

OPINION

regarding the materials submitted by Chief Assistant Professor Natalina Konstantinova Panova, PhD, for participation in a competition for the academic position of “Associate Professor” in the Field of Higher Education 4. Natural Sciences, Mathematics and Informatics, Professional Field 4.1. Physical Sciences, specialty “Physics”, announced in the *State Gazette*, Issue No. 50 of 2 June 2026, for the needs of the Medical University “Prof. Dr. Paraskev Stoyanov” – Varna.

Opinion prepared by: Prof. Krastena Todorova Nikolova, PhD

Professional Field: 4.1. Physical Sciences

Institution: Department of Physics and Biophysics, Medical University – Varna

I. Analysis of the Candidate's Career Profile

Chief Assistant Professor Natalina Konstantinova Panova has demonstrated consistent academic and professional development directly related to physics, medical physics, and biophysics.

She completed her higher education in Physics, obtaining the professional qualification of “Physicist and Physics Teacher” at Shumen University. Between 2006 and 2009, she acquired a specialization in Biophysics at the Medical University – Varna, and in 2024–2025 she further enhanced her qualifications by completing a Master's degree in “Artificial Intelligence in Biomedicine” at the Medical University – Varna.

A significant stage in her academic development was the acquisition, in 2024, of the educational and scientific degree “Doctor” (PhD) in Medical Physics, following the successful defense of a doctoral dissertation entitled “Corrosion Resistance in Biological Fluids of AISI 321 Austenitic Steel after Laser Surface Treatment.” The dissertation falls within Professional Field 4.1. Physical Sciences and is directly related to the application of physical methods and laser technologies in the investigation of materials intended for medical applications.

The candidate's professional career at the Medical University – Varna began in 2001, when she was appointed as an Assistant Professor. From 2008 until February 2025, she worked as an Assistant Professor at the Faculty of Pharmacy, Department of Physics and Biophysics, and since February 2025 she has held the position of Chief Assistant Professor. As of 17 June 2026, she has accumulated 24 years and 9 months of teaching experience, demonstrating substantial practical expertise.

The academic development of Natalina Panova demonstrates continuity and consistency, as well as a clear commitment to expanding her expertise in contemporary interdisciplinary fields. I particularly value the integration of classical training in physics with biophysics, medical physics, materials science, laser technologies, and artificial intelligence in biomedicine. This combination provides a solid foundation for teaching and scientific research in a modern academic environment.

II. Evaluation of Scientific Publications and Research Activity

The research activity of Chief Assistant Professor Natalina Panova is characterized by a substantial volume of scientific work, a clearly expressed interdisciplinary profile, and increasing international publication activity in recent years.

According to the submitted documentation, the candidate is the author or co-author of 60 scientific publications, of which 21 have been published in international journals indexed and referenced in Web of Science and Scopus. These include 10 Q1 publications, 1 Q2 publication, 7 Q3 publications, and 3 Q4 publications. The reported h-index values are 5 in Scopus, 3 in Web of

Science, and 7 in Google Scholar, while the cumulative impact factor of the journals in which the papers have been published amounts to $IF = 55.3$. The documentation also reports 55 citations in Scopus, 26 in Web of Science, and 133 in Google Scholar.

These indicators demonstrate good international visibility of the candidate's scientific results.

Particularly noteworthy is the presence of publications in first-quartile journals, as well as the diversity of the research topics addressed, combined with the application of contemporary physical, spectroscopic, chromatographic, and materials-science methods.

The submitted scientific output can be grouped into three major research areas.

1. Biologically Active Substances, Natural Products, and Optical Methods for Their Characterization

A substantial part of the candidate's research is devoted to the physicochemical and biophysical characterization of natural products, plant extracts, essential oils and vegetable oils, as well as to evaluating their potential applications in pharmacy, cosmetics, and dietary supplements.

The studies include essential oils from German and Roman chamomile, yarrow, and other plant sources, *Moringa oleifera*, vegetable oils, and propolis. Analytical approaches include GC-MS, UV-Vis, FTIR, Raman spectroscopy, and three-dimensional excitation-emission fluorescence spectroscopy, which gives the research a distinctly physical and spectroscopic character.

In studies on *Moringa oleifera*, for example, the combination of fluorescence, infrared, and Raman spectroscopy has been proposed as a multispectroscopic approach for the characterization and quality control of plant products.

Particularly significant are the results establishing relationships between spectral characteristics, chemical composition, and the functional properties of the investigated materials. This approach is promising because it facilitates the development of rapid, non-destructive methods for screening and quality control.

Scientific contributions in this area include the comparative chemotypic and functional characterization of essential oils from different chamomile species, the comprehensive characterization of plant products, and the development of spectroscopic approaches for their identification and evaluation.

2. Microalgae and Functional Systems with Applications in the Food and Pharmaceutical Industries

The second clearly defined research area concerns *Arthrospira platensis*, *Chlorella vulgaris*, and their biologically active components.

Research results have been obtained regarding the stabilization of phycocyanin using Ca(II)-alginate microspheres and different hydrocolloids. It was established that the incorporation of inulin improves phycocyanin stability, and the conditions providing the highest degree of pigment retention were determined.

Another contribution concerns the investigation of the potential use of *Spirulina platensis* as a natural stabilizer and emulsifier in emulsion systems. Relationships were established between the concentration of spirulina, Gibbs free energy, physical stability, and the rheological behavior of the systems.

Models have also been developed for optimizing the drying of functional fruit products enriched with *Chlorella* and *Spirulina*, establishing relationships between drying temperature, product thickness, deformation, and sensory evaluation.

The scientific contributions in this area may be classified as scientific and applied, with potential for the development of functional foods, nutraceuticals, and pharmaceutical systems. According to the submitted documentation, the principal results include the development of systems for phycocyanin stabilization, optimization of technological regimes, and the establishment of

relationships between metabolic composition, particle size, and the biological activities of *Chlorella vulgaris*.

3. Materials Science, Laser Technologies, Corrosion in Biological Media, and 3D Printing

This research area is the most directly related to the professional field of the competition and represents a logical continuation of the candidate's doctoral research.

Studies on AISI 321 stainless steel investigate the influence of laser surface melting on the microstructure and corrosion behavior of the steel in artificial saliva and Ringer's solution. Using optical microscopy, SEM, EDX, and electrochemical methods, pitting and crevice corrosion have been analyzed, together with their relationship to the morphology and orientation of the dendritic structure.

I consider the proposed explanation of the mechanism of corrosion degradation of the laser-modified layer, as well as the established relationship between dendrite orientation and the development of corrosion pits, to represent particularly significant contributions.

According to the submitted documentation, the beneficial effect of laser melting on the corrosion resistance of AISI 321 steel in biological media has been demonstrated, and a model describing the mechanism of corrosion degradation has been proposed.

This research area also includes studies on 3D printing in pharmacy. A systematic analysis of SLA, SLS, FDM, IJP, and SSE technologies has been performed, evaluating their applicability, the materials employed, and their advantages and limitations in the personalized manufacturing of pharmaceutical dosage forms.

Overall, the candidate's scientific output demonstrates a successful integration of fundamental physical approaches with practical problems in medicine, pharmacy, materials science, and biotechnology.

III. Teaching and Educational-Methodological Activities

The teaching activity of Chief Assistant Professor Natalina Panova is substantial both in terms of duration and scope.

The candidate has participated in the practical training of students in Medical Physics, Biophysics, Physics and Biophysics, Biophysics and Biomechanics, Biomechanics, Optoelectronics and Laser Technology, Medical Physics and Instrumentation, Laboratory Equipment and Instrumentation, Equipment in Cosmetics, and other disciplines.

She has taught students enrolled in the programmes of Medicine, Dental Medicine, Pharmacy, Kinesitherapy, Biomedical Engineering and Technologies, Medical Optics, Medical Laboratory Assistant, Medical Cosmetology, among others.

This broad range demonstrates a high degree of adaptability and strong professional preparation in various areas of applied physics and biophysics.

The teaching workload during the last five academic years has been exceptionally high, ranging from approximately 907 to 1,103 hours per year, compared with a statutory teaching workload of 360 hours. This provides convincing evidence of substantial practical teaching experience and active involvement in the educational process.

The candidate's educational and methodological activity is further complemented by co-authorship of four teaching manuals with a total volume of approximately 550 pages. These include:

- *Collection of Sample Test Questions in Medical Physics for Students of Medicine and Dental Medicine;*
- *Collection of Sample Test Questions in Physics and Biophysics for Pharmacy Students;*

- *Laboratory Manual for Practical Exercises in Medical Physics and Biophysics for Pharmacy Students.*

The latter manual has a clearly practical orientation, combining self-study materials with laboratory exercises and work with measuring equipment.

I evaluate the candidate's teaching and educational-methodological activity as very good and fully consistent with the requirements for the academic position of "Associate Professor."

IV. Project Activities and Participation in Scientific Forums

Chief Assistant Professor Natalina Panova has participated in a number of internal university and larger-scale research projects.

These include Project No. 21003, focused on corrosion in biological fluids of chromium-nickel stainless steel after laser treatment; Project No. 21001, devoted to the development of a green method for obtaining phycocyanin from *Spirulina*; Project No. 23003, investigating the antitumor, anti-inflammatory, and antibacterial effects of plant extracts; as well as activities within the MUVE-TEAM project, including participation in the SMART research group.

The scientific results have been presented at numerous national and international scientific forums. The updated list includes participation in conferences held in Bulgaria, Poland, Croatia, Montenegro, Greece, Türkiye, the United Arab Emirates, and other countries, with the most recent participation listed as occurring in July 2026.

This activity demonstrates the candidate's active presence within the scientific community and her ability to work effectively in interdisciplinary research teams.

V. Comparison with the Minimum National Requirements

The submitted academic documentation confirms that the candidate meets and exceeds the minimum national scientometric requirements.

Under Indicator A, the candidate has obtained the required 50 points for holding the educational and scientific degree "Doctor" (PhD).

For the publications submitted as the equivalent of a habilitation thesis under Indicator B4, ten publications indexed in Web of Science and/or Scopus have been included. The values reported in the documentation amount to a total of 146 points, compared with the minimum requirement of 100 points.

Under Indicators G5–10, the candidate has obtained 225 points, compared with the mandatory minimum of 200 points, while under Indicator D, she has obtained 108 points, compared with the minimum requirement of 50 points, based on 54 reported citations in refereed and indexed scientific publications.

Group of Indicators	Mandatory Minimum	Candidate's Points
A	50	50
B4	100	146
G5–10	200	225
D	50	108
Total	400	529

Therefore, the candidate not only fulfils the minimum national requirements but exceeds them by 129 points, corresponding to slightly more than 32% above the mandatory overall minimum.

VI. Critical Remarks and Recommendations

From a technical perspective, a minor discrepancy between the individual documents should be noted. The report on scientific contributions lists **24 participations in scientific forums**, whereas the updated separate list contains **25 participations**.

This discrepancy has no bearing on the scientific evaluation of the candidate; however, it would be advisable to harmonize the information in the final documentation.

The recommendations indicated above do not diminish my positive assessment of the candidate's scientific and teaching activities.

VII. Conclusion

The submitted materials demonstrate that Chief Assistant Professor Natalina Konstantinova Panova possesses extensive and diverse teaching experience, proven research activity, and a publication record with good international visibility.

Her scientific research is interdisciplinary but is, to a significant extent, based on the methods and principles of physics, biophysics, medical physics, materials science, and optical spectroscopy.

Particularly significant are the studies on the corrosion resistance of metallic materials in biological media following laser treatment, the application of spectroscopic methods for the characterization of biologically active systems, and the development of new approaches for the application of physical methods in pharmaceutical and biomedical research.

The candidate meets and exceeds the minimum national scientometric requirements for appointment to the academic position of "Associate Professor." Her publication activity, citation record, participation in scientific projects and international forums, substantial teaching workload, and development of educational materials provide grounds for a highly positive overall assessment of her academic profile.

On the basis of the above, I give a positive evaluation of the application and confidently recommend that the esteemed members of the Scientific Jury propose to the Faculty Council of the Faculty of Pharmacy that Chief Assistant Professor Natalina Konstantinova Panova, PhD, be elected to the academic position of "Associate Professor" in the Field of Higher Education 4. Natural Sciences, Mathematics and Informatics, Professional Field 4.1. Physical Sciences, specialty "Physics."

Date: 15 September 2026

Opinion prepared by: Prof. Krastena Nikolova, PhD

Signature: ...



