

OPINION

On the 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 "Innovative processes and systems engineering" at the Institute of Chemical Engineering - Bulgarian Academy of Sciences, announced in the State Gazette No. 37 (21.04.2026)

with candidate Elisaveta Georgieva Kirilova, Assoc. Prof. PhD

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

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

The research and applied research activities of the candidate for the competition, Assoc. Prof. Elisaveta Georgieva Kirilova, PhD are related to: the optimal design of sustainable resource-security systems - in the dairy industry, biodiesel production and hydrogen energy - with the application of multi-criteria MILP/MINLP models and taking into account economic, environmental and social factors; modeling and thermal integration of biotechnological systems in order to improve their energy efficiency and sustainability; application of artificial neural networks for modeling chemical and biotechnological processes; analytical modeling of multilayer nanocomposite structures with analysis of stresses, deformations and delamination under different loads. The main scientific and applied scientific contributions, according to the attached publications, are presented by the candidate in several thematic areas, namely:

- Improving the sustainability and energy efficiency of production systems with batch processes on the example of conventional industrial systems for domestic wastewater treatment, applying the process of autothermal thermophilic aerobic sludge degradation (ATAD);
- Optimal design of sustainable resource-supply chains for the production and distribution of biofuels using various bioresources;
- Optimal design of sustainable resource-supply chains for the production and distribution of dairy products;
- Mechanical behavior and delamination of layered nanocomposites - analytical methods and optimization.

The total number of scientific works of the candidate, including those submitted in the competition, is 85 (scientific publications published in journals, cited and indexed in the global databases Web of Science and Scopus and scientific publications in Bulgarian and international collections of reports) and 8 book chapters published by prestigious publishing houses.

National and European contracts: The candidate participates in a number of scientific and scientific-educational projects related to: assessment of the condition and study of the behavior of intelligent sensor elements on hygrothermal piezoelectric structures; sustainable processes, systems and 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, he is the leader. He participates in 2 national scientific projects, as a member of the scientific team, funded by the Scientific Research Fund-MES Republic of Bulgaria and in 6 international scientific projects, funded by the DFG, Germany.

Expert activity: The expert activity of Assoc. Prof. Elisaveta Kirilova 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, and preparing opinions for competitions for academic positions.

Supervision of PhD students and teaching activities: The candidate does not present data and information on supervision of doctoral students and teaching and academic activities.

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 international and national forums.

From 2018 to the present, he is the Head of the Laboratory "Innovative Processes and Systems Engineering" of IChE-BAS. According to this position, he leads and coordinates the scientific activity of the laboratory, organizes and controls the implementation of research projects, assists in attracting national and international funding and represents the laboratory before internal and external scientific structures. From 2022 to the present, Assoc. Prof. Elisaveta Kirilova, PhD is the Scientific Secretary of IChE-BAS, according to which she coordinates and organizes the scientific activity of the institute. She assists the management in administrative processes, ensures communication with the BAS administration. Organizes scientific events, maintains documentation and archiving, assists in quality control and popularization of the institute's scientific achievements.

2. Evaluation of the submitted materials

In the competition for the academic position of "Professor", the candidate presents himself with 25 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, six articles are in journals in quartile Q1 (JCR-IF (Web of Science), SJR (Scopus)), one - in quartile Q2 (SJR (Scopus)), twelve - in quartile Q3 (SJR (Scopus)) and six - in quartile Q4 (SJR (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 and applied scientific 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 through: development of an optimization stochastic approach and a method for estimating the flexibility index (Flexibility Index) for the reconstruction of thermally integrated ATAD systems operating under conditions of uncertainty regarding the parameters of the input-output flows; development of approaches (integrated multi-criteria approach and deterministic approach) for optimal design of a sustainable resource-supply chain at a strategic level for the production and distribution of dairy products and biodiesel/diesel. A new, sustainable optimization approach is proposed to deal with uncertainty in product requirements in a resource-supply chain for the production of various dairy products using different technologies, while taking into account economic and environmental requirements.

Valuable data and significant contributions have been obtained related to: development of a 2D analytical method for stress and strain analysis in three-layer nanocomposites; modeling of the hygrothermomechanical behavior of graphene/PMMA nanocomposites; investigation of the influence of the type of adhesive/glue on delamination in piezoelectric structures subjected to dynamic loading.

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. The applicability of a methodology for increasing the energy efficiency and sustainability of batch production systems on the example of systems for autothermal thermophilic aerobic degradation of sludge has been developed and proven. Approaches have been implemented for: optimal design of a combined resource-security chain for the production and distribution of dairy products and biodiesel on the scale of Bulgaria, optimal design of resource-security chains for the production and distribution of dairy products according to different recipes while satisfying environmental, economic and social criteria, 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 co-authors. 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. The candidate presents a reference for 209 citations in scientific publications, referenced and indexed in world-renowned databases of scientific information (Web of Science and Scopus) on 48 scientific papers.

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 "Innovative Processes and Systems Engineering". 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 applied research 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 Institute of Chemical Engineering - 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 materials and scientific works submitted by the candidate in the competition, their significance, the scientific and applied scientific contributions contained in them, *gives me reason to confidently propose Assoc. Prof. Elisaveta Georgieva Kirilova, PhD to occupy the academic position of "Professor" in Professional Direction 4.2. Chemical Sciences, specialty "Processes and Apparatus in Chemical and Biochemical Technology", for the needs of the laboratory "Innovative Processes and Systems Engineering" at the IChE-BAS, Sofia.*

Date: 20.08.2026

Member of the Scientific Jury:

/Assoc. Prof. Adriana Georgieva, PhD /