REVIEW

by Dr. Violeta Georgieva Koleva,

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of the materials submitted for participation in a competition
for the academic position of **"Associate Professor"**
at Paisii Hilendarski University of Plovdiv,

in the field of higher education 4. Natural Sciences, Mathematics and Informatics,
professional field 4.2. Chemical Sciences (General and Inorganic Chemistry)

In the competition for the academic position of "Associate Professor," announced in the State Gazette, issue no. 96 of November 11, 2025, and on the website of Paisii Hilendarski University of Plovdiv (PU), for the needs of the Department of General and Inorganic Chemistry with Methodology of Chemistry Education at the Faculty of Chemistry**, the only applicant is Chief Assistant Professor Dr. Kirila Trifonova Stoynova** from the Department of General and Inorganic Chemistry with Methodology of Chemistry Education at the Faculty of Chemistry (PU).

1. General description of the materials presented

By Order No. РД-22-55 of January 9, 2026, issued by the Rector of PU, I was appointed as a member of the Scientific Jury in a competition for the academic position of "Associate Professor" at PU in the field of higher education 4. Natural Sciences, Mathematics and Informatics, professional field 4.2. Chemical Sciences (General and Inorganic Chemistry), announced for the needs of the Department of General and Inorganic Chemistry with Methodology of Chemistry Education at the Faculty of Chemistry.

The set of materials submitted in hard copy and electronic format by Chief Assistant Professor Dr. Kirila Trifonova Stoynova is fully compliant with the Regulations for the Development of the Academic Staff of Paisii Hilendarski University of Plovdiv. The required lists according to the scientometric indicators have been provided, including scientific publications, citations, participation in research projects and scientific forums, textbooks and teaching materials, a report on teaching and instructional activities, as well as copies of the publications and teaching materials submitted for the competition. The following required documents have also been submitted: a "Report on Compliance with the Minimum National and Additional Faculty Requirements," an "Extended Habilitation Report," "Abstracts of the Articles Submitted for the Competition," a "Statement of Contributions" (in Bulgarian and English), and a "Declaration of Originality and Authenticity".

2. Brief biographical data of the applicant

Kirila Stoynova obtained her Bachelor's and Master's degrees from the Faculty of Chemistry at Paisii Hilendarski University of Plovdiv (in 2008 and 2009, respectively). In 2011, she was enrolled as a full-time PhD student at the same Faculty, in the Department of General and Inorganic Chemistry

with Methodology of Chemistry Education, and in 2014 she was awarded the educational and scientific degree "Doctor" in professional field 4.2. Chemical Sciences (Inorganic Chemistry). Her doctoral dissertation, entitled *"Investigation of Ternary Ion-Associated Complexes of Gallium Involving Tetrazolium Salts,"* was based on three publications in peer-reviewed journals. Within the same department, she subsequently held the academic positions of Assistant Professor (2012) and Chief Assistant Professor (2015). She has carried out long-term teaching and training activities (more than 10 years), including laboratory classes and seminars, and since 2020 she has also delivered lectures to full-time and part-time students.

3. General characteristics of the candidate's activity

Evaluation of the Teaching and Educational Activity

The candidate has many years of active teaching experience in the Department of General and Inorganic Chemistry with Methodology of Chemistry Education, which includes the following:

- To date, she has delivered 5,346 teaching hours to students enrolled in the Bachelor's degree programs (full-time and part-time), including lectures, seminars, and laboratory classes. Her teaching workload significantly exceeds the minimum requirement of 1,080 hours set by the Faculty of Chemistry: on an annual basis, it has ranged between 339 and 690 hours.

- She is a co-author of two teaching manuals: "Manual for Laboratory Exercises in General and Inorganic Chemistry" (2016), for which she developed three of the sections, and "Manual for Laboratory Exercises in Inorganic Chemistry" (2019), in which she is the first author and the author of seven of the included laboratory exercises.

- Chief Assistant Professor K. Stoynova has also participated in the development and implementation of lecture materials and examination tests for semester exams in the courses "General and Inorganic Chemistry (Parts I and II)," as well as in the preparation of assignments for independent work and ongoing assessment tests for lectures, seminars, and laboratory classes.

All of the above demonstrates that Dr. Stoynova has accumulated substantial long-term professional experience, skills, and competencies in teaching inorganic chemistry to university students.

Evaluation of the Candidate's Research and Research-Applied Activity

To date, the candidate's overall research output comprises 30 publications over the period 2010–2025, 29 of which are published in journals indexed in the Scopus database. These publications are distributed by quartile as follows: 4 in Q1, 2 in Q2, 17 in Q3, and 6 in Q4 journals. Three of the articles (2012–2013) are based on her doctoral dissertation. According to Scopus, 16 of these publications have received a total of 36 citations, resulting in an H-index of 3, with all citations accumulated after the award of the educational and scientific degree "Doctor." The submitted documents also include a list—albeit not well structured—of 57 independent citations excluding self-citations of all authors, indicating the interest in the conducted research. Of these, 37 are indexed in Scopus and/or Web of Science and are recognized by the reviewer. The citations originate from foreign authors and are published in journals with an impact factor, which attests to the good scientific quality and international visibility of the research carried out.

In the competition, the candidate submitted 21 scientific works outside of her dissertation, which the reviewer accepts for evaluation. These articles were published in journals with impact factors, such as *Central European Journal of Chemistry*, *Acta Chimica Slovenica*, *Molecules*, *Rus-*

sian Journal of Inorganic Chemistry, *Monatshefte für Chemie*, *Journal of Applied Spectroscopy*, *Bulgarian Chemical Communications*, and others. The distribution of the publications by journal quartiles is as follows: Q1 – 3 articles, Q3 – 13 articles, and Q4 – 5 articles.

The scientific results have been presented in a total of 36 oral and poster presentations at international and national forums. Dr. Stoynova has participated in 5 research projects, including: three internal institute projects funded by PU, one project funded by the National Science Fund (NSF), and one under the Program for Accelerating Economic Recovery and Transformation through Science and Innovation, Pillar 2: Establishing a Network of Research Universities in Bulgaria.

4. Compliance with the Requirements for occupying the Academic Position of "Associate Professor

Chief Assistant Professor Dr. Kirila Stoynova meets the requirements for occupying the academic position of "Associate Professor" according to the Law on the Development of the Academic Staff in the Republic of Bulgaria (LDASRB), as well as the additional requirements of the Faculty of Chemistry at PU.

- Kirila Stoynova is registered in the National Center for Information and Documentation on Academic Degrees and Titles (NACID) (https://ras.nacid.bg/dissertation-preview/42042), where her educational and scientific degree "Doctor" (Diploma No. 1000123/03.11.2014) and her academic position of "Chief Assistant Professor" in professional field 4.2. Chemical Sciences (effective from 27.07.2015) are officially recognized.

- According to the data in NACID and the submitted certificate, Dr. K. Stoynova has more than 10 years of experience as a "Chief Assistant Professor" in the Department of General and Inorganic Chemistry with Methodology of Chemistry Education at the Faculty of Chemistry (PU).

- The publications and citations submitted for the competition do not overlap with those used for the acquisition of the educational and scientific degree "Doctor."

- Chief Assistant Professor **Dr. Kirila Stoynova meets both the national minimum requirements and the additional requirements** of the Faculty of Chemistry at PU for occupying the academic position of "Associate Professor" in professional field 4.2. Chemical Sciences. For Indicator "B," she submitted 8 articles, earning 114 points out of the required 100 points. For Indicator "G," she achieved 216 points (required: 200 points). For Indicator "D," she presented 37 citations from the Scopus database, all received after obtaining the educational and scientific degree "Doctor" (after 2014), corresponding to 74 points (required: 50 points). Altogether, for these groups of indicators, Chief Assist. Prof. Dr. Kirila Stoynova has accumulated 454 points, exceeding the required minimum of 400 points. Additionally, her teaching workload of 5,346 hours with students significantly surpasses the minimum requirement of 1,080 hours.

- The professional qualifications and the thematic focus of Dr. K. Stoynova's research activity correspond to the specialty "General and Inorganic Chemistry" of the announced competition in professional field 4.2. Chemical Sciences.

- There is no evidence of plagiarism in the scientific papers submitted to the competition.

5. Main scientific achievements

The majority of the candidate's research submitted for the competition (19 articles – 90 %) is in the field of coordination chemistry, continuing long-term research conducted in the department under

the supervision of Assoc. Prof. Dr. Vanya Lekova, who is the corresponding author on most of the articles (17 in total). Specifically, this research focuses entirely on the synthesis and systematic extraction–spectrophotometric studies of novel ion-associated complexes. **The relevance** of these studies is determined by the potential analytical applications of these complexes for the determination and monitoring of chemical elements in samples of various origins (natural, industrial, and biological), thereby addressing several environmental issues. Eight of these articles, concerning complexes containing chelate anions of Zn(II), Mo(VI), and Ge(IV) and large tetrazolium cations, constitute the so-called Habilitation work, in which the candidate is the first author. The remaining 11 articles on this topic are included in group "G." This group also includes two articles (Nos. 19 and 21) with a completely different focus, namely the synthesis and study of mebeverine-derived compounds as potential drug candidates for the gastrointestinal tract. It is noteworthy, however, that the candidate did not comment on these articles in her submitted documents and did not indicate her contributions to them, even though these two Q1 articles account for 50 points.

The scientific contributions in the research submitted for the competition by Dr. K. Stoynova can be summarized as follows:

1) A total of 22 new ion-associated complexes were synthesized, comprising the following: Co(II) – 10 complexes; Mo(VI) – 5 complexes; Ge(III) – 3 complexes; Zn(II) – 1 complex; Ga(III) – 1 complex; Fe(III) – 1 complex; W(VI) – 1 complex. Four chelating agents were investigated: two azo derivatives of resorcinol and two nitro derivatives of catechol. A wide variety of organic cation sources (10 in total) were used, with tetrazolium salts being predominant.

2) For each of the 22 extraction systems, the optimal extraction–spectrophotometric conditions were determined, including the absorption maximum in the visible region, pH of the aqueous phase, extraction time, and the concentration of the components.

3) Based on appropriate research methods, including theoretical calculations as in the cases of the Fe(III) and W(VI) complexes, reaction schemes for the complexation processes were proposed, and the composition and structure of the complexes were determined.

4) For all systems, a quantitative assessment of the equilibrium in the aqueous phase and the extraction efficiency into the organic phase was performed by determining the equilibrium constants: the association constant (β), the extraction constant (K_{ex}), the distribution constant (K_D), and the recovery factor (R%). The results obtained indicate that the formed complexes are highly extractable and sufficiently stable, providing a reliable basis for their use in analytical determinations.

5) The influence of co-existing ions on the extraction equilibria and complexation processes was studied, which is crucial for practical applications in the analysis of compositionally complex samples. For example, in the case of Mo(VI) complexes, it was found that ions such as Al(III), Fe(III), Cr(VI), and NO_3^-, at concentrations above their respective thresholds, hinder the extraction of Mo(VI) complexes. For these cases, analytical approaches were proposed to eliminate their interfering effects, such as pre-precipitation or masking, for instance, using a complexing agent (Complexone III).

6) Important analytical characteristics were determined, including the range of obedience to Beer's law, molar absorptivities, Sandell's sensitivity, limit of detection, and limit of quantification, reflecting the potential of these complexes for analytical applications.

7) Extraction–spectrophotometric methods have been developed for the determination of the elements gallium (Ga(III)), cobalt (Co(II)), iron (Fe(III)), and tungsten (W(VI)), which do not require expensive reagents, they are reliable, and offer high sensitivity and accuracy.

8) Three of the newly synthesized mebeverine analogs combine a strong antispasmodic effect with anti-inflammatory properties, highlighting their potential for effective therapy of intestinal diseases with fewer side effects. Additionally, the potential of silver nanoparticles functionalized with mebeverine and its analogs has been investigated as advanced systems for safe and therapeutic drug delivery for gastrointestinal diseases.

In summary, **the candidate's contributions are of both a scientific and research-applied nature and fall into the category of "enrichment of existing knowledge and theories."** Specifically, they consist of generating new data and expanding understanding in the field of complex compounds.

6. Evaluation of the Candidate's Personal Contribution

Dr. K. Stoynova has been working for more than 10 years on topics related to complex compounds. She has accumulated substantial experimental experience and expertise in the synthesis and characterization of various ion-associated complexes and their application for the analytical determination of elements. All 21 publications submitted for the competition are collective works, primarily with authors from PU and the Medical University of Plovdiv, with most papers having 4–5 authors. Two of the papers have only two authors. In 10 of the publications, Dr. K. Stoynova is the first author, and in eight, she is the second author. This record demonstrates the candidate's personal contribution and significant role in the collaborative research.

7. Critical Remarks and Recommendations

1) I have a critical remark regarding the preparation of the "Habilitation Extended Report" (not "Extended Habilitation Report"). Spanning 29 pages with 6 tables and 69 cited references, it provides an excessive amount of unnecessary details on the eight publications in group"B," with numerous repetitions and only on the last two pages is there an attempt to summarize the contributions.

2) I find the lack of any commentary and contributions to articles 19 and 21 to be a serious omission. In this regard, I would ask Dr. Stoynova to specify her personal contributions to these two papers.

8. Personal Impressions

I do not personally know Dr. Stoynova and therefore have no personal impressions of her work.

CONCLUSION

The documents and materials submitted by Chief Assist. Prof. Dr. Kirila Stoynova comply with all requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria (LDASRB), the Regulations for the Implementation of LDASRB, and the relevant Regulations of Paisii Hilendarski University of Plovdiv.

Dr. Kirila Stoynova has presented a sufficient number of scientific publications issued after the materials used for obtaining the educational and scientific degree "Doctor." Her works contain original scientific contributions that have received international recognition. The candidate has an

active and long-standing teaching activity with significant contributions to the teaching of general and inorganic chemistry. Her scientific and teaching qualifications are indisputable.

The results achieved by Dr. K. Stoynova in both research and teaching activities fully comply with the national minimum requirements and the additional requirements of the Faculty of Chemistry at Paisii Hilendarski University of Plovdiv for occupying the academic position of "Associate Professor."

Based on the above, I find it justified to give my **positive evaluation** and to recommend that the **Scientific Jury prepare a report-proposal to the Faculty Council of the Faculty of Chemistry for the election of Chief Assistant Professor Dr. Kirila Stoynova to the academic position of "Associate Professor" at Paisii Hilendarski University of Plovdiv** in the field of higher education 4. Natural Sciences, Mathematics and Informatics, professional field 4.2. Chemical Sciences (General and Inorganic Chemistry).

March 5, 2026

Reviewer: .....

(Prof. Dr. Violeta Koleva)