OPINION

by Assoc. Prof. Rusi Ivanov Rusev, PhD
Institute of Mineralogy and Crystallography – Bulgarian Academy of Sciences

Member of the Scientific Jury appointed by Order No. 446РД-09/07.08.2026 of the Director of the Institute of Mineralogy and Crystallography "Acad. Ivan Kostov" – BAS

REGARDING:

The competition for the academic position of Associate Professor in Professional Field 4.4. Earth Sciences (Mineralogy and Crystallography), announced for the needs of the Department of Experimental Mineralogy and Crystallography at the Institute of Mineralogy and Crystallography – BAS, and published in the State Gazette, Issue No. 56 of 19 June 2026.

The sole candidate in the competition is Assist. Prof. Liliya Vladimirova Tsvetanova, PhD, from IMC-BAS. The candidate has submitted a complete and well-organized set of documents in accordance with the requirements of the Act on the Development of Academic Staff in the Republic of Bulgaria, its Implementing Regulations, and the relevant regulations of the Bulgarian Academy of Sciences and IMC-BAS.

ACADEMIC AND PROFESSIONAL DEVELOPMENT OF THE CANDIDATE

Assist. Prof. Liliya Vladimirova Tsvetanova obtained her Master's degree in 2002 from the University of Mining and Geology "St. Ivan Rilski", Sofia, specializing in Mineral Resources Exploration and qualifying as a Geological Engineer. In 2017, she successfully defended her doctoral dissertation entitled "Structural Characterization of Ion-Exchanged ETS-4" at the Institute of Mineralogy and Crystallography "Acad. Ivan Kostov" – BAS, obtaining a PhD in Mineralogy and Crystallography.

Dr. Tsvetanova began her academic career at IMC-BAS in 2015, where she successively held the positions of Assistant Professor (2015–2019) and Assistant Professor (since 2019). Throughout her professional development, she has gained experience in experimental mineralogy and crystallography, with particular emphasis on the synthesis and characterization of inorganic materials, the investigation of sorption processes, and the application of X-ray analytical techniques.

The applicant's educational background, scientific qualifications, and consistent professional development demonstrate a research profile that closely corresponds to the scope and requirements of the present competition for the academic position of Associate Professor in Professional Field 4.4. Earth Sciences (Mineralogy and Crystallography).

EVALUATION OF RESEARCH ACTIVITIES

The materials submitted by Assist. Prof. Liliya Tsvetanova demonstrate sustained research activity and compliance with the quantitative criteria for appointment to the academic position of Associate Professor. According to the submitted documentation, the candidate has achieved a total of **546 points** across **indicator groups A–D**, exceeding the minimum requirement of **430 points** established by the additional regulations of BAS (Table 1).

Under **indicator group A**, **50 points** are awarded for the acquired PhD degree (Diploma No. 000940/23.10.2017). The habilitation work is presented in the form of **4 scientific publications**

in internationally refereed and indexed journals, all ranked in the first quartile (Q1), fulfilling the required **100 points** under **indicator group B**. The remaining scientific output, included in **indicator group Г**, comprises **17 publications** corresponding to **261 points**, exceeding the required minimum of **220 points**. These publications appear in specialized scientific journals with international visibility and cover a broad range of topics in mineralogy, crystallography, materials science, and environmental applications of inorganic materials.

An additional indication of the scientific impact and recognition of the applicant's research is provided by the **27 citations** registered in the Scopus database, corresponding to 1**35 points under indicator group Д**. This value exceeds twice the minimum requirement of **60 points**.

In addition to her publication record, Dr. Tsvetanova has participated in **7 research projects** funded through national and European programmes, serving as principal investigator in one of them. Her curriculum vitae also lists participation in **22 scientific conferences and forums** in Bulgaria and abroad. These activities complement her research profile and demonstrate her involvement in both collaborative research and independently initiated scientific activities.

Based on the presented bibliometric data and research achievements, it can be concluded that the applicant not only meets the formal requirements for the academic position of Associate Professor but also demonstrates consistent scientific activity, with results recognized and disseminated within the specialized scientific literature.

Table 1. Minimum required and achieved points by indicator group for the academic position of Associate Professor in Professional Field 4.4. Earth Sciences, according to the applicable national regulations and the regulations of the Bulgarian Academy of Sciences.

Indicator group	Minimum required points	Points achieved by the candidate
А	50	50
Б	–	–
В	100	100
Г	220	261
Д	60	135
Total	**430**	**546**

EVALUATION OF SCIENTIFIC CONTRIBUTIONS

The research activities of Chief Assist. Prof. Liliya Tsvetanova cover a broad range of topics in experimental mineralogy, crystallography, and materials science. The submitted publications focus primarily on the synthesis, modification, and characterization of natural and synthetic inorganic materials, as well as on establishing relationships between their chemical composition, crystal structure, and functional properties. The scientific contributions can be summarized in several main research areas.

A substantial part of the research is devoted to the synthesis and modification of titanosilicates and natural zeolites for environmental applications. The sorption properties of ETS-4, GTS-1, and natural clinoptilolite toward Pb(II) have been investigated, revealing the influence of structural characteristics and ion-exchange capacity on sorption efficiency. Zr-modified titanosilicates exhibiting enhanced photocatalytic activity toward the degradation of organic dyes in aqueous solutions have also been developed. These findings contribute to the development of efficient and reusable materials for the treatment of contaminated water.

Another research area of considerable practical relevance involves the development of functional materials based on natural clinoptilolite. Geopolymer coatings incorporating Ag-

and Cu-modified zeolites have been prepared and shown to retain their antimicrobial activity even after accelerated carbonation. Of particular interest are the investigations into the biological effects of Na-modified clinoptilolite, which demonstrated a protective effect against cadmium-induced toxicity in experimental animals. These results broaden the potential applications of natural mineral materials beyond environmental remediation to include biomedical applications.

An important part of the applicant's scientific output also concerns the utilization of natural and industrial by-product materials for the production of geopolymer, ceramic, and cementitious materials. The potential use of waste from electronic equipment, cement production, metallurgical processes, and plant biomass as alternative raw materials has been investigated. Relationships between chemical and mineralogical composition, processing conditions, and the resulting structural and phase transformations have been established. These findings contribute to the development of materials and technologies with a reduced environmental footprint.

Particular attention should also be given to the mineralogical and crystal-chemical investigations of natural mineral assemblages, including the characterization of sulfate mineralization and the distribution of trace elements in ore minerals. Among the notable findings are the identification of serpierite in Bulgaria and the characterization of a new polytypoid variant, serpierite-1M. These studies, together with the investigations of functional materials, demonstrate the integrated application of X-ray diffraction, X-ray fluorescence analysis, and other modern analytical techniques.

In summary, I consider that the submitted scientific publications contain original scientific and applied contributions that expand existing knowledge of the structure, properties, and applications of mineral materials. I particularly appreciate the combination of fundamental crystal-chemical investigations with application-oriented research addressing environmental protection and the sustainable utilization of natural resources.

CONCLUSION

The submitted scientific publications and supporting documents demonstrate that Chief Assist. Prof. Liliya Vladimirova Tsvetanova is an established researcher with proven expertise and significant scientific and applied contributions in the fields of mineralogy and crystallography. The applicant meets all minimum national requirements and the additional criteria established by BAS and IMC-BAS for appointment to the academic position of Associate Professor.

Based on the above, I give my positive evaluation and recommend that the Scientific Jury propose to the Scientific Council of IMC-BAS the appointment of Chief Assist. Prof. Liliya Tsvetanova to the academic position of Associate Professor in Professional Field 4.4. Earth Sciences (Mineralogy and Crystallography).

Заличено съгласно
чл. 2 от ЗЗЛД

02.11.2026г.
Sofia, Bulgaria

Prepared by:
Assoc. Prof. Rusi Rusev, PhD