

## О P I N I O N

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 Elena Nikolaeva Razkazova-Velkova, Assoc. Prof., PhD Eng.

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 scientific activities of the candidate under the competition, Assoc. Prof. PhD Eng. Elena Razkazova-Velkova are related to research, design, optimization and structural sizing of packed columns, research on absorption and adsorption processes, kinetics and modeling of mass transfer processes, research on catalytic processes, purification of flue gases from sulfur dioxide, creation and research of fuel elements with an ecological focus for the disposal of various pollutants.

The total number of scientific works of the candidate, including those presented under the competition, is 71 scientific publications, which are published in journals, cited and indexed in the global databases Web of Science and Scopus, a published book chapter, two issued patents.

**National and European contracts:** The candidate participates in a number of scientific and scientific-educational projects related to the study of column apparatus for the implementation of absorption, desorption and rectification processes, utilization of hydrogen sulfide in the Black Sea waters, development of new fuel cells based on chemical and microbial processes, integrated absorption-adsorption process for waste-free purification of gases from sulfur dioxide, bioelectrochemical systems for purification of organic pollutants. In three of the projects with the "Scientific Research Fund" at the Ministry of Education and Science of the Republic of Bulgaria, he is the leader. He participates in 11 scientific projects, as a member of the scientific team, funded by the Ministry of Education and Science of the Republic of Bulgaria, under the Seventh Framework Program of the EU 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 in the field of chemical engineering and reviews of project proposals and reports to the Scientific Research Fund at the Ministry of Education, Science and Culture of the Republic of Bulgaria.



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

**Scientific and organizational activity:** The candidate's scientific and organizational activity is expressed in the successful management and administration of research projects, as well as in organizational activities of scientific seminars in the field of chemical engineering.

## **2. Evaluation of the submitted materials**

In the competition for the academic position of "Professor", the candidate is presented with 22 scientific papers, which are published in journals, cited and indexed in the global databases Web of Science and Scopus, one published book chapter and two issued patents. Of the scientific papers, three articles are in journals in quartile Q1 (SJR (Scopus), JCR-IF (Web of Science)), three - in quartile Q2 (JCR-IF (Web of Science)), two - in quartile Q3 (SJR (Scopus), JCR-IF (Web of Science)), twelve - in quartile Q4 (SJR (Scopus), JCR-IF (Web of Science)), and two publications have an 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 applied scientific contributions declared in the candidate's Author's Reference in the submitted scientific works. The most significant ones can be characterized as enriching existing knowledge and theories and obtaining new ones, namely: based on experimental determination of the hydraulic resistance of high-efficiency metal Raschig Super-Ring (RSR) packings for column apparatuses, more precise equations for its prediction have been derived, dimensionless criterion equations have been proposed for two types of packing elements, which can be successfully applied for design and correct structural sizing of industrial apparatuses, studies for the development of an energy-efficient technology for removing SO<sub>2</sub> from flue gases in combustion systems using the Wellman-Lord method have been critically analyzed and improvements to the latter have been proposed, an integrated absorption-adsorption method for capturing sulfur dioxide from flue gases has been developed, simulation and experimental results have been obtained for the cumulative effect of combining absorption and adsorption processes, which complement the existing knowledge on the mechanism and the main factors affecting the efficiency of These processes. Valuable data and significant contributions related to the study of catalysts and electrocatalysts have been obtained, a new method for the simultaneous purification of sulfur dioxide and hydrogen sulfide at atmospheric pressure, by electrochemical means, has been proposed, and the conditions for the simultaneous reduction of sulfur dioxide and oxidation of hydrogen sulfide



have been found, various fuel elements with an ecological focus for the neutralization of various pollutants have been constructed and studied.

**Significance of contributions to science and practice:** 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.

**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 scientific-applied contributions in the submitted scientific works are the personal work of the candidate in equal cooperation with the co-authors. All scientific works submitted to the competition correspond to its multidisciplinary topic 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. Research will continue with bioelectrochemical systems for the purification of organic pollutants, with the aim of removing dyes and phenol in fuel cells. In addition to sulfur dioxide, efforts will be directed to the separation and utilization of other waste gases from industry and households, research on the oxidation of metal sulfides in fuel elements will continue, 3D printing methods will be used to create new fuel element designs, and research on the use of thermal waters from various springs for use in fuel elements will be deepened and expanded.

#### **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 works in the competition were cited with 62 citations in scientific publications, referenced and indexed in Web of Science and Scopus. In an additional reference to the citations, a total of 162 citations of 37 scientific works are presented.

#### **5. Personal impressions for the candidate**

I know the candidate from fruitful cooperation on scientific and educational projects in the field of chemical engineering. I believe that her professional and personal qualities will be beneficial for the development of the topic of the competition and the needs of the laboratory "Transfer Processes in Multiphase Media". The candidate has proven that she combines perseverance and purposefulness 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 familiarization with the scientific papers submitted 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 Eng. Elena Nikolaeva Razkazova-Velkova 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**

