SCIENTIFIC OPINION

Subject: Evaluation of documents of a candidate, a participant in a competition for the academic position "Professor" at ICheE-BAS, specialty "Processes and apparatus in chemical and biochemical technology", professional direction 4.2. Chemical sciences, announced in State Gazette no. 96 of 02.12.2022, with candidate Assoc. Dr. Daniela Boyanova Djonova-Atanasova

The scientific opinion was prepared by: Prof. DSc. Kaloyan Kirilov Petrov

Candidate Associate Professor Daniela Djonova-Atanasova was born in 1963 in Vidin and graduated from the Technical University of Sofia with a Master's degree in "Heat Engineering - Heating, Ventilation and Air Conditioning" in 1988. In 1992, also at the "Technical University - Sofia", defended a dissertation on the topic "Heat exchange processes in two-dimensional free turbulent jets" for the acquisition of the educational and scientific degree "Candidate of Technical Sciences". At the same time (1988-1992), Associate Professor Djonova-Atanasova also worked as a part-time teacher at the same educational institution. Since January 1994, her scientific career continues at the Institute of Engineering Chemistry - BAS, where she has worked continuously until now. Since 2011, Daniela Djonova-Atanasova holds the position of "docent".

During this time, the candidate finds realization of his scientific interests in the field of heat and mass exchange processes, their modeling and optimization in order to predict their dynamics, improve their energy efficiency, and their application in various industrial fields. During this time, the candidate participated in more than 20 scientific projects funded by the Ministry of Education and Culture, Bulgarian and foreign private organizations (Ecosystem project EOOD, Raschig GmbH), as well as in various European cooperation programs (Horizon 2020, etc.). Separately, over the years, Daniela Djonova-Atanasova has been the scientific supervisor of 2 doctoral students, 2 graduate students, and more than 10 interns in various programs. She participates in the organization of various national and international scientific forums, being the chairman of the organizing committee of one international (COST Action MP1305) and one national forum (17th Workshop on transport phenomena in two-phase flow). At 6 international forums, candidate Daniela Djonova-Atanasova is co-chair of the organizing committees (AESMT'18, AESMT'19, AESMT'20, AESMT'21, AESMT'22, 16th Workshop on transport phenomena in two-phase flow). In addition, over the years the candidate has had significant teaching, expert, and editorial activities. In the period 2012-2013, she led lectures and exercises in English at the "European Polytechnic University" - Pernik, and before entering IIH, exercises on fluid mechanics at TU-Sofia. He is the guest editor of 6 special issues of the

journal "Izvestiya po khimiya" (Bulgarian Chemical Communication) and the author of over 40 reviews for scientific journals, over 10 reviews of project proposals, and 6 reviews and opinions in competitions. Also, Associate Professor Daniela Djonova-Atanasova is distinguished by a rich scientific and administrative activity, performing 4 years in the position of "Scientific Secretary" of IIH, half a year (and currently) in the position of "Deputy Director" of IIH, and 9 years (and currently) the position "Laboratory Manager" of the lab. "Transport Processes in Multiphase Media".

In the current competition, the candidate Associate Professor Daniela Djonova-Atanasova participated with 33 publications, printed in the period 2016 - 2022 (after holding the position of "associate professor"). Of them, 7 pcs. are in journals with Q1, 3 - in journals with Q2, 6 - in journals with Q3, 11 - in journals with Q4, 2 - in non-Q category SJR journals, two printed by national academic publishers, and 1 - in international non-academic publishing. She is a co-author of a useful model. Separately, for her overall scientific activity, the candidate has presented another 32 publications in full text. 172 citations of the candidate's publications are also presented.

Referred to the minimum requirements for "Professor" in direction 4.2. Chemical sciences, the presented materials form points, either fully meeting the requirements for the relevant indicator (indicator "A"), or exceeding the relevant requirements - for indicator "B", materials are presented for 140 points, if required 100 points, for indicator „Г" - 350 points, if required 220 points, for indicator „Д" - 164 points with a requirement of 120 points and for indicator "E" - 258 points with a requirement of 150 points. The additional criteria of ICheE-BAS for holding the position of "professor" are fully met.

The main scientific contributions in the publications presented as substitutes for the habilitation work (indicator "B") concern the modeling of membrane-integrated bioreactors, with application in the chemical industry and biotechnology for the separation of mixtures, purification of products and capture of pollutants, which, serving as raw materials for other productions, lead to completely waste-free technologies. Two main types of membrane-integrated bioreactors have been investigated in the publications – with an external tangential flow filtration cell and with a submerged membrane module. In these publications, along with the achieved experimental results, a computer simulation was made to study the dynamics of fluid flows and create models to determine the optimal pa process parameters.

Another significant contribution in the publications presented under indicator B is the study of hydrodynamics and mass transfer in filtration processes and their prediction by computer simulation. In this way, basic parameters such as variation of the concentration at different points, thickness of the boundary layer, mass transfer coefficient were determined. Based on the research done, a new turbine design with mixed radial-axial flow circulation, providing higher performance, is also proposed.

Among the contributions in the publications presented under indicator „Г" can be noted: a new approach for evaluating the efficiency of an integrated membrane bioreactor with a submerged membrane module, defined as the ratio of the volume-averaged mass transfer coefficient to that at the maximum transfer rate through the boundary layer of the membrane; development of new fillings with improved absorption and heat exchange characteristics - "honeycomb" type, loose fillings with an open structure, etc.

A separate, above all, applied contribution of her work is the development of efficient thermal accumulators, mainly under international cooperation projects with Kazakhstan and India.

CONCLUSION

In conclusion, the documents and materials presented by Assoc. Dr. Djonova-Atanasova meet all the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria (ZRASRB), the Regulations for the Implementation of the ZRASRB of the BAS and the relevant Regulations of the Institute of Chemical Engineering for occupying the academic position "Professor". The candidate's works contain original scientific and applied contributions that have received international recognition, a representative part of which has been published in renowned scientific journals and scientific collections. After familiarizing myself with the materials and scientific works presented in the competition, analyzing their significance, and the scientific, scientific-applied, and applied contributions contained in them, I give my positive assessment and recommend that the Scientific Council of IEES choose Assoc. Dr. Daniela Boyanova Djonova - Atanasova for "Professor" in professional direction 4.2. Chemical sciences, scientific specialty "Processes and devices in chemical and biochemical technology", at the Institute of Engineering Chemistry - BAS.

Prepared the opinion: [redacted]

16.03.2023 (Prof. DSc. Kaloyan Kirilov Petrov)