potential to improve the condition in influenza due to its antioxidant activity and its chelating ability towards Fe^{2+} . These results were obtained using *ex vivo* model chemiluminescent systems and in mice infected with influenza virus H3N2, in which restoration of the activity of hepatic monooxygenase enzymes and cytochrome P450 (C4, D1) was observed. These studies are a continuation of similar studies conducted in connection with her PhD thesis (4,5).

Another study investigated the antiviral effects of an extract of *Tanacetum vulgare* L. (tadpole) on herpes simplex virus type 1 (HSV-1), influenza virus A (H3N2) and coxsackievirus B1 (CVB1). The extract studied, which has strong antioxidant activity. It significantly inhibits HSV-1 replication, has moderate antiviral activity against H3N2 and has no effect on CVB1. Different cell cultures were used for these studies and for toxicity of the extract (C6).

Other studies have investigated the mechanisms of damage in breast cancer. In human breast cancer cell lines MCF-7 and MDAMB-231, and the non-cancerous MCF-10A control, the pro-inflammatory cytokine resistin has been shown to have a pro-oxidative effect at moderately high physiological concentrations (12.5 nM/mL), as judged by reduced levels of thiobarbituric acid reactive products and carbonylated proteins (D7). In this rather large-scale study, which included the effects of resistin, leptin and vitamin C on the activities of key antioxidant enzymes, I find the action of resistin to be quite diverse, given the differences observed over the days of the three-day study. In any case, the adipokine resistin is now

considered a tumor promoter that links breast cancer to obesity (see, e.g., Ließem et al., 2025; doi: 10.2147/BCTT.S491277).

A significant part of the scientific research of the teams with which Elitsa Pavlova has partnered is dedicated to the antibacterial properties, biocompatibility and toxicity of nanomaterials and nanoparticles. Such are the effect of nanocomposite thin layers of TiO_2/Cu on the bacterium *Pseudomonas putida* (C5); the prooxidant and antimicrobial activity of nanoparticles of iron (Fe_3O_4) and titanium oxides (TiO_2) (C7); the biological activity of newly synthesized nanocomposites of reduced graphene oxide and its combinations with silver, copper and zinc oxide (D3, D4, D8). Elitsa Pavlova's studies in the biomedical field are complemented by work with hybrid materials of silica and polyvinylpyrrolidone, applied in a ratio of 4:1, which have been found to significantly increase the antibacterial effect of the combination of the antibiotics vancomycin and ciprofloxacin (C5, D12).

Some purely methodological contributions are also included. These include the development of thin films of hemoglobin, myoglobin, or hemin with retained gas binding capacity, making them suitable for biosensors for CO, CO_2 , and NO (B2,B3,D2), using MAPLE (Matrix-Assisted Pulsed-Laser Evaporation) technology. In addition, a modification of a rapid ATP test was developed to determine the viability of lyophilized BCG vaccine (13, 14, D9).

Another contribution is related to the development of low-toxic nanoparticles of zinc oxide, which exhibit antibacterial, antifungal, antioxidant, analgesic and antipyretic properties. To obtain these nanomaterials, an interesting methodology of mixing a solution of zinc acetate and an aqueous extract of the plant *Heliotropium rariflorum* (D11) in a highly alkaline environment was used. This method has been known since 2023. The development of materials with potential application in medicine is also based on another study, in which a hybrid material of silicon dioxide and polyvinylpyrrolidone (D10) was formed. The resulting structure demonstrated antimicrobial and antifungal effects that enhance those of the antibiotic vancomycin and the antifungal ionophore nystatin (D12). The hybrid material $\text{SiO}_2/\text{polyvinylpyrrolidone}$ showed excellent tolerance in the same test as the dose of 0.01 g/l for 24 and 48 hours left 97% of the crustacean *Daphnia magna* (water flea; D12). The contributions related to new materials are complemented by the studied antimicrobial properties and oxidative effect of silver-substituted zeolites X and ZSM-5. It was found that the antibacterial properties of the zeolite AgX increase with increasing silver content and a greater selectivity was found against *E. coli* compared to *S. aureus*. Ecotoxicological tests with *Daphnia magna* showed moderate toxicity of zeolites X and ZSM-5 and the presence of maximum permissible doses in the environment up to 0.01 g/L was proposed (D13).

As an experimenter in the teams that conducted the above studies, Assist. Elitsa Pavlova has specialization mainly in screening biomarkers of oxidative stress and determining enzyme activities, as well as in the interpretation of the results. This circumstance, as well as her place as a co-author in the publications under criteria C and D, where in the publications with IF in 8 of them she is the first author (3 with Q1, 2 with Q2, 2 with Q3, 1 with Q4), in 3 – second (1 with Q1, 1 with Q2 and 1 with Q3) and in 2 – last (1 with Q1 and 1 with Q2).

I am very impressed by the scientific-applied and applied nature of the distinguished research contributions. In them, the expert and experimental contribution of Elitsa Pavlova is undeniable, given her place in the applied publications, as well as the specialization in some biochemical and other methodologies. The relevance of the conducted research is confirmed by the large number of citations (157 in the Scopus, checked on 31.01.2025). In terms of toxicity, the promising results obtained with nanomaterials as means for improving the redox status of patients with infectious and tumor diseases are initial and only suggest the possibility of their use as supporting therapy for antibiotic-resistant bacterial strains or as antitumor agents. In all such studies, however, such materials, extracts or newly synthesized substances are too far from their application to humans, because there are still many mandatory studies and huge costs ahead before their application in therapy as drugs. Often, this possibility is dropped at later stages as a result of these large-scale clinical trials.

I accept the presented scientific contributions as presenting and proving new facts, and also as having contributed to the formation of skills and expertise, i.e. as having built the competence necessary for a habilitated teacher.

Teaching experience. Since 2007, Elitsa Pavlova has been teaching classes for students at the Faculty of Physics of Sofia University "St. Kliment Ohridski". Over the past five academic years, her teaching activity has been well above the required 360 hours, of which at least 270 hours are lecture and seminars hours. Thus, her lectures and practical lesson in the indicated period vary from 456 hours (2019/2020 academic year) to 569 hours (2021/2022 academic year), and her total hours - from 489 hours (2019/2020 academic year) to 630 hours (2021/2022 academic year). These data indicate significant teaching experience. There is no information about the assignment of lectures that she may have led. This would strengthen my belief in her readiness for a habilitated teacher.

Other activities. Over the years, Assistant Professor Elitsa Pavlova has worked with many graduates. The reference shows that there are 17 successfully defended theses with her participation as a scientific supervisor or consultant. The MD theses are in the field of the

competition for "associate professor". It is clear from her scientific biography that she works with English, Russian and Spanish.

No information has been provided about her membership in scientific organizations or whether she has been awarded.

Conclusion

The candidate for this competition has significant scientific creativity, many participations in scientific projects and scientific forums, has a number of significant scientific and applied scientific contributions, significant teaching experience and ensured teaching activity according to the curriculum, as well as sufficient publications and citations. These activities exceed, in some cases, such as in the case of citations multiple times, the minimum criteria for the academic position of "associate professor" of the Law on the Development of the Academic Staff of the Republic of Bulgaria and the Regulations for its implementation. All this makes me recommend to the esteemed Scientific Jury to vote FOR the election of Elitsa Lyubomirova Pavlova as "associate professor" in the field of higher education 4. "Natural Sciences, Mathematics and Informatics", in the professional field 4.3. "Biological Sciences", scientific specialty "Animal and Human Physiology" for the needs of the Department "Optics and Spectroscopy", Faculty of Physics, Sofia University "St. Kliment Ohridski".

Sofia, February 13, 2025

Reviewer:

/ Prof. Hristo Gagov, PhD /