

REPORT

by Prof. Dragomir Yankov, PhD
concerning

the materials submitted for a competition for the academic position of "Reader" in the scientific specialty 4.2. Chemical Sciences (Unit Operations in the Chemical and Biochemical Technology) for the needs of the laboratory " Innovative Processes and Systems Engineering " - Institute of Chemical Engineering - BAS, announced in the State Gazette no. 17/ 21.02.2023

According to the announced competition, the only candidate who submitted documents is Chief Assistant Dimitar Nikolaev Kolev, PhD.

Dr. Boyadjiev graduated from Sofia Technical University in 1995 with a master's degree in Computer Science. He obtained the educational and scientific degree "doctor" in 2020 at IChE. He worked at IChE as a technologist from 2019 to 2021, and then as Chief Assistant.

The candidate for "Reader" Chief Assistant Boyan Boyadzhiev, PhD, takes part in the competition with a total of 28 publications - 20 publications in international scientific journals, one monograph with two editions, two book chapters, one patent and three utility models. Nine of the publications are included in the PhD dissertation and will not be considered.

The articles are distributed as follows:

In journals with impact factor - 8: *Applied Thermal Engineering (Q1) – 3; Journal of Engineering Thermophysics (Q2) - 1; Bulgarian Chemical communications (Q4) – 4.*

In journals without impact factor - 3: *International Journal of Modern Trends in Engineering and Research - 2; Open Access Library Journal - 1;*

Boyan Boyadzhiev is first author in eight publications, second in 1 and third in three. The author's h-factor is 7 according to Google Scholar, 6 according to Web of Science, and 4 in Scopus.

The listed publications have been cited a total of 54 times.

B. Boyadzhiev participated in one international project with Vrije Universiteit, Brussel, and in 3 projects with NSF.

Below is a table of the minimum required points by groups of indicators and those of the applicant:

Group	Content	Minimum required	Points collected
A	Indicator 1	50 points	50
B	Indicator 2	-	-
C	Indicator 3 or 4	100 points	107
D	Sum of indicators from 5 to 10	220 points	226
E	Sum of points in indicator 11	60 points	104
F	Sum of indicators from 12 to end	-	-

The total number of points is 487 with a required minimum of 430.

As a member of a team, B. Boyadjiev won a gold medal for the development "Absorption-adsorption apparatus and method for purifying gases from sulfur dioxide" at the 10th national exhibition ITI-2017 and third place for "Best Innovative project" from the BCCI for 2017.

The main scientific and applied scientific interests of Dr. B. Boyadzhiev are in the field of the investigation of nonlinear effects on mass transfer with intensive mass exchange, as well as in the mathematical description and modeling of multiphase flows in column apparatus.

The main contributions in the materials submitted for the competition can be systematized as follows:

- Through a comparative analysis, the influence of concentration on the mechanism and kinetics of transfer processes in systems with intensive mass transfer was studied.

- A theoretical analysis of non-stationary evaporation kinetics was made. An analysis of the stability of the Oberbeck-Boussinesq equations was also made. A program for solving these equations has also been created.

- The distribution of the mass transfer resistance in the gas and liquid phases during the purification of gases from sulfur dioxide was calculated, in order to determine in which phase the process is the slowest, so that its intensification can be sought.

- New algorithms and programs have been composed to solve the equations in the mathematical model of a column apparatus with intensive chemical reactions, which allow to determine the influence of both the radial non-uniformity of the velocity and the tangential flow on the efficiency of the processes.

- A number of mathematical models have been created in the field of sulfur dioxide capture in industrial column apparatuses. The models include various absorption and absorption-adsorption processes for the capture of low concentrations of sulfur dioxide in a large volume of output gases. A new approach for modeling interphase mass transfer processes – absorption (chemical or physical), adsorption and catalytic processes – is proposed.

- Mathematical models of various column reactors - absorption, catalytic, etc., both co-current and counter-current - have been composed.

- Algorithms and programs have been composed for solving the systems of differential equations in all of the listed mathematical models, and programs have been created for the parametric identification of the parameters in these models

CONCLUSION:

The presented materials in terms of volume and quality meet the requirements of the IChE Internal Regulations, the Regulations for the conditions and procedure for acquiring scientific degrees and holding academic positions in the Bulgarian Academy of Sciences, the Act on Development of the Academic Staff in the Republic of Bulgaria and the Regulations on the Implementation of the DASRBA. With full conviction, I give a positive assessment to the candidate in the competition for the academic position of "Reader" in professional field 4.2. Chemical sciences, scientific specialty "Unit Operations in the Chemical and Biochemical Technology", and I will vote "Yes" for the esteemed jury to propose to the Scientific Council of IEES to appoint Chief Assistant, PhD B. Boyadjiev for Reader.

Sofia

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(Prof. Dragomir Yankov, PhD)