

REPORT

Вх. № 108 / 1.12.03 2023г.

From assoc. prof. D-r. Tatyana Stefanova Petrova

**For Competition :** Academic position (AP) "Associated Professor" in a professional field (PF) „4.2. Chemical Sciences ", specialty " Processes and apparatus in chemical and biochemical technology "

**announced:** in Government newspaper, No. 96 of December 2, 2022, by the Institute of Chemical Engineering at the Bulgarian Academy of Sciences (ICHE-BAS), for the needs of the Laboratory "Innovative processes and system engineering"

**with one candidate:** Petya Georgieva Popova-Krumova, assistance professor, doctor, engineer

## 1. Brief biographical data and characteristics of the applicant's scientific interests.

The candidate, assist. prof. Dr. Eng. Petya Popova-Krumova, was born on April 11, 1975. She graduated in 2004 in University "Prof. D-r Asen Zlatarov" - Burgas, specialty "Chemical engineering", master degree. In 2004 she began his PhD at IChE-BAS, code 02.10.09 and successfully defended it in 2011, with a dissertation on " Parameters identification in modeling of chemical engineering processes". Dr. Eng. Popova-Krumova worked at IChE-BAS first as a research assistant (2008 - 2011), and then as a assistant professor from 2011 until now, she has over 18 years of work experience.

The scientific interests of the assist. prof. Dr. Eng. Petya Popova-Krumova can be summarized with the following key expressions: development of programs and methods for parametric identification in multiparametric models; modeling of interphase mass transfer in distillation, absorption, adsorption, catalytic and bio processes in industrial column apparatuses.

## 2. General characteristics of the research and scientific-applied activity of the candidate (including participation in national and European projects/contracts, expert activity, management of doctoral students, scientific-organizational activity, etc.).

The candidate has mainly scientific and scientific-applied activities. Quantitatively, the overall scientific-research, scientific-educational and applied activity of the candidate at the present moment and according to the documents submitted by her for this competition, is expressed through the following indicators:

- Total number of scientific publications: 27, 12 of them with impact factor (IF) and/or impact rank (SJR);
- Number of scientific publications other than those in PhD: 18, 10 of them with impact factor (IF) and/or impact rank (SJR);
- Total number of citations of all scientific publications: 41;
- H index (according to Scopus or Web of Science): 3;
- Total number of reports/posters published in the conference proceedings: 14;
- 2 utility models and 3 patents;
- Participation in 8 projects and project leader of 2

Dr. Popova-Krumova is also a co-author in the development of 2 utility models of column apparatus and reactor (2013 and 2020) and in 3 patents regarding: methods and apparatus for gas absorption (2012), methods and apparatus for purification of sulfur dioxide (2013), and apparatus for absorption of medium and highly soluble gases (2013). She has participated in 8 projects in the period 2005-2019 (3 with BNSF, 1 under HRD FP, 4 in inter-academic collaborations with universities in Ben-Gurion, Tel Aviv, and Haifa in Israel). She is the leader of two projects - one under the budget subsidy of BAS and one with the BNSF for Young Scientists. Dr. Popova-Krumova was awarded a prize (gold medal) for the presentation of the development "Absorption-adsorption apparatus and method for purifying gases from sulfur dioxide", at the X national exhibition "Inventions, Transfer, Innovations"-ITI'2017, November 01-03, Sofia. The scientific and organizational activity of Dr. Popova-Krumova is expressed by participation as a member and secretary of 5 organizing committees of various international scientific events, in the period 2018-2022. She is a member of the International Scientific Center for Power and Chemical Engineering Problems (<http://www.int-sci-center.bas.bg/index.htm>). Dr. Popova-Krumova's expertise is also reflected in the



preparation of reviews for articles in various journals in the field of chemical engineering. No teaching activity data is presented.

### 3. Evaluation of the presented materials (number and characteristics of the presented works - scientific publications, monographs, research

The candidate has submitted for the current competition the complete set of required documents and supporting evidence certifying: a) meeting the minimum requirements for the academic position (AP) "Associate Professor" in PF 4.2 "Chemical Sciences", according to the Regulations on the Terms and Procedures for the Acquisition of Scientific degrees and occupying academic positions at the BAS/ 3.09.2019, and b) meeting the additional requirements of IChE-BAS for the appointment of AP "associate professor", according to the Methodology for the growth of scientists at IChE-BAS, Appendix 1.

I checked the sources indicated by her for each of the indicators in points a) and b), and I accept, with minor remarks, and I agree with the points calculated by the candidate. From the publications presented in full text, No. 21 is missing (to those for her PhD). Out of a total of 41 citations presented, 25 meet the requirements of point a), section E. During the verification of the citations on the Internet, in the meantime, 6 additional citations from the beginning of 2023 were found, so the requirements of point a), section E are met. The candidate has submitted for the current competition - 12 co-authored articles in journals with IF/SJR out of a total of 26, 31 citations in journals with IF/SJR, she is a co-author in 2 books from prestigious international publishing houses, also in 1 book chapter and in 2 utility models and 3 patents. According to the two tables below, the presented assets fully satisfy and, by individual indicators, exceed the minimum number of points for covering the minimum and additional criteria for holding the AP "associate professor" under this competition, namely:

	<b>A. PhD degree</b>	<b>B. DSci degree</b>	<b>C. Monography/ publications in Web of science/Scopus</b>	<b>D. Publications Besides Monography/ publications in C</b>	<b>E. Citations (Web of Science/Scopus)</b>
<b>Covered</b>	<b>50</b>	<b>---</b>	<b>113</b>	<b>224</b>	<b>62</b>
<b>Required (min)</b>	50	---	100	220	60

	<b>T.1 Publications outside PhD to be <math>\geq 15</math></b>	<b>T.2 All publications <math>\geq 20</math>, from which 15 in referred journals. At least 5 of them with <math>IF \geq 0.5</math> or <math>SJR \geq 0.25</math></b>	<b>T.3 Citations <math>\geq 20</math></b>	<b>T. 4 Hirsch factor optional</b>
<b>Covered</b>	<b>18</b>	<b>26 (20), 12</b>	<b>39</b>	<b>3*</b>
<b>Required IChE</b>	15	20 (15), 5	20	4

\* 5 by Google scholar, 5 by Researchgate, 3 by Scopus

### 4. Main scientific and scientific-applied contributions.

The presented publications and patents summarize the scientific and scientific-applied contributions of the candidate in the field of modeling of chemical engineering and biotechnological processes:

- 1) methods for solving incorrect parameters identification tasks;
- 2) modeling and analysis of interphase mass transfer processes (distillation, absorption, adsorption and catalysis) by developing convective-diffusion and average-concentration models in industrial column apparatus;
- 3) a hierarchical method for solving multiparameter models with the use of polynomial approximations of experimental data, necessary for the identification of their parameters;
- 4) model for a specific case of absorption-adsorption process in a column apparatus with bell plates;
- 5) a new approach for two-level modeling of the mass transfer process in industrial column apparatus;



6) innovative method and apparatus for cleaning waste gases from SO<sub>2</sub>.

The main contributions of the presented materials could be summarized, in my opinion, as follows: enrichment of existing knowledge and theories (for the scientific) and proposals for the application of scientific achievements in practice (for the scientific-applied), in the above-listed publications, books, patents and useful models submitted by the applicant.

I appreciate and agree with the applicant's described scientific and scientific-applied contributions from his research as presented. The emphasis is on scientific and applied contributions, in particular those related to increasing the efficiency of absorption and adsorption processes and apparatus, as well as the purification of gases and the provision of waste-free technologies.

I believe that the personal contribution of the candidate is clearly visible enough - in the 26 publications presented for the competition, she is in first place in 7, in 4 - in second place, in 11 in third place, in 2 in fourth place and in 2 in fifth place and seventh place. From the submitted materials and documents for this competition, it can be seen that Dr. Popova-Krumova has sufficient qualifications, skills and experience in various fields, both at the national and international level.

#### **5. Reflection of the candidate's scientific publications in the Bulgarian and foreign literature.**

The citations of the publications for the competition presented by the candidate meet the required minimum (see the comments and tables in item 3). It should be noted the citation of patents and books, which further increases the recognition of the applicant at the international level.

#### **6. Critical remarks and recommendations.**

From the scientific publications submitted for this competition, no full text was submitted for publication No. 21 (for PhD). From the citations presented in the minimum requirements reference No. 17, 20, 23, 31 are not in journals with SJR/IF; No. 6 is duplicated by another that is in a dissertation, and No. 15 is wrong. Notwithstanding the above, this does not significantly change the points for fulfilling the minimum requirements, as can be seen from the above tables in item 3 and is rather of a recommendatory and clarifying nature.

#### **7. Personal impressions of the reviewer about the candidate.**

I know Dr. Popova-Krumova from the time when she was a PhD student at IChE-BAS. Assoc. prof. Popova-Krumova is a very conscientious and competent specialist in the modeling of chemical engineering and biotechnological processes, she is the organizer of several summer schools and other scientific events of the IChE, and actively participates in national and international projects.

### **CONCLUSION**

Based on the above, I believe that the candidate in this competition for AP "Associate Professor" at IChE-BAS, Dr. Petya Popova-Krumova, fully satisfies and meets the minimum requirements for the academic position (AP) "Associate Professor" in PF 4.2 "Chemical Sciences", according to the Regulations on the terms and conditions for acquiring scientific degrees and holding academic positions at BAS /3.09.2019, as well as the additional requirements of IChE-BAS for holding AP "Associate Professor".

I propose to the esteemed jury and to the National Assembly of IEES to vote positively on the following proposal for decision: "Assist. prof. Dr. Eng. Petya Georgieva Popova-Krumova to be elected to the academic position of "Associate Professor" at the Institute of Chemical Engineering - BAS, under PF 4.2 "Chemical Sciences", "Processes and apparatus in the chemical and biochemical technology", for the needs of the Laboratory "Innovative processes and system engineering".

Date

Prepared the report:

16.03.2023

/Assoc. Prof. Dr. Tatyana Petrova, IChE-BAS/