Българска академия на науките институт по инженерна химия софия

Вх. № 10 /03.01 2025

OPINION

By competition for the academic position of "Professor", Professional field 4.2. Chemical Sciences, specialty "Processes and apparatus in chemical and biochemical technology", for the needs of the laboratory "Transfer Processes in Multiphase Media" at the Institute of Chemical Engineering - Bulgarian Academy of Sciences, announced in the State Gazette No. 77 (10.09.2024)

with candidate Tatyana Stefanova Petrova, Assoc. Prof. PhD

Member of the Scientific Jury: Adriana Asenova Georgieva, Assoc. Prof., PhD Eng. from the University "Prof. Dr. Assen Zlatarov" - Burgas

1. General characteristics of the candidate's research and applied scientific activities

The research and applied research activities of the candidate in the competition, Assoc. Prof. PhD Tatyana Petrova are related to: research, modeling and optimization of transfer processes in multiphase media, including research on hydrodynamics, heat and mass transfer and assessment of flow distribution in column apparatus; modeling and optimization of composite and nanocomposite structures; design of optimal resource-assurance chains in the dairy industry.

The total number of scientific works of the candidate, including those submitted in the competition, is 85, of which: 3 chapters of books published by prestigious publishing houses; 43 scientific publications published in journals, cited and indexed in the global databases Web of Science and Scopus; 39 scientific publications in Bulgarian and international collections of reports.

National and European contracts: The candidate participates in a number of scientific and scientific-educational projects related to: research and optimization of the operation of packed columns; a new principle for creating packings for operation at extremely low dewpoint densities; sustainable processes, systems and the environment; sustainable resource supply chains in terms of environmental, economic and social criteria; research, modeling and optimization of composites and nanocomposites. In two of the projects with the "Scientific Research Fund" at the Ministry of Education and Science of the Republic of Bulgaria and the Operational Program "Human Resources Development 2007-2013", he is the leader. He participates in 16 scientific projects, as a member of the scientific team, funded by the Ministry of Education and Science of the Republic of Bulgaria, under the OPHRD, funded by the DFG, Germany and through contracts with other ministries and departments in the country.

Expert activity: The candidate's expert activity consists of preparing reviews of publications for international scientific journals and collections of reports in the field of

chemical engineering, reviews of project proposals and project reports for competitions at the Scientific Research Fund at the Ministry of Education, Science and Culture of the Republic of Bulgaria, competitions under the National Program "Young Scientists and Postdoctoral Fellows" and those at the Bulgarian Academy of Sciences - Sofia. Preparing opinions for competitions for holding academic positions, for the Educational and Scientific Degree "PhD" and the Scientific Degree "Dr. of Sciences".

Supervision of PhD students and teaching activities: The candidate is a cosupervisor of a successfully defended doctoral student at the Institute of Chemical Engineering at the Bulgarian Academy of Sciences - Sofia.

From 2012 to the present, Assoc. Prof. PhD Tatyana Petrova has also been carrying out teaching and pedagogical activities at the European Polytechnic University, Pernik, Department of Natural Sciences, which covers the disciplines of Mechanics and Theoretical Mechanics - Part I and II. She is also the scientific supervisor of the master's theses of two defended diploma students at the Technical University - Sofia.

Scientific and organizational activity: The candidate's scientific and organizational activity is expressed in the successful management and administration of research and scientific and educational projects and their implementation in a professional environment. He is a member of program and organizational committees of 7 international and national forums. From 2018 to the present, he is the Chairman of the Colloquium of Scientists at the IChE - BAS, and is currently the Chairman of the Scientific Council of the IChE - BAS, Sofia.

2. Evaluation of the submitted materials

In the competition for the academic position of "Professor", the candidate presents himself with 23 scientific papers, which are published in journals, cited and indexed in the global databases Web of Science and Scopus and two published book chapters. Of the scientific papers, one article is in a journal in quartile Q1 (IF (Web of Science)), four - in quartile Q2 (SJR (Scopus)), five - in quartile Q2 (IF (Web of Science)), seven - in quartile Q3 (SJR (Scopus)), four - in quartile Q4 (SJR (Scopus), one in quartile Q4 (IF (Web of Science)) and one publication with Impact rank (Scopus). All quantitative indicators and criteria for occupying the academic position of "Professor" have been met, according to the national minimum requirements, the Regulations on the conditions and procedure for occupying academic positions at the Bulgarian Academy of Sciences and the Methodology for the growth of scientists at the Institute of Chemical Engineering - Bulgarian Academy of Sciences, Sofia.

3. Main scientific and applied scientific contributions

I accept the scientific, applied and scientific-applied contributions declared in the candidate's Author's Reference in the presented scientific works. The most significant ones can be characterized as enrichment of existing knowledge and theories and obtaining new ones, namely: proposing experimental measures for reducing non-uniformity in gas distribution devices; a new graphical method for determining the number and location of zones with equal

local velocities along the cross-section of a column apparatus; deriving new criterion equations for determining the hydraulic resistance of dry and wetted structured packing, as well as the gas velocity at the retention point, taking into account the influence of the geometric characteristics of the packing; numerical modeling of the influence of the hydrodynamics of a gas flow on heat and mass transfer during flow around a single catalyst particle; proposing an improved design of sprinklers and a collecting device and obtaining missing experimental data for three types of packings with an open structure.

Valuable data and significant contributions have been obtained related to: modeling and optimization of composite and nanocomposite structures, with and without defects, subjected to static or dynamic mechanical loads, under the influence of an electric field and/or changes in the temperature and humidity of the environment; design of optimal resource-assurance chains in the dairy industry. A new, sustainable optimization approach has been proposed to deal with uncertainty in product requirements in resource-assurance chains for the production of various dairy products using different technologies, while taking into account economic and environmental requirements.

Significance of contributions to science and practice: In connection with the above, I can state that the contributions in the candidate's scientific works are valuable, both for science and for practice, which corresponds to the scientific-applied nature of the specialty of the competition. New experimental and mathematical models have been obtained for the study and description of hydrodynamics, heat and mass transfer in column apparatuses, an optimization approach for dealing with uncertainty in product requirements in resource-assurance chains in the dairy industry, data on new materials (composite and nanocomposite) and technologies have been obtained and analyzed, and new and improved engineering solutions have been implemented in practice.

The candidate's personal contribution and the vision for the development of the topic of the competition over the next 5 years:

There is no doubt that the scientific and applied scientific contributions in the submitted scientific papers are the personal work of the candidate in equal cooperation with the coauthors. All scientific papers submitted under the competition correspond to its multidisciplinary theme in the field of chemical engineering and are a serious prerequisite for the development and expansion of the scope of scientific research at the Institute of Chemical Engineering at the Bulgarian Academy of Sciences - Sofia over the next five years.

4. Reflection of the candidate's scientific publications in Bulgarian and foreign literature

The candidate's authority in scientific circles in our country and abroad is evidenced by the citations that exceed the requirements for this indicator. According to the reference for the minimum requirements, 21 of the scientific papers in the competition were cited with 66 citations in scientific publications, referenced and indexed in Web of Science and Scopus. In

an additional reference to the citations, a total of 165 citations of 37 scientific papers are presented.

5. Personal impressions for the candidate

I know the candidate from fruitful cooperation on scientific and scientific-educational projects in the field of chemical engineering. I believe that her professional and personal qualities and scientific expertise will be beneficial for the development of the competition topic and the needs of the laboratory "Transfer Processes in Multiphase Media". The candidate has proven that she combines perseverance, determination and professionalism in work with excellent organizational skills, maintains good collegial relations and successful cooperation with scientists and researchers in the country and abroad.

6. Critical remarks and recommendations

I have no critical remarks on the submitted materials for the competition.

CONCLUSION

All quantitative indicators for assessing the candidate's research and academic activities comply with the National Minimum Requirements, the Regulations on the Conditions and Procedure for Holding Academic Positions at the Bulgarian Academy of Sciences and the Methodology for the Growth of Scientists at the IChE - BAS, Sofia, and in some indicators exceed the requirements for holding the academic position of "Professor".

Everything stated so far and based on the familiarization with the scientific works presented by the candidate in the competition, their significance, the scientific and scientific applied contributions contained in them, gives me reason to confidently propose Assoc. Prof. PhD Tatyana Stefanova Petrova to occupy the academic position of "Professor" in Professional field 4.2. Chemical Sciences, specialty "Processes and Apparatus in Chemical and Biochemical Technology" at the Institute of Chemical Engineering - BAS, Sofia.

Date: 27.12.2024

Member of the Scientific Jury:..../Assoc. Prof. PhD Adriana Georgieva/