OPINION

On the competition for occupying the academic position "Professor" in 4.2. Chemical Sciences (Processes and Apparatuses in Chemical and Biochemical Technology), at the Institute of Chemical Engineering, Bulgarian Academy of Sciences (IChE-BAS) for the needs of the Transfer Processes in Multiphase Media Laboratory, announced in the State Gazette, issue 96/02.12.2022

The only candidate being Associate Professor Dr. Eng. Daniela Boyanova Dzhonova-Atanasova

By Prof. Dr. Roumiana Petrova Stateva, Institute of Chemical Engineering - BAS

The brief examination of Assoc. Prof. Dzhonova's CV shows her scientific and career development over the years, namely: graduation as a mechanical engineer (MSc from the Technical University of Sofia in 1988); defense of a PhD (candidate of technical sciences) in 1992; joining IChE-BAS in 1994 where she has held successively the positions of Technologist, Chief Assistant and Associate Professor (since 2014). The colleague is the Head of the Laboratory "Transfer Processes in Multiphase Environments" of IChE-BAS from 2018 until now, in the period 2018-2022 she was Scientific Secretary of IChE-BAS, and since 2022 - Deputy Director of the Institute.

Brief overview of the scientific and applied research, and pedagogical activities of the candidate Assoc. Prof. Dzhonova in the light of the REGULATIONS on the terms and conditions for occupying academic positions at the Bulgarian Academy of Sciences (section 4.2. Chemical Sciences).

Publications

Remark: The corresponding Indicators will be given by Cyrillic Letters in order to avoid confusion

Indicators В, Г

In the materials prepared for participation in the competition, Assoc. Prof. Dzhonova has included a total of 44 scientific articles, systematized following the requirements by groups of indicators, as discussed briefly below:

Indicator В: Works that can be equated to a Habilitation - 8; Indicators group Г: Publications outside the habilitation work – 20 (indicator 7); Published chapter of a book or collective monograph – 4 (indicator 8); Utility model – 1 (indicator 9). As well as 11 additional publications to meet the specific requirements of IChE-BAS, aside those with which the colleague has participated in the competition for an associate professor.

Indicator В:

The articles included in this group are published in international journals, distributed by quartiles, as follows Q1 – 4; Q2 - 1; Q3 – 3. In this group should be particularly singled out papers published in prestigious journals such as *Chemical Engineering Research and Design* (3), and Chemical Engineering and Processing - Process Intensification (1). All works in this group are co-authored and collect a total of 140 points with a mandatory minimum of 100 points.

Indicators Group Г:

Indicator 7. The publications are in journal which are referenced and indexed in databases of scientific information, and are distributed by quartiles as follows: Q1- 3; Q2 – 2; Q3 – 2; Q4 – 11, as well as papers which do not fall into any of Q1 - Q4. *Indicator 8.* Dr. Dzhonova has presented two chapters of a book published by the Publishing House of the BAS "Prof. Marin Drinov", and two other chapters in books published by prestigious international publishers such as De Gruyter and Springer. The total number of points from indicators 7-9 is 350, which significantly exceeds the minimum requirement of 220 points for this group.

I will not comment the additional 11 publications, as they do not contribute to the minimum requirements for indicators A-E, but only their citations, reflected in the list of all citations of the candidate's works.

Citations - Indicator Д

There are 82 citations of the works of Assoc. Prof. Dzhonova that were discussed above (indicator 4, and indicator 7 of Group Г, respectively), which brings her 164 points with the minimum requirement being 120 points. I am taking the liberty to point out a certain eclecticism in the writing of the authors names of the cited publications (see, for example, pub. 1, 3, 11, etc., but 2, 15, etc.). The same holds for the citing publications.

In addition, for citation No. 44 is given just a link, and not the citing publication itself (Mahshid Mohammadi *et al*: „Lichenochemicals: extraction, purification, characterization, and application as potential anticancer agents". *Expert Opinion on Drug Discovery*, 15:5, 575-601 (2020).

The colleague has also attached a list of all citations to her works noticed so far – a total of 172.

Indicators Group E:

In this group are indicators 12-20. Dr. Dzhonova has given information about indicators 13-15, 17 and 18, respectively. For Group E the total number of points collected is 258 points, which again significantly exceeds the recommended minimum of 150 points.

Particular attention and emphasis should be placed on the co-ordinating of a successfully defended PhD thesis of 1 student, participation in four international projects, of which three funded by the EC under the COST program (Horizon 2020), as well as acting as a Coordinator of the Bulgarian team in 2 international projects.

In conclusion of this section, the following should be specifically noted:

- Impressive is the enhancement and development of Dr. Dzhonova's potential as a researcher in the years after her first habilitation. For this positive trend, the testimonial is undoubtedly the scientific works with which she participates in this competition – seven of them are published in journals of quartile Q1, and the rest, except two, are in Q2-Q4, respectively.

- There is also a positive trend in the number of articles citing the works of Dr. Dzhonova. The colleague has attached a Table reflecting the compliance of her results with the additional requirements of IIH-BAS (Methodology for Growth of Scientists in IIH – BAS, section Professor). All requirements are exceeded with one exception (Hirsch index). Still, it should be explicitly emphasized, not only that this is a recommendatory and not a mandatory criterion, but also that the H index of the colleague differs slightly from the recommended one (7 vs 8). Moreover, the latter was increased considerably after the first habilitation.

The main scientific and applied scientific contributions.

The scientific research of the candidate Dr. Dzhonova is mainly focused on the study of integrated technologies with membrane processes - undoubtedly an innovative and up-to-date field with significant applications in industry, especially regarding the development of processes for extracting/recovering of thermosensitive secondary metabolites from natural matrices, the production of biofuels, etc. Those processes are characterized with enhanced and intensified efficiency as a result of reducing the amount of solvents used, the time of extraction, etc.

The main scientific contributions were obtained applying Computational Fluid Dynamics (CFD) models, ANSYS Fluent tools, etc. Some of the most important, in my opinion, arranged not by their significance and importance, are systematized very briefly as follows:

The influence of the hydrodynamics and the distribution of shear stresses during filtration processes were evaluated; As a result of experimental and numerical research, new information regarding a two-stage process - extraction with the help of ultrasound and concentration of biologically active compounds by nanofiltration in a tangential mode with organic solvents was obtained; Based on CFD simulations and taking concentration polarization into account, new data on the hydrodynamics and mass transfer in a cell with stirring were obtained; A dispersion model for the liquid distribution in a high-performance, open-structure random-packed column is proposed, which was compared and validated with the experimental data of Dr. Dzhonova, and those available in publications by other authors, etc.

A significant number of applied scientific contributions were also achieved and reported in the articles of the colleague, some of the most important, in my view, of which are briefly summarized below:

The theoretical hybrid vessel model was solved numerically and new data concerning flow characteristics (velocity, and velocity gradients) were obtained which may find application in bioreactor scaling; Taking into account the lack of a universal methodology for evaluating the performance

characteristics of structured and random packings with an open structure, new equations that allow calculating hydraulic resistance and dynamic retention capacity were derived on the basis of the experimental data available. The equations proposed are characterized by high accuracy and can find wide application; New information regarding the distribution of the liquid phase in an industrial scale random packing with an open structure was obtained, etc.

To conclude, I would like to note that the contributions are presented in very elaborate terms, and in their form look more like abstracts of the corresponding articles rather than systematized and clearly presented scientific and applied scientific achievements and contributions.

I have known Dr. Dzhonova since she joined the IChE-BAS, and I have wonderful impressions of her, moreover that we have worked together in the Attestation Commission of the Institute, where she served as a Chair. Dr. Dzhonova is a thorough, precise, ambitious and devoted researcher with very good theoretical background. I would also like to express my confidence that the acquired qualification and experience will allow her not only to expand the topics she has been working on in recent years, but why not choosing a new one with a promising horizon, where I am sure she will be proactive, and persistent in its affirmation and development.

In view of the above, I strongly and unreservedly recommend to the Scientific Jury to support with their positive votes the candidacy of Associate Professor Dr. Daniela Boyanova Dzhonova-Atanasova in this competition for the academic position of Professor in scientific specialty 4.2. Chemical Sciences (Processes and Apparatus in Chemical and Biochemical Technology), announced by the IChE-BAS.

17. 03. 2023 г. Member of the Jury: [redacted]

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