REVIEW

by Dr. Kiril Blazev Gavazov - Professor at MU-Plovdiv

on the materials submitted for participation in the competition for the academic position of Associate Professor at Plovdiv University "Paisii Hilendarski" field of higher education 4. Natural Sciences, Mathematics and Informatics, professional field 4.2. Chemical Sciences (Inorganic Chemical Technology)

In the competition for "Associate Professor", announced in the State Gazette, no. 98 of November 19, 2024 and on the Internet page of Plovdiv University "Paisii Hilendarski" for the needs of the Department of Chemical Technology at the Faculty of Chemistry, Irena Petrova Kostova - Senior Assistant Professor at the same Department, participated as a candidate.

1. General presentation of the materials received

Subject:

By Order No. RD-22-79 of 17.01.2025 of the Rector of Plovdiv University "Paisii Hilendarski" (PU) I have been appointed as a member of the scientific jury of the competition for the academic position of "Associate Professor" at PU in the field of higher education 4. Natural Sciences, Mathematics and Informatics, professional field 4.2. Chemical Sciences (Inorganic Chemical Technology), announced for the needs of the Department of Chemical Technology at the Faculty of Chemistry.

For participation in the announced competition has submitted documents only one candidate: Dr. Irena Petrova Kostova - Chief Asst. Prof. at the Department of Chemical Technology (DCT) at the Faculty of Chemistry (FC) of PU “Paisii Hilendarski”. For brevity, only her name is mentioned in the text below.

The set of paper materials submitted by Irena Kostova is in accordance with the Regulations for the Development of the Academic Staff of PU, and includes the following documents:

- Application form for admission to the competition
- CV in European format
- Diploma of higher education (Master's degree) with an annex
- Doctorate degree

- List of scientific works

- List of scientific works for the competition for the academic position Associate Professor

- List of citations

- Reference for compliance with minimum national and additional faculty requirements

- Annotations according to Article 65 of the Regulations for the Development of the Academic Staff of PU of the submitted materials with extended habilitation reference and self-assessment of the contributions

- Declaration of originality and reliability

- Certificate of work experience

- Reference of academic work and documents related to additional requirements of the FC

- Note of participation in research projects and national programmes

- Other documents

The materials included make a good impression. They testify to extensive activity in a field that is in line with the competition's focus.

In the list of scientific achievements covering the whole creative period, Irena Kostova has included:

- 35 scientific papers published in the period 2012-2024.

- 37 participations in scientific forums (15 national and 22 international).

- 47 citations (35 of them in refereed journals).

- Reviews of scientific articles and research project.

In Irena Kostova's Scopus profile there is data for 30 publications and 31 independent citations. Her Hirsch index is 4, and when excluding self-citations - 3. The number of her publications in Google Scholar is 36 and the number of citations is 77. Her Hirsch index in this specialized search engine of scientific literature is 5.

25 scientific publications (23 scientific articles, one book and one utility model) were peer-reviewed in the context of this competition. These do not overlap with the data from the National Centre for Information and Documentation (NACID) register on the award of the doctorate.

2. Brief biographical details of the applicant

Irena Petrova Kostova was born in 1987 in Sofia. She holds a Master's degree from PU "P. Hilendarski", Plovdiv (speciality "Chemistry and Ecology", 2011). She obtained her Ph.D. degree in Inorganic Materials Technology at P. Hilendarski in 2016, after defending her thesis "Synthesis and study of modified zinc borophosphates doped with samarium" with the scientific supervisors Assoc. Prof. Dr. Dan Tonchev Tonchev and Assoc. Prof. Dr. Georgi Ivanov Patronov.

In the period 2015 - 2017 Irena Kostova was Assistant Prof. and then Chief Assistant Prof. at the Department of Chemical Technology, Faculty of Chemistry, PU. Her total teaching experience is about 10 years. She has given lectures and laboratory exercises in the following disciplines: Inorganic Chemical Technology, Materials for Medicine, Applied Inorganic Chemistry, Ecology and Environmental Protection, Environmental Chemistry, Production and Research Practice. Her research activities are described in more detail in the following sections. It is mainly focused on materials science and includes work on scientific publications, project work, peer review of scientific publications and projects, and work with undergraduate and postgraduate students.

3. General description of the applicant's activities

Evaluation of teaching-pedagogical activity

Irena Kostova is an academic mentor of Chemical Analysis and Quality Control, class of 2023. She has fulfilled and is fulfilling the norm for academic employment at PU. In addition to laboratory experiments of students of "Bachelor" and "Master", she has given lectures (Bachelor) in the following disciplines:

Chemical Industry of Bulgaria (CIB):

- Specialty "Analysis and Control"
- Specialty "Chemistry with Marketing"

Chemical and Pharmaceutical Industry of Bulgaria (CPB):

- Specialty "Medicinal Chemistry"

Inorganic Chemical Technology (ICC):

- Specialty "Chemistry", part-time and full-time study

Materials Science

- Specialty "Chemistry with Marketing", full-time study
- Specialty "Chemistry", part-time study
- Specialty "Forensic Chemistry", full-time study

Chemical and Physicochemical Expertise of Materials and Substances

- Specialty "Forensic Chemistry", full-time studies.

Irena Kostova has developed new laboratory experiments, as well as new tests and tasks for the implementation of current control and written exams.

She has been a scientific advisor (2015) and a scientific supervisor (2022) of graduate students. Currently, she is the scientific supervisor of a graduate student (from 2024) and the scientific advisor of a PhD student (from 2021) at the Department of Chemical Technology, enrolled in the PhD programme Technology of Inorganic Substances.

Evaluation of the candidate's scientific and applied activity

Irena Kostova participated in the competition for the position of Associate Professor with 23 scientific articles published in the period 2014 - 2024, one independent book based on a defended dissertation and one useful model.

In the "B" group of scientific metrics, she has 5 publications, which gives her the required 100 points.

In group 'D', 20 scientific publications have been added, including one independent book (scientific indicator D6), 18 scientific articles in IF/SJR journals (scientific indicator D7) and one Bulgarian utility model (scientific indicator D9). The total number of points for indicator group D is 216, which exceeds the national minimum requirement (200 points).

Irena Kostova is the first author in 9 of the scientific articles (with the main contribution in performing the experiment, processing the results and writing the article). Eleven of the scientific articles in which she is involved are published in journals with an impact factor (IF) according to Clarivate (an organisation that owns Web of Science). Summing up the IFs for the relevant years gives a significant figure of 28.8.

The work presented by Irena Kostova is in the field of materials science. Some of the problems addressed can be seen as a further development and improvement of the research from previous years, which served to obtain the doctorate.

The main topics of the research carried out are

- ✓ Synthesis and investigation of glass and/or glassy crystalline materials;
- ✓ Synthesis of luminescent inorganic materials;
- ✓ Synthesis and characterisation of silver nanoparticles;
- ✓ Preparation of polymer-inorganic composites.

Work on the above activities is linked to project activities, publications in scientific journals and presentations at scientific forums in the country and abroad.

According to NACID, Irena Kostova has led 4 national projects:

- Preparation of components to produce paper and polymer nanocomposites with application in the production and protection of valuable documents, MU17XF024 (14.03.2017 - 01.12.2018).

- Investigation of the possibility of using zinc oxide glass crystal samples as laser active media (01.12.2018 - 30.04.2019)

- Investigation of the feasibility of using zinc borophosphate glassy crystal samples as solid-state laser media (01.03.2020 - 30.08.2020)

- Optimisation of innovative methods for the synthesis of luminescent materials (26.02.2021 - 30.10.2022).

She was a member of the working group of an international project entitled "Preparation of safe inks suitable for the GET Group P1 project, USA 02/948" (01.05.2020 - 31.12.2020), as well as of the working groups of several other projects funded by the Research Fund at PU "P. Hilendarski".

Irena Kostova has attached an official note from the NPD subdivision of PU "P. Hilendarski", which lists the participation in 8 research projects and two national programmes:

- "Young Scientists and Postdocs" (2018-2019).

- Young Scientists and Postdocs" (2020).

Contributions (scientific, applied scientific, applied)

Irena Kostova's research addresses important problems of modern technologies in optics, materials science and the energy sector, proposing new solutions and potential applications in various industrial fields. Her contributions can be classified as scientific, applied scientific and applied. They relate to the development of innovative sensors and materials based on rare earth elements (REEs) and nanotechnologies with high efficiency and sensitivity in thermal sensing, fluorescence analysis and radiation protection. New methods of material synthesis (microwave-assisted synthesis, green synthesis) are presented, which significantly improve the properties of the materials under investigation. Unique properties of glasses doped with REE have been investigated, including their potential for dosimetry, optical devices and document protection.

Irena Kostova's research focuses on real-world applications in industry, healthcare and ecology, aiming at automation, miniaturisation and environmental friendliness. I believe that Irena Kostova's contributions are indisputable and that her publications are "visible" and recognised in the scientific community (as can be judged from the citation sources).

Citations

The list of citations for this competition contains 27 items (54 points). This number is sufficient to meet the minimum requirements for the position of Associate Professor (50 points). There is a clear upward trend in the number of citations over the years. For example, the number of independent citations is 1 for 2021, 4 for 2022, 6 for 2023 and 8 for 2024. Among the most cited publications are "Rise and decay time responses of Sr aluminate phosphorescent materials" (Journal of Luminescence, 2021) and "Effects of temperature on the time responses of strontium aluminates" (Optical Materials, 2021). I believe that Irena Kostova's publications from last year (2024) are also characterised by high citation potential.

Utility model

The utility model relates to the creation of a modular air monitoring station capable of automatically measuring several parameters and sending them to a database server where they can be visualised and analysed. The station is designed for long-term use without the need for periodic or preventive maintenance.

4. Assessment of the candidate's personal contribution

Irena Kostova is the only author of a book based on a defended doctoral thesis (indicator D6). She is the first author of nine of the other scientific publications related to the competition (indicators C4 and D7). This shows that her personal contribution is significant. The same conclusion can be reached when working with Scopus. An automatically generated reference based on 22 selected publications by Irena Kostova (Scopus Author Identifier: 55485118900) for the period 2014-2023 shows that she is the first author in 32% of them and the sole author in another 5%.

5. Personal impressions

I have known Irena Kostova since she was a student at the PU. Her excellent theoretical education, intellect and curiosity allowed her to continue her studies in the doctoral programme. I was a member of the scientific jury involved in her selection as an Chief Assistant Professor in

2017, and I was pleased to vote positively for her candidacy. Based on my personal impressions as well as the materials submitted for this competition, I believe that Irena Kostova's career development is well deserved.

CONCLUSION

The documents and materials submitted by Irena Kostova meet all the requirements of the Academic Staff Development Act in the Republic of Bulgaria (ASDA), the Regulations for the Implementation of the ASDA and the relevant Regulations of PU "P. Hilendarski".

The candidate in the competition has submitted a sufficient number of scientific works published after the materials used in the defence of the doctoral thesis. The candidate's works contain original scientific and applied contributions that have received international recognition, a representative number of which have been published in prestigious journals (Q_1 and Q_2). Furthermore, her scientific developments have practical applicability.

The results achieved by Irena Kostova in her teaching and research activities fully comply with the minimum national and additional requirements of the FC, adopted in conjunction with the PU Regulations for the Implementation of the Law on Research and Development. Her professional qualifications are unquestionable.

After familiarising myself with the materials and scientific works presented in the competition, analysing their significance and the scientific, scholarly and applied contributions contained in them, I consider it justified to give a positive assessment and to recommend the Scientific Jury to prepare a proposal to the Faculty Council of the Faculty of Chemistry for the election of Irena Kostova to the academic position of Associate Professor at PU "P. Hilendarski" in the following fields of higher education: 4. Natural Sciences, Mathematics and Informatics, professional field 4.2 Chemical Sciences (Inorganic Chemical Technology).

14.02.2025 г. Reviewer: .....

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