

Statement of Reviewer

Concerning the academic competition for the occupation of the academic title of "Professor" in the professional field **4.4. Earth Sciences** ("Structural Crystallography and Materials Science") at the Institute of Mineralogy and Crystallography "Acad. Ivan Kostov" – BAS (IMC-BAS), announced in SG. № 95/14.11.2023

Candidate: *Assoc. Prof. Rositsa Hristova Titorenkova, PhD – Institute of Mineralogy and Crystallography "Acad. Ivan Kostov" - BAS*

Member of the Scientific Jury: *Assoc. Prof. Irena Kirilova Mihailova, PhD – University of Chemical Technology and Metallurgy*

1. General characteristics of the research and applied research activities of the candidate.

The list of publications of Associate Professor Dr Titorenkova for participation in the competition for the academic title of "Professor" (after the acquisition of the academic title of "Associate Professor") includes 36 publications. The candidate has 112.74 points for the indicator group "B" having 10 publications with an impact factor (8 in journals with quartile Q1 and 2 publications with quartile Q2) when the minimum required points are 100. Under the indicator group "Г", Assoc. Prof. Dr Titorenkova has presented 17 articles in referenced and indexed journals in the Web of Science and/or Scopus (155.1 points according to indicator "Г7"), 7 articles in editions included in the national reference list of NACID (76.68 points according to indicator "Г8"), and 2 book chapters (4.76 points according to indicator "Г9"). The candidate's total number of points for the indicator group "Г" are 236.54 points whereas the minimum required points are 200, according to the current regulations of IMC-BAS. Data for 100 citations of the candidate's publications, in papers referenced and indexed in the Web of Science or Scopus, for the period 2014-2023, was presented. Thus, 500 points are awarded for the indicator group "Д". The minimum required points for the indicator group "Д" are 100, according to the current rules of the IMC-BAS for the scientific field 4. Natural Sciences, Mathematics and Informatics; Professional field 4.4. Earth Sciences. Assoc. Prof. Dr Titorenkova has presented information on participation in 23 national and international research projects in the period from 1998 until now. She is the head of three international scientific projects, a participant in 4 international projects and 15 national scientific projects (the last nine projects were with the support of the Scientific Research Fund). These data correspond to 350 points for the indicator group "Е", where the minimum required points are 150 points. From the submitted materials concerning the publications, citations and participation in research projects, it is clear that the candidate, Assoc. Prof. Dr Rositsa Titorenkova meets all the quantitative indicators of the requirements of IMC-BAS for occupying the academic position "Professor", significantly exceeding the minimum required number of points by indicator groups "Д" and "Е".

2. Main characteristics of the candidate's scientific, applied scientific and pedagogical activities (scientific areas and problems; successful doctoral students and graduates).

As an established specialist in vibrational (infrared, micro-infrared and Raman) spectroscopy, Assoc. Prof. Dr R. Titorenkova has had teaching activities and participated successfully in various scientific research teams. She also studies various objects in terms of their structural features, degree of crystallinity, isomorphic substitutions, etc. Her publications refer to the following topics: Biological apatite and biomaterials for application in dental medicine (8); Synthetic heteropolyhedral porous materials (4); Ceramic pigments (10); New materials (5); Natural minerals and natural pigments (6) and Spectrophotometric methods (2).

Assoc. Prof. Dr Titorenkova was the scientific supervisor of a PhD student with the topic of his dissertation "Structural characteristics of biological apatite, studied with vibrational (micro-infrared

and Raman) spectroscopy". Biomaterials have been an important, promising and rapidly developing interdisciplinary scientific field in recent decades. Some of the research, with the participation of the candidate, regarding the effect of laser treatment on dental enamel was included in an already defended doctoral dissertation at the Medical University. Articles on biomaterials for the application in dental medicine refer to biomimetic synthesis of calcium phosphates in simulated tissue fluids, elucidating the influence of Mg^{2+} and Zn^{2+} and amino acid additions, as well as the phase transformations occurring during thermal treatment. In addition, the potential, for the remineralisation of dental apatite of new hybrid materials was investigated.

Assoc. Prof. Titorenkova has participated in the measurement and interpretation of infrared, Raman and optical spectra in publications on a well-established and traditional IMC topic for the synthesis and characterization of new, synthetic porous silicates with a zeolite-like structure and prospective applications.

The candidate is actively involved in the synthesis and characterization of ceramic pigments, by including transition elements-chromophores (Co^{2+} , Mn^{2+} , Cr^{3+} , Fe^{2+} , Fe^{3+} , V^{5+} , REE^{3+}) in the structure of pyroxenes. This topic was further investigated by the research of natural pigments used on archaeological objects. All the other publications with the participation of Assoc. Prof. Titorenkova give the impression that she has an affinity for current scientific topics related to the synthesis and in-

3. Main scientific and/or applied scientific contributions with an assessment to what extent they are the candidate's merit.

I believe that the main scientific and applied scientific contributions of Assoc. Prof. Dr R. Titorenkova, which are her personal work, relate to the enrichment of existing knowledge and theories and participation in scientific achievements, with the potential for application in practice.

Through skilful application of the local methods of vibrational spectroscopy in mineralogy, the structural features of natural and synthetic minerals and materials have been thoroughly studied and new data on their chemical and phase composition, isomorphous impurities, crystal-chemical characteristics, defects, properties, etc., have been obtained. On this basis, composition-structure-property dependencies for minerals and materials, which directly relate to their practical application, have been established.

4. Critical remarks and recommendations on the scientific works of the candidate. I have no critical remarks on the candidate's scientific works.

5. Reasoned and well-formulated conclusion

My acquaintance with the materials submitted for participation in the competition, the topicality and importance of the research topics, the level of research, coverage and exceeding the minimum scientometric indicators provided by the law (ZRASRB –Law on the development of the academic staff in the Republic of Bulgaria) and Regulations of the BAS and the IMC give me the reason to confidently give a positive assessment. As a member of the Scientific Jury, I propose that the candidate Assoc. Prof. Dr Rositsa Hristova Titorenkova shall take the academic title of "Professor" in the Professional Field 4.4. "Earth Sciences" ("Structural Crystallography and Materials Science").

March 20th, 2024

Member of the Scientific Jury:
/ Assoc. Prof., Eng. Irena Mihailova, PhD/

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