



OPINION

on the materials submitted for participation in a competition for the academic position of "professor" at the Department of "Mathematics, Physics and Informatics", Faculty of "Forest Industry", area of higher education 4. Natural Sciences, Mathematics and Informatics, professional direction 4.1. Physical sciences, scientific specialty: "Electrical, magnetic and optical properties of condensed matter (multiferroic properties of bulk samples and nanomaterials)", in the discipline "Physics with biophysics", announced by the Forestry University in SG, no. 102/8.12.2023 and on the LTU website, procedure code: WWI-P-1123-112

Candidate in the competition: Assoc. Prof. Dr. Iliana Naumova Apostolova

The opinion prepared by: Professor Sashka Petrova Alexandrova, professional direction 4.1. Physical sciences, specialty "Electrical, magnetic and optical properties of condensed matter", retired, part-time teacher at Technical University – Sofia

1. Brief biographical data

Assoc. Prof. Dr. Iliana Naumova Apostolova graduated from the Faculty of Physics of the University of St. Kliment Ohridski" in 1993 with the educational degree "master's degree in solid state physics". In 2012, he defended his thesis on the topic "Static and dynamic properties of magnetic and multiferroic nanoparticles" as a doctoral student of independent training at SU "Kliment Ohridski", Faculty of Physics, Department of Solid State Physics and Microelectronics.

She has acquired the qualification of "physics teacher" after part-time study in the department "Physics Teaching Methodology" in the same faculty. In 1996, she started working at LTU, successively holding the positions of assistant, senior and chief assistant, and since 2015 she has been an associate professor at LTU, Department of "Mathematics, Physics and Informatics". She also has practice as a physics and informatics teacher in the high school course.

2. Compliance of the candidate's submitted documents and materials with the requirements according to the Regulations of the PAC at LTU

The submitted documents and materials of the candidate Assoc. Prof. Dr. Iliana Apostolova are precisely prepared and arranged and correspond to the requirements in Section V "Conditions and procedure for occupying the academic position of "professor" of the Regulations for the implementation of ZRAS at LTU. The required minimum for acquiring the academic position "professor" of 600 points is significantly exceeded for all criteria (Appendix 1.4). The total number is 2109, and the number of points according to criterion D for publication activity (871 with a requirement of 200 items) and D for citability (828 with a requirement of 100 items) is especially exceeded. This is a sign of scientific activity, persistence and striving for development and improvement.

3. Evaluation of the candidate's educational and teaching activities

Assoc. Prof. Dr. Iliana Apostolova is a committed and active teacher. As an associate professor, her main activities are developing and conducting lecture courses, leading laboratory exercises and developing curricula and updating them in the bachelor's and master's degrees for full-time and part-time studies. Delivers lectures on the disciplines:

- Physics with basics of biophysics, for the specialty "Veterinary Medicine"
- Noise and vibration protection, for the specialty "Ecology and environmental protection"

- Physics with biophysics, for the specialty "Ecology and environmental protection"

Leads exercises in the disciplines:

- Physics with basics of biophysics - laboratory
- Noise and vibration protection - laboratory and seminar
- Physics - laboratory

Assoc. Prof. Iliana Apostolova has published university textbooks - as author of "Physics with Biophysics for Ecologists" and co-author of "Physics with Biophysics". She is the author and co-author in the creation of a test system for assessing students' knowledge acquired from the laboratory exercises in "Physics with Biophysics" and "Physics" and is the author of the manual "Tests in Physics and Physics with Biophysics".

Assoc. Prof. Iliana Apostolova participates in a program board for the opening of a new bachelor's educational program in a professional direction 5.13. General engineering from the field of higher education with the name "Computer technologies in the furniture industry".

4. Evaluation of the candidate's scientific, applied scientific and publication activities

General description of the presented materials:

Assoc. Prof. Dr. Iliana Naumova Apostolova participated in the competition with:

- 2 Textbooks;
- 1 Learning aids;
- Publications – 58 issues in scientific journals, of which 11 issues included in the extended habilitation reference, all in indexed journals from the world databases Web of Science and Scopus;
- Projects – 9 items.

The author has also presented a general list including the publications for the ONS "doctor" and the academic position "associate professor", which shows that the total number of publications of the candidate is 114.

4.1 Participation in scientific, applied and educational projects

Assoc. Prof. Iliana Apostolova is a participant in a total of 9 scientific-research and scientific-applied projects:

- 1 project financed by the National Research Foundation
- 2 projects financed by NIS at LTU
- 5 projects financed by the Central Research Institute at the UASG

Of the projects, 3 are of a fundamental nature and are in the main area of the candidate's research. The rest of the projects are applied, mainly in the fields of medicine and ecology.

4.2 Characteristics of the published scientific results

Assoc. Prof. Iliana Apostolova has a significant and intensive publication activity, with her articles published in renowned internationally recognized scientific publications, as can be seen from the presented materials. A summary of her scientific research and results are reflected in the habilitation reference "Magnetoelectric interactions in bulk samples and nanostructures".

She participated in the competition with a total of 58 scientific publications in prestigious international journals, referenced and indexed in world-renowned databases (Web of Science and Scopus), all with an impact factor, of which 47 journal articles distributed by quartiles:

Q1 – 4, Q2 – 27, Q3 – 14 and Q4 – 3. The habilitation report is on with 11 articles in magazines, of which with Q2 – 5 and Q3 – 6. He has authorship and co-authorship in 2 textbooks and one aid. All materials on the competition are published after receiving the academic position of associate professor.

The published results are in the field of condensed matter in accordance with the scientific specialty and competitive discipline. At the center of scientific research are the properties of multiferroic materials of different dimensions: bulk materials, thin films and nanoparticles. The research has a theoretical character. The method of Green's functions is applied in combination with the microscopic models at an appropriately chosen Hamiltonian describing the relevant interactions, numerical programming and calculations. Qualitative and quantitative matches and correlations with experimental literature results were sought to assess the adequacy and applicability of the models.

4.3 Reflection of the candidate's scientific publications in the literature (citations)

In the documents, Assoc. Prof. Iliana Apostolova attached a list of known citations of her works. The scientific publications with which the candidate participates in the competition are cited in 414 articles by other authors in scientific publications, referenced and indexed in Web of Science and Scopus, all of which are in Q-factor journals. The total number of citations of the candidate's scientific publications is 505 in articles by other authors, again all of which are referenced and indexed in Web of Science and Scopus scientific publications with a Q factor.

The h-index value of Assoc. Prof. Iliana Apostolova is 11.

These data characterize Associate Professor Iliana Apostolova as a prominent and competent scientist with authority in the international community in the field of condensed matter physics.

4.4 Contributions to the candidate's works (scientific, scientific-applied, applied)

The report presented by candidate Assoc. Prof. Iliana Apostolova is structured thematically in 4 sections, summarizing 58 publications:

- I. Multiferroic materials: bulk samples and low-dimensional systems
- II. Room temperature magnetism and multiferroism in doped magnetic and multiferroic nanoparticles
- III. Self-consistent magnetic hyperthermia
- IV. Phonon spectra in multiferroic and magnetic bulk samples and low-dimensional systems

Scientific contributions

Models have been developed and mechanisms have been sought to predict the behavior and characteristics of many multiferroic compounds with different compositions and doped with different chemical elements. Microscopic models accounting for the influence of surface and size effects in multiferroic thin films and nanoparticles are included here. The scientific contributions relate to the systematic study and analysis of magnetoelectric interactions responsible for the appearance of multiferroism and are appropriately formulated in the attached reference under numbers 1 to 7.

Scientific and applied contributions

A model of composite nanoparticles suitable for self-controlled magnetic hyperthermia treatment was built by achieving the maximization of thermal efficiency and biocompatibility requirements of the process. Numerous magnetic nanoparticles have been investigated for

application in the method. Composite nanoparticles have been proposed that have maximum thermal heating efficiency. Scientific and applied contributions are presented under number 8 in the attached reference.

5. Evaluation of the candidate's personal contribution

The substantial personal contribution of the candidate to the results obtained from the scientific, scientific-applied and teaching-pedagogical activities, the significant publication activity and the high citation rate is indisputable and significant.

In the published articles on the competition, Assoc. Prof. Dr. Iliana Apostolova is the first author in 18 of them and the second author in 29.

The number of co-authors in scientific publications is as follows:

- 1 individual
- 1 with one co-author
- 46 with two co-authors
- 12 with three or more co-authors

6. Critical Notes

I have no grounds for critical remarks.

Prof. Dr. Iliana Apostolova is also the co-author of a popular science article in the magazine "The World of Physics", issue 3/2022, p. 161, entitled "Multiferroics" with authors Iliana Apostolova, Angel Apostolov and Yulia Veselinova. The magazine is a publication of the Union of Physicists in Bulgaria and appears in the National Reference List of modern Bulgarian scientific publications.

7. Conclusion:

The analysis of the scientific, publication and teaching activity of Assoc. Dr. Iliana Apostolova allows to draw the conclusion that all scientometric criteria for holding the academic position of "professor" provided for in the ZRASRB and the Regulations of the RAS at LTU have been met and are exceeded significantly. The total number of points achieved is 2109 with a minimum requirement of 600.

In view of the stated above, I propose that Associate Professor Dr. Iliana Apostolova be elected "Professor" in professional direction 4.1. Physical sciences, scientific specialty "Electrical, magnetic and optical properties of condensed matter physics".

10.04.2024

Jury member: _____

Prof. Dr. Sashka Alexandrova