

OPINION

by Assoc. Prof. Iliyana Dimitrova Stefanova-Kancheva, PhD, habilitated in Higher Education Area 4. Natural Sciences, Mathematics and Informatics, Professional Field 4.3. Biological Sciences, scientific specialty Biophysics, and specialist in Medical and Sanitary Physics, appointed as an external member of the Scientific Jury by Order No. P-109-265/30.07.2026 of the Rector of the Medical University of Varna

regarding: the competition for the academic position of Associate Professor in Higher Education Area 4. Natural Sciences, Mathematics and Informatics, Professional Field 4.1. Physical Sciences, specialty “Physics”, for the needs of the Department of Physics and Biophysics, Faculty of Pharmacy, Medical University “Prof. Dr. Paraskev Stoyanov” – Varna, opened in accordance with the Regulations of the Medical University of Varna and announced in the State Gazette, issue No. 50 of 02.06.2026.

Pursuant to the Academic Staff Development Act of the Republic of Bulgaria (ASDA), the Regulations for the Implementation of the Academic Staff Development Act (RIASDA), and the Regulations for the Development of the Academic Staff of the Medical University of Varna, a procedure has been opened for the academic position of Associate Professor in Higher Education Area 4. Natural Sciences, Mathematics and Informatics, Professional Field 4.1. Physical Sciences, specialty “Physics”, for the needs of the Department of Physics and Biophysics, Faculty of Pharmacy, Medical University “Prof. Dr. Paraskev Stoyanov” – Varna.

Within the statutory period following the announcement of the competition in the State Gazette, the required documents were submitted, and only one candidate was admitted to participate in the competition – Natalina Konstantinova Panova, PhD, Chief Assistant Professor at the Department of Physics and Biophysics, Faculty of Pharmacy, Medical University of Varna.

1. GENERAL INFORMATION ABOUT THE CANDIDATE AND ASSESSMENT OF HER PROFESSIONAL DEVELOPMENT

Natalina Konstantinova Panova was born on 03 August 1978 in Provadia. In 2000, she obtained a Master's degree in Physics, with professional qualification “Physicist, Physics Teacher”. In 2009, she obtained a specialization in Biophysics at the Medical University of Varna. In 2024, she obtained the educational and scientific degree “Doctor” (PhD) in Medical Physics after defending her doctoral dissertation entitled “Corrosion Resistance in Biological Fluids of AISI 321 Austenitic Steel after Laser Surface Treatment”. In 2024–2025, she obtained a Master's degree in Artificial Intelligence in Biomedicine.

The candidate's professional and academic career has been continuously associated with the Medical University of Varna. Between 2001 and 2024, she successively held the position of Assistant Professor at the Faculty of Public Health and the Faculty of Pharmacy. Since 2025, she has held the position of Chief Assistant Professor at the Department of Physics and

Biophysics, Faculty of Pharmacy, Medical University of Varna. Throughout her professional career, she has also performed administrative functions.

The available data demonstrate consistent and purposeful academic development, with professional qualifications progressing from fundamental physics to biophysics and medical physics, and subsequently to artificial intelligence in biomedicine. This has resulted in a broad interdisciplinary profile combining theoretical knowledge in physics with applied fields in medicine and contemporary biomedical technologies.

The scientific output of Chief Assistant Professor Natalina Konstantinova Panova, PhD, is characterized by consistent and actively developing interdisciplinary research activity focused on priority areas of the Medical University of Varna, including "Nutrition and Quality of Life", as well as on Professional Field 4.1. Physical Sciences. The studies employ physical, physicochemical, spectroscopic and electrochemical approaches for the characterization of natural bioactive systems and functional materials, investigation of structure–property relationships, electrochemical corrosion, laser surface treatment, and additive technologies with potential biomedical applications.

2. RESEARCH OUTPUT AND BIBLIOMETRIC INDICATORS

The candidate is an author and co-author of 60 scientific publications, 21 of which have been published in international journals indexed in Web of Science and Scopus, with an Impact Factor and/or Journal Impact Rank: 10 publications in Q1, 1 in Q2, 7 in Q3, and 3 in Q4. An additional 5 publications have been indexed in other scientific databases. Her scientific activity is further complemented by 24 presentations and poster contributions at international and national scientific forums.

The bibliometric indicators demonstrate good scientific visibility and citation impact of the publication activity. The h-index is 5 in Scopus, 3 in Web of Science, 7 in Google Scholar, and 6 in ResearchGate, with a total journal Impact Factor of $IF = 55.3$. The publications have received 55 citations in Scopus, 26 in Web of Science, 133 in Google Scholar, and 103 in ResearchGate. The submitted scientific output also includes publications constituting the required habilitation scientific corpus.

According to the submitted report, the scientific output under Groups of Indicators G5–G10 amounts to 225 points, exceeding the minimum threshold of 200 points required for appointment to the academic position of Associate Professor in Professional Field 4.1. Physical Sciences and exceeding the published minimum scientometric requirements of the Medical University of Varna for the respective academic position.

3. ANALYSIS OF THE MAIN RESEARCH AREAS AND ORIGINAL SCIENTIFIC CONTRIBUTIONS

The candidate's scientific output develops in three interrelated areas:

biologically active substances from plant extracts and essential oils;
microalgae, functional foods, and systems for the stabilization and delivery of bioactive substances;
materials science, laser processing, corrosion resistance in biological environments, and additive technologies in pharmacy.

A common feature of these areas is the application of physical, physicochemical, spectroscopic and electrochemical methods to establish relationships between composition, structure, properties, and biological or functional activity.

In the field of bioactive substances, an important contribution is the comprehensive characterization of natural products through the combination of chromatographic, spectroscopic and spectrophotometric methods with assessment of their biological activity. For essential oils from *Matricaria recutita*, *Chamaemelum nobile* and *Hypericum perforatum*, relationships have been established between chemical profile and antioxidant, antimicrobial, anti-inflammatory and photoprotective properties. In *Moringa oleifera*, the use of FTIR, Raman spectroscopy and 3D fluorescence enables the development of a comprehensive chemical and structural profile of the plant material, applicable to its characterization and quality control. A contribution is also represented by the investigation of the relationship between extraction method, chemical composition and biological activity of natural products, including plant oils and resins.

In the area of microalgae and functional products, the contributions are associated with the characterization and optimization of *Chlorella* and *Spirulina* as functional ingredients, as well as with the development of systems for stabilization and delivery of bioactive substances. A relationship has been established between technological processing conditions and the quality characteristics of functional products. The developed Ca(II)-alginate systems with hydrocolloids demonstrate the importance of composition and pH for the stability and encapsulation efficiency of phycocyanin. In *Chlorella vulgaris*, a relationship has been established between metabolic composition, particle size and biological activity, contributing to a more comprehensive understanding of the factors determining the functional properties of microalgae.

Of particular relevance to Professional Field 4.1. Physical Sciences is the research area related to materials science, laser processing, and the corrosion behavior of materials in biological environments. In AISI 321, a relationship has been established between microstructural changes induced by laser surface melting and the characteristics of corrosion damage. Using OM, SEM/EDS, EBSD and electrochemical methods, the morphology and development of corrosion pits have been investigated. An original contribution is the proposed mechanism of degradation of laser-treated layers, involving initial destruction of δ -ferrite, formation and subsequent destruction of an austenitic dendritic structure, and development of corrosion pits, as well as the established relationship between dendrite orientation and the direction of their development.

Among the applied scientific contributions is also the systematic analysis of the potential of additive technologies in pharmacy. The main approaches to 3D printing of pharmaceutical dosage forms – SLA, SLS, FDM, IJP and SSE – have been analyzed with regard to the materials used, technological limitations, and possibilities for precise dosing and controlled release of active substances. The results outline the potential of these technologies for the development of personalized pharmaceutical dosage forms.

A significant unifying element of the scientific output is the physical and physicochemical methodology. The use of vibrational and electronic spectroscopy, UV-VIS and fluorescence analysis, electrochemical measurements, microscopic and microanalytical methods enables the investigation of the structure, composition and properties of complex natural and biomedical systems. In this respect, the candidate's scientific contributions demonstrate the applied significance of physical methods for addressing interdisciplinary problems at the interface of physics, chemistry, materials science, pharmacy and biomedicine.

The overall scientific and applied value of the presented results lies in the development and application of analytical approaches for the characterization and quality control of natural products, optimization of functional foods and bioactive delivery systems, assessment of materials for biomedical applications, and investigation of the potential of additive technologies in pharmacy. The formulated contributions have a scientifically substantiated applied potential, without this being equated with demonstrated clinical efficacy.

In summary, the scientific output of Chief Assistant Professor Natalina Konstantinova Panova, PhD, is distinguished by a clearly defined research focus, interdisciplinarity and originality of the results obtained, combining physical and physicochemical approaches with applied problems in biophysics, materials science, pharmacy and biomedicine, and forming significant scientific and scientific-applied contributions within Professional Field 4.1. Physical Sciences.

4. CITATION IMPACT AND SCIENTOMETRIC INDICATORS

An important indicator of the candidate's research activity is the citation impact of the submitted scientific output. 54 points have been achieved for the citation criterion against a required 50 points, exceeding the minimum threshold by 4 points. The citations cover a broad range of scientific areas, including laser technologies and materials science, medical and dental applications of lasers, natural bioactive substances, plant extracts, functional foods, and spectroscopic studies.

The presence of citations to publications from recent years, including 2024–2026, demonstrates the topicality and continuing scientific visibility of the results, which are reflected in subsequent research in various interdisciplinary fields. This allows the conclusion that Natalina Panova's scientific results do not remain isolated within her own publication activity but are also reflected in subsequent research conducted by other author teams.

5. SCIENTIFIC PUBLICATIONS PRESENTED IN LIEU OF A MONOGRAPH

The candidate has submitted 10 scientific publications as publication output presented in lieu of a monograph. They form a thematically coherent body of work encompassing major areas of her research activity – laser processing and corrosion behavior of medical materials, 3D printing of pharmaceutical products and personalized medicine, as well as physicochemical and spectroscopic characterization of natural bioactive substances, food supplements and functional foods.

The publications reflect the interdisciplinary nature of the research and the application of physical, spectroscopic, electrochemical and materials science methods in biomedical and pharmaceutical research. Some of them are directly related to the doctoral dissertation topic and studies on laser-modified AISI 321 surfaces and their corrosion behavior in biological environments. The review article on contemporary technologies for 3D printing of pharmaceutical products and their application in personalized medicine also deserves attention. The scientific papers have been published in peer-reviewed and indexed journals, including journals indexed in Web of Science and Scopus, with publications in Q1 and Q2 journals.

Taken together, the 10 publications constitute a thematically coherent scientific body of work, reflect the principal research areas and contributions of the candidate, and meet the required number of points under the relevant indicators for publication output presented in lieu of a monograph.

6. PARTICIPATION IN RESEARCH PROJECTS

The candidate has participated in six research projects funded by the Scientific Research Fund, the National Recovery and Resilience Plan, and the MUVE-TEAM initiative. Her project activity covers interdisciplinary topics related to laser-modified materials and corrosion processes, bioactive substances and microalgae, food additives, translational medicine, and optical analytical technologies.

Participation in these projects demonstrates engagement in current research areas and the ability to work in interdisciplinary teams, with some of the developments having a scientific and applied orientation and potential applications in medicine, pharmacy and food technologies. Taken together, the project activity complements the candidate's scientific output and confirms her active involvement in contemporary research and translational initiatives.

7. TEACHING AND EDUCATIONAL-METHODOLOGICAL ACTIVITY

The teaching activity of Chief Assistant Professor Natalina Konstantinova Panova, PhD, is characterized by substantial professional experience, sustained teaching workload, and a broad thematic and disciplinary scope. Over 24 years and 9 months of academic teaching experience, she has taught physics, medical physics, biophysics, biomechanics, laser technology, and other

specialized disciplines to students from a wide range of medical, pharmaceutical, technical and healthcare specialties.

During the last five years, she has completed 4,795 teaching hours, confirming her sustained teaching engagement and experience in the organization and delivery of the educational process. Her educational-methodological activity is represented by 4 teaching aids with a total volume of 550 pages, corresponding to the subjects taught and supporting students' education and preparation. Taken together, these data characterize the candidate as a lecturer with extensive practical experience, sustained teaching engagement, and an established contribution to the education of students in various professional fields.

8. CRITICAL ASSESSMENT

The scientific output of Chief Assistant Professor Natalina Konstantinova Panova, PhD, is characterized by a broad methodological spectrum, interdisciplinarity, and consistent application of physical and physicochemical approaches to the investigation of relationships between composition, structure, properties and functional activity. The publication activity, citation impact, participation in research projects and international research teams, as well as publication of results in peer-reviewed and indexed journals, are positively assessed.

As a characteristic feature rather than a deficiency, the interdisciplinary nature of a substantial part of the scientific work may be noted. In the context of Professional Field 4.1. Physical Sciences, the contributions should primarily be considered in terms of the physical methodology employed, instrumental and quantitative methods, analysis of structure–function relationships, and materials science research. This connection is particularly evident in the spectroscopic and optical studies, laser processing of materials, electrochemical investigations of corrosion, and the application of 3D printing in pharmacy.

Taken as a whole, the presented scientific, teaching and project activities demonstrate consistent academic development, scientific independence, and an established research profile in the field of physical sciences with an interdisciplinary biomedical orientation.

9. CONCLUSION

Based on the submitted scientific publications, scientific and scientific-applied contributions, scientometric indicators, teaching and project activities, I consider that Chief Assistant Professor Natalina Konstantinova Panova, PhD, has established significant and consistent research activity, characterized by high publication productivity, international scientific visibility, interdisciplinarity, and original scientific and scientific-applied results.

Her research demonstrates the ability to conduct both independent and collaborative contemporary experimental studies, in which physical, physicochemical and instrumental methods are applied to address relevant problems in the fields of natural bioactive systems, functional materials, biomedical technologies, and personalized pharmacy.

The submitted scientific output meets and exceeds the established minimum scientometric requirements for the academic position of Associate Professor in Higher Education Area 4. Natural Sciences, Mathematics and Informatics, Professional Field 4.1. Physical Sciences, specialty "Physics". Under Groups of Indicators G5–G10, the candidate has achieved 225 points against a required 200, while 54 points against a required 50 have been achieved under the citation criterion. Her substantial teaching experience, high teaching workload, participation in research projects, and authorship/co-authorship of teaching aids further strengthen her overall academic profile.

Following an analysis and comprehensive assessment of the submitted scientific, teaching and project activities, I consider that Chief Assistant Professor Natalina Konstantinova Panova, PhD, meets the requirements for appointment to the academic position of Associate Professor in Higher Education Area 4. "Natural Sciences, Mathematics and Informatics", Professional Field 4.1. "Physical Sciences", specialty "Physics". I give a positive assessment of the candidacy and support the appointment of Chief Assistant Professor Natalina Konstantinova Panova, PhD, to the academic position of Associate Professor.

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Member of the Scientific Jury (opinion)

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/Assoc. Prof. Iliyana Stefanova, PhD/