

OPINION

by Prof. Dr. Aleksandar Nikolov Dimitrov, Dipl. Eng.,
Burgas State University "Prof. Dr. Assen Zlatarov"

Member of the Scientific Jury, according to Order № RD 4/05.01.2026 of the Rector
of BSU "Prof. Dr. Assen Zlatarov"

Regarding a competition for the academic position of "**Associate Professor**" in the field of higher education 4. Natural Sciences, Mathematics, and Informatics, professional field 4.2. Chemical Sciences, **scientific specialty "Inorganic Chemistry"**, announced by BSU "Prof. Dr. Assen Zlatarov", in State Gazette, issue 89/24.10.2025.

The candidate, Chief Assist. Prof. Dencho Ivanov Mihov, PhD, is the sole participant in the competition. I have received all materials of the candidate in electronic format.

1. Biographical Notes

Dencho Ivanov Mihov was born in 1961. He graduated from BSU with a qualification as "chemical engineer". He defended his PhD thesis on "Experimental and theoretical studies of selenate systems" in 2023. He has been working at BSU, with a brief interruption, since 1988 as an Assistant Professor, Senior Assistant Professor, and Chief Assistant Professor. He is also the manager of a publishing house specializing in scientific and fiction literature.

2. Submitted Materials Related to Compliance with Regulations

In accordance with Art. 67, Para. 2 of the Regulations on the Terms and Conditions for Acquiring Scientific Degrees and Holding Academic Positions at Burgas State University "Prof. Dr. Assen Zlatarov", all necessary documents have been submitted. A reference for length of service is provided. According to a reference from BSU, the candidate is the author of 2 curricula. He conducts lectures and practical classes for students from various specializations. He is the author of 3 (three) and co-author of 1 (one) textbooks/teaching aids. Under his supervision, 4 (four) graduate students have defended their theses. He participates in 4 projects under the University's Research Funding, acting as the supervisor for one of them.

3. Submitted Scientometric Indicators

The presented scientific output consists of 18 scientific publications (11 in Scopus and WoS), 3 monographs, and 10 international and national scientific conferences. *h-index = 7.*

Two of the publications are in Q1 quartile (*Journal of Chemical Thermodynamics*), five are in Q2 quartile (*Journal of Molecular Structure - 2; Monatshefte fur Chemie; Crystal Research and Technology - 2*), and one each in Q3 (*Zeitschrift fur Physikalische Chemie*) and Q4 (*Bulgarian Chemical Communications*).

A reference for over 100 citations noted in Scopus is presented.

According to the submitted "Reference for Fulfillment of Minimum Requirements," the candidate's points meet the requirements of the Act for Development of the Academic Staff in the Republic of Bulgaria Implementing Regulations and those of the University.

4. Research Activity and Scientific Contributions

Dr. Dencho Mihov presents a document certifying that he is the supervisor of one internal university project and a member of the team of 3 others, one of which is a University-wide Research Grant.

He is the author of 3 monographs in the field of inorganic chemistry, namely: synthesis, properties, application, and modeling of selenates and selenium-containing compounds.

Dr. Mihov's publications have been cited in over 100 scientific articles, according to Scopus data.

Scientific and Applied Scientific Contributions

The candidate's contributions are structured into 5 thematic areas:

1. Experimental study of solubility isotherms of ternary water-salt systems of the type: M_2SeO_4 - $MeSeO$ - H_2O

The aim is the thermodynamic characterization of phase equilibria in metal selenate systems for obtaining new salts. Solubility isotherms at 25°C were studied using the Chlopin method. The composition of the formed double salts was determined through physicochemical analysis (Schreinemakers' method), derivatographic analysis, and X-ray phase analysis (for confirmation).

New double salts were obtained in the studied systems, and their equilibrium crystallization fields were determined.

2. Experimental determination of water activity at various concentrations in binary selenate solutions and calculation of osmotic coefficients and activity coefficients.

Water activity for binary water-salt systems of alkali and divalent selenates was determined by the isopiestic method. Based on these data, a quantitative description of the ternary systems was made (thermodynamic parameters: osmotic coefficients, activity coefficients, chemical potential, Gibbs energy, etc.). A theoretical calculation of the solubility isotherms of ternary systems, combining the respective binary ones, was performed.

For systems of simple eutectic type, a very good agreement was achieved between the experimental data and those theoretically calculated through modeling.

3. Thermodynamic modeling of equilibrium in ternary water-salt selenate systems.

The Pitzer specific interaction approach was used, which, with a small number of parameters, allows accurate description of ionic interactions even in highly concentrated multicomponent solutions.

Thermodynamic models for the behavior of solutions and solid-liquid equilibrium in binary systems of the 1-2 type were developed and validated. Both binary and ternary systems involving lithium, sodium, magnesium, and nickel ions were modeled. The equilibrium crystallization fields of the components were determined, achieving very good agreement with experimental data.

4. Characterization of the obtained double selenate salts using a set of physicochemical methods.

Double selenate salts (of sodium and a divalent metal) were obtained for the first time by co-crystallization. They were subjected to analysis. The main parameters of the new compounds were determined by infrared spectroscopy and thermal analysis. Their isobaric molar heat capacities were experimentally determined by differential scanning calorimetry. Based on these, the thermodynamic functions (entropy, enthalpy, Gibbs energy) were calculated. The osmotic coefficients and activity coefficients of the salts in aqueous solutions were determined.

Using density functional theory, the molecular structures and geometric parameters of the synthesized compounds were determined. This theory accounts for electronic correlation, which increases the accuracy of the calculations. Characteristic absorption bands were determined and compared with literature data. The GaussView software was also used.

5. Probabilistic assessment for the application of the synthesized double salts of selenic acid.

Potential application aspects of the new compounds were explored in two main directions -- in agriculture (as ingredients for insecticides) and in medicine and pharmacotherapy (anticancer effect):

An inhibitory effect on tumors and high cytotoxicity were established.

Morphological studies were conducted, confirming the cytotoxic effect through phase-contrast microscopy, fluorescence analysis of the actin cytoskeleton, and zeta potential measurement.

5. Fulfillment of the Requirements for the Academic Position "Associate Professor"

Group A (Indicator 1) - PhD Thesis – 50 points. The candidate meets the requirement with diploma № 0083/2023.

Group B (Indicator 3 or 4) - Habilitation work – a monograph – 100 points. The candidate chose the monograph option and fully meets the requirement of 100 points.

Group G (Indicators 5 - 10) - Total number of points: 227 (required minimum 200).

- Indicator 5 – Monograph - (30 pts.)
- Indicator 6 – (Book based on dissertation): Monograph (20 pts.).
- Indicator 7 (Publications in Scopus/Web of Science): 8 scientific articles are declared.
 - Q1 (25 pts.): 2 articles = 50 pts.
 - Q2 (20 pts.): 5 articles = 100 pts.
 - Q3 (15 pts.): 1 article = 15 pts.
 - Q4 (12 pts.): 1 article = 12 pts.
- Indicators 8, 9, 10: No documents submitted.

Group D (Indicator 11 – Citations) - Total number of points: 106 (required minimum 100 for the University). The candidate declares 53 citations in publications referenced in Scopus/Web of Science.

Group E (Indicators 12 – 20) Total number of points: 116 (required minimum 100 for the University).

- Indicator 14 (Participation in national project): Participation in 3 projects (10 pts. each) = 30 pts.
- Indicator 16 (Supervision of a national project): Supervision of 1 project (20 pts.) = 20 pts.
- Indicator 20 (Teaching aids): 4 teaching aids – 3 individual aids (3x20=60 pts.) + 1 co-authored (20 pts. / 3 authors = 6.6 pts.). Total for indicator 20: 66 pts.

In conclusion, two main facts should be noted:

1. The candidate exceeds the national and university requirements.
2. Very high quality of publications – out of the 8 articles in Group D, 7 are in the top two quartiles (Q1 and Q2).

CONCLUSION

I have known Chief Assist. Prof. Dencho Ivanov Mihov, PhD, as a lecturer, researcher, and colleague for more than 30 years. He has accumulated serious knowledge and experience both professionally and scientifically, as well as in extracurricular activities.

Based on the documents submitted for the competition, he fully meets the requirements, and in most indicators exceeds them, which makes his scientific output completely worthy of holding the academic position of "Associate Professor".

I give my unconditional **positive assessment** and propose to the esteemed members of the Scientific Jury to propose to the Faculty Council of the Faculty of Natural Sciences **to elect Chief Assist. Prof. Dencho Ivanov Mihov, PhD, to the academic position of "Associate Professor"** in the field of higher education 4. Natural Sciences, Mathematics, and Informatics, professional field 4.2. Chemical Sciences, scientific specialty "Inorganic Chemistry".

23.02.2026

Member of the Scientific Jury:

(Prof. Dr. Aleksandar Dimitrov)