

R E V I E W



on the competition for "Associate Professor" at the Institute of Chemical Engineering-BAS, specialty "Processes and Apparatus in Chemical and Biochemical Technology", professional field 4.2. Chemical Sciences, announced in the State Gazette No. 77 of 10.09.2024, with candidate Senior Assist. Dr. Rayka Kirilova Vladova

Prepared by: Prof. Dr. Kaloyan Kirilov Petrov, DSc

Candidate Senior Asst. Rayka Vladova was born in 1982, in 2010 she graduated as a Bachelor of Science in Biotechnology in the specialty "Biotechnology" at the University of Chemical Technology-Sofia, defending her thesis on the topic "Lipases and their application". She obtained her master's degree in 2013 at the same University, defending a thesis entitled "Mathematical modeling of the distribution of air pollutants in the area of compressor stations Lozenets, Strandzha, Ihtiman for the periods before and after the replacement of old with new units". Since 2014, she has been enrolled in full-time doctoral studies at the Institute of Chemical Engineering - Bulgarian Academy of Sciences (IChE-BAS), where in 2017 she defended a dissertation under the doctoral program "Processes and Devices in Chemical and Biochemical Technology" on the topic "Increasing the Sustainability and Energy Efficiency of Production Systems in Batch Processes on the Example of an Autothermal Thermophilic Aerobic Treatment (ATAD) System for Wastewater". At IChE-BAS, she successively holds the academic positions of Assistant Professor (2017 - 2019) and Chief Assistant Professor (since 2019).

The candidate's scientific interests are in the field of mathematical modeling, management, logistics and optimization of various chemical and biotechnological processes. Thematically, the research has a strongly applied nature, with most of it related to modeling and optimization of production processes and systems in order to improve their energy efficiency and sustainability.

Candidate Senior Assist. Vladova has two specializations abroad, is a co-author of 37 scientific publications, 2 book chapters, and has over 60 participations in scientific conferences.

Since 2016, she has participated in a total of 7 scientific projects, two of which she was the leader. The candidate also possesses organizational skills - he participates in the organization of numerous scientific conferences, two of which he is the chairman of the organizing committee (1. "A joint symposium of: The 8th Sustainable Process Integration Laboratory (SPIL), Scientific Conference CAPE Forum 2024 Computer Aided Process Engineering, 2nd International Scientific Conference on Cleaner Energy and Chemical Engineering for Sustainable Circular Economy: CLES-CE 2024", Brno, Czech Republic, 02.09.2024 - 03.09.2024 and 2. "1st International Scientific Conference on Cleaner Energy and Chemical Engineering for Sustainable Circular Economy", Sofia, Bulgaria, 28.08.2022 - 31.08.2022).

Senior Assistant Professor Vladova participated in the competition with a total of 33 scientific publications (4 publications were submitted separately for the acquisition of the ONS "Doctor"), of which 21 are referenced in Scopus or WoS. Of these, 3 are presented in the Q1 quartile pcs., in Q2 - 1 pc., in Q3 - 11 pcs. and in Q4 - 3 pcs. The scientific publications have been cited a total of 33 times.

The candidate meets the minimum national requirements for holding the academic position of "associate professor" with a dissertation for the ONS "Doctor" (50 points for group of indicators A), one publication in Q1, one in Q2, three in Q3 and one in Q4 for a total of 102 points for group of indicators B (requirement 100 points), two publications in Q1, eight in Q3, two in Q4, two in journals with SJR without IF and two book chapters for a total of 244 points for group of indicators Γ (with a requirement of 220 points) and 33 citations for 66 points for group of indicators D (with a requirement of 60 points).

Regarding the fulfillment of the additional requirements of the IIH-BAS for holding the position of "associate professor", the candidate has submitted a total of 37 scientific publications (with a requirement of 20), 33 publications after the ONS "Doctor" (with a requirement of 15), 21 refereed publications in Scopus or WoS (with a requirement of 5) and 33 citations with a requirement of 20 citations. The candidate's H-index in Scopus is 4 without self-citations with a recommended H-index requirement of 4.

The references made show that the candidate Senior Asst. Vladova fully meets the scientometric requirements for the position of "associate professor" of the ZRASRB, the Regulations for the implementation of the ZRASRB of the BAS, as well as the additional requirements of the Institute of Chemical Engineering.

In the materials submitted for the competition, significant scientific contributions of a fundamental nature are the development of a scheme for thermal integration of flows in a periodically operating ATAD system, as well as the development of new methods for designing and optimizing resource-supply chains, while simultaneously taking into account the economic and environmental goals of production.

The candidate's scientific and applied contributions are particularly significant. For the most part, they are related to the modeling and optimization of various processes and productions and consist in proposing new methods and approaches for their sustainable design and management. For example, to increase the sustainability and energy efficiency of periodic production systems, new methods for thermal integration have been proposed, for determining the boundaries of the change of variables, to determine the flexibility index and prevent thermal shock of systems for autothermal thermophilic aerobic wastewater treatment. For the optimization of resource supply chains in dairy production, models have been proposed that assess the environmental feasibility of production. The models include both an assessment of the impact of carbon dioxide generated during production and an assessment of its production depending on the type of production recipes and vehicles used.

Among the significant scientific and applied contributions, one can also mention the development of a mixed integer linear programming model for optimizing resource supply chains in biodiesel production, in the case that waste from dairy production is used as raw material. A model for assessing the energy costs of a wastewater treatment plant has also been proposed, allowing for optimal use of waste material. Methods have also been developed to assess the stresses and the probability of deformations under load of various nanocomposite materials. As a result, the models determine the zones of safe work with the materials.

Regarding my personal impressions of the candidate, I know Senior Asst. Prof. Raika Vladova as a good scientist and precise administrator, as a person with significant social and organizational skills. In addition to her scientific activity, at IIIH-BAS the candidate has also carried out significant administrative and scientific-administrative activity for years, performing the position of secretary of the Scientific Secretary of the Institute - an activity with which she copes extremely successfully. The competencies acquired in this way would certainly contribute to the successful performance of tasks as an associate professor.

CONCLUSION

In conclusion, the documents and materials submitted by Senior Asst. Prof. Dr. Raika Vladova 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 ZRASRB of BAS and the relevant Regulations of the Institute of Chemical Engineering for occupying the academic position of "Associate Professor". After reviewing the materials and scientific papers submitted in the competition, analyzing their significance and the scientific, scientifically applied and applied contributions contained therein, I give my positive assessment and recommend to the Scientific Council of the Institute of Chemical Engineering to elect Senior Assistant Professor Dr. Rayka Kirilova Vladova as "Associate Professor" in the professional field 4.2. Chemical Sciences, scientific specialty "Processes and Apparatus in Chemical and Biochemical Technology", at the Institute of Chemical Engineering - BAS.

Reviewer:

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(Prof. Kaloyan Petrov, PhD)

17.12.2024