STATEMENT

by Associate Professor Adriana Asenova Georgieva, PhD -
Burgas State University "Prof. Dr. Assen Zlatarov"
Faculty of Technical Sciences, Department of Chemical Technologies

Regarding: of a dissertation for the award of the educational and scientific degree "Doctor" (PhD) in: field of higher education 4. Natural sciences, mathematics, and informatics, professional field 4.2. Chemical Sciences, Doctoral Program "Technology of Inorganic Substances" at the Faculty of Chemistry, Paisii Hilendarski University of Plovdiv (PU)

Author of the Dissertation: Katya Petrova Hristova
Title of the Dissertation: "Synthesis and study of yttrium, lanthanum, and aluminium borates doped with rare earth compounds"
Scientific Supervisor: Assoc. Prof. Dancho Tonchev Tonchev, PhD

1. General Presentation of the Procedure and the PhD Student

By order No. RD-22/909 of 22.04.2025 of the rector of Plovdiv University "Paisii Hilendarski", I am appointed as a member of the scientific jury for participation in the procedure for the defense of a dissertation on the topic: "Synthesis and study of yttrium, lanthanum and aluminum borates doped with rare earth compounds". The procedure is for the acquisition of an educational and scientific degree "doctor" in the field of higher education 4. Natural sciences, mathematics and informatics, professional field 4.2. Chemical sciences, doctoral program "Technology of inorganic substances". The author of the dissertation is Katya Petrova Hristova - part-time doctoral student at the Department of Chemical Technology under the supervision of Assoc. Prof. Dancho Tonchev Tonchev, PhD. The submitted set of documents under the procedure meets the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria, the Regulations for its Implementation and the Regulations for the Development of the Academic Staff of the "Paisii Hilendarski" University.

2. Actuality of the Research Topic

The dissertation work is focused on the synthesis and study of borates doped and co-doped with rare earth elements, with an emphasis on their luminescence. I believe that the presented research and the obtained results are relevant and will attract the attention of a wide audience. The proof of their significance is the high publication activity on the topic in prestigious international journals. The main results of the research in the dissertation have been published in peer-reviewed journals and presented at refereed conferences. In addition, two of the publications already have citations indexed in the Web of Science (WoS) and/or Scopus databases, which clearly shows the relevance of the issues considered in the dissertation.

3. Knowing the Problem

The research topic requires in-depth study of the problem area. The doctoral student successfully demonstrated a high level of knowledge of the issue under consideration, as evidenced by the well-structured dissertation work. It is important to note that the list of

literature is composed of 273 literary sources that are actually relevant to the research in the dissertation.

4. Research Methodology

The doctoral student has focused on two approaches for the synthesis of materials in her research: solid-phase synthesis and microwave-assisted method. She has used modern methods for analysis and characterization, such as: Infrared spectroscopy with Fourier transform, Fluorescence analysis, X-ray structural analysis, Raman analysis, and the chemical stability of the synthesized samples has also been established. Under the experienced guidance of her scientific supervisor and experts in the scientific subject, the doctoral student has mastered specific methods and techniques and has applied them correctly, which allows the achievement of the set goals and objectives and guarantees good and reliable results.

5. Characterization and Evaluation of the Dissertation Work and Contributions - Presence/Absence of Plagiarism

The dissertation work (PhD-thesis) of Katya Petrova Hristova is an in-depth study related to the synthesis and study of borates doped and co-doped with rare-earth compounds, with an emphasis on the development of materials with improved luminescent and sensor properties. The dissertation work presented to me for opinion is excellently structured and has a total volume of 181 pages, including 150 pages of main text, 107 figures, 17 tables, 5 schemes, 5 photos and a bibliography of 273 literary sources. The structure of the dissertation work follows the generally accepted norms: introduction; literature review; goal and objectives; materials and methods; results and discussion; conclusion, in which the conclusions are formulated and the contributions are indicated; literary sources; applications.

With the conducted research, the doctoral student proves that doped borates, synthesized under various conditions, offer broad opportunities for application in areas such as optoelectronics, photonics and sensor technologies. The results obtained will also expand the fundamental knowledge about the characteristics of borate materials, will provide a scientific basis for future developments.

The contributions reflect with sufficient accuracy the essence of the dissertation work and the results of the research and show that the doctoral student has well mastered and appropriately and accurately applied the material related to the topic and the set goals. I fully accept all scientific and scientific-applied contributions of the dissertation, and I appreciate them very highly. I did not detect any plagiarism in the candidate's works according to the provisions of the Law on the Development of Academic Staff in the Republic of Bulgaria.

6. Assessment of the Dissertation's Publications and Personal Contributions of the Author

The declared publications and reported scientific results related to Katya Hristova's dissertation work correspond to the topic and content of the main elements of the doctoral work. They clearly demonstrate her significant contribution to the scientific topic and confirm the quality of her work. The scientific publications are 5 in number. The indexing of the articles in prestigious databases such as Web of Science (WoS) and Scopus, as well as the fact that one of them is classified in the first quartile (Q1), testify to the high level of scientific significance and

recognition. The presence of 5 citations to two of the publications shows that the results of her work have already found their place in the scientific literature and are recognized by other researchers. The quantitative requirements by groups of indicators for obtaining the Educational and Scientific Degree "Doctor" (PhD) have been met.

7. Abstract

The abstract of the dissertation work of Katya Petrova Hristova is well structured and accurately reflects the content of the main work. The volume of 32 pages is suitable for providing an adequate overview of the research and its main results. Both the dissertation work and the abstract comply with the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria and the Regulations on the Terms and Procedure for Acquiring Scientific Degrees and Holding Academic Positions at the University of Plovdiv.

8. Recommendations for Future Use of Dissertation Contributions and Results

I have no critical remarks about the documents and works provided. I would recommend that doctoral student Katya Petrova Hristova publish a monograph based on her dissertation. I also fully admire her intentions for future research, which she has quite successfully formulated.

CONCLUSION:

The dissertation work **of doctoral student Katya Petrova Hristova on the topic: "Synthesis and study of yttrium, lanthanum and aluminium borates doped with rare earth compounds"** ***contains scientific, scientifically applied and applied results that represent an original contribution to science***. It meets all the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria, the Regulations for its implementation and the relevant Regulations of the PU "Paisii Hilendarski". The dissertation work shows that doctoral student Katya Petrova Hristova, based on the theoretical and specialized knowledge in the research area and practical skills accumulated in the process of work, has the ability to analyse and evaluate specific experimental results and situations and to conduct independent scientific research.

Based on the above, I confidently give my **positive assessment** of the conducted research **and recommend to the Honorable Scientific Jury** to award the educational and scientific degree **"doctor" (PhD)** to **Katya Petrova Hristova in the field of higher education: 4. Natural Sciences, Mathematics and Informatics, professional field 4.2. Chemical Sciences, Doctoral Program "Inorganic Substances Technology".**

06.06.2025г. Scientific jury member:…….
Burgas /Assoc. Prof. Adriana Asenova Georgieva, PhD/