

REPORT

on a competition for the academic position **Associate Professor**,
professional field **4.4. Earth Sciences** (Applied mineralogy, innovative building materials),
for the needs of Department “Experimental mineralogy and Crystallography” at the Institute of
Mineralogy and Crystallography “Acad. Ivan Kostov”, Bulgarian Academy of Sciences (IMC–BAS)
announced in the State Gazette, issue 56/19.07.2022

Candidate: *Assistant Professor Dr. Aleksandar Nikolaev Nikolov – Institute of Mineralogy and Crystallography “Acad. Ivan Kostov”, Bulgarian Academy of Sciences*

Member of the Scientific Jury: *Assoc. Prof. Dr. Yana Koleva Tzvetanova – Institute of Mineralogy and Crystallography “Acad. Ivan Kostov”, Bulgarian Academy of Sciences*

This report was prepared according to orders No 373PД09/08.09.2022 and No 387PД09/26.09.2022 of the Director of IMC–BAS and the decision of the Scientific Jury dated 29.09.2022.

1. General characteristics of the presented materials

The candidate Assistant Professor Dr. Aleksandar Nikolov participates in the competition for the academic position of “Associate Professor” with 24 publications (without those submitted for obtaining the educational and scientific degree PhD), 16 of them are published in scientific journals indexed by Web of Science and Scopus databases (among them 8 are in impact factor journals categorized in quartiles by WoS and Scopus: 1 in Q1, 5 in Q2, 1 in Q3 1 in Q4). In 20 of the publications, Dr. Aleksandar Nikolov is the first or single author which proves his major contribution in these studies. The presented publications have received a good response in the international scientific community. 126 citations have been noted. The most cited articles are these numbered as 1 (91 citations) and 14 (24 citations) in the list submitted. The Hirsch index (h-index) of Dr. Nikolov is 4 according to Scopus. The candidate has participated in 6 research projects, funded by National Science Fund and other national organizations, in 3 of them he has been a coordinator of the team. He has presented the results of his research activities with oral presentations or posters at 20 international and national scientific forums. As additional materials for the competition, certificates for various awards for scientific achievements are presented, among them is the BAS “Professor Marin Drinov” award for young scientists and the “Professor Zhivko Ivanov” award for young scientist in the field of Earth Sciences.

In accordance with the requirements of the contest, a reference is presented for the implementation of the minimum national requirements for scientific activity, laid out in The Implementation Rules for Development of Academic Staff in the Republic of Bulgaria Act (DASRBA), as well as the requirements of the Bulgarian Academy of Sciences and IMC–BAS. The presented documents for participation in the competition show that Dr. Alexander Nikolov meets and significantly exceeds the minimum national requirements for the academic position Associate Professor in the professional field 4.4. “Earth Sciences”. The points on all indicators are: Group of indicators “**A**” – **earned points 50** (required 50 points); Group of indicators “**B**” – **earned points 227** (required 100 points); Group of indicators “**G**” – **earned points 271** (required 220 points); Group of indicators “**D**” – **earned points 657** (required 60 points).

2. General characteristics of the scientific and scientific-applied activity

Dr. Alexander Nikolov's research activities are mainly focused on the field of Applied Mineralogy. The publications with which he participates in the competition can be grouped in the following thematic areas:

➤ *Geopolymers – synthesis, composition, structure, properties and application.* The emphasis in this area is the application of various methods for the synthesis of geopolymers, as well as the use of natural raw materials and industrial by-products in combination with different types and concentrations of activator solutions. New geopolymer materials have been prepared using precursors of natural zeolite, metakaolin, fayalite waste and fly ash from thermal power plants. Their mechanical, physical, physicochemical and thermal properties were investigated. The utilization of different industrial wastes and their application in various innovative materials makes them new and unique systems with potential application in civil engineering [articles No 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 14, 15, 16, 17, 18, 20, 21, 23, 24].

➤ *Environmental protection.* The ion exchange properties of natural clinoptilolite for Cs^+ and Sr^{2+} from a bi-cation solutions were investigated. The experimental kinetic data were well fitted with pseudo-second-order kinetic model. The equilibrium of cation uptake by natural clinoptilolite was expressed by ion-exchange isotherms and the data were fitted with three common isotherm models: Langmuir, Freundlich and Dubinin–Radushkevich. Rietveld structure refinement was applied to exchanged clinoptilolite samples using X-ray powder diffraction data [article No 13, report No 22 from the list of reposts at scientific forums]; The natural levels of tungsten content and its distribution in soils, sediments and waters were elucidated [article No and project No 3 from the list of research projects]; Clinoptilolite sorbents have been obtained and characterized for efficient ion exchange for heavy metals, which will be tested for detoxification of different biological model systems [report No 5 from the list of reposts at scientific forums and project No 4 from the list of research projects].

➤ *Archaeomineralogy.* The mineral composition of flint artefacts from stratified archaeological settlements before and after thermal treatment was investigated [article No 19].

3. Main scientific and/or scientific-applied contributions

Dr. Alexander Nikolov is a researcher with proven scientific and scientific-applied contributions in the field of geopolymers. In all publications in this field, the applicant is the first or single author, which undoubtedly proves his leading role in these studies. The major contributions of Dr. Alexander Nikolov to this field are related to new scientific facts and can be summarized as follows:

- *the synthesis of geopolymers using different natural raw materials and industrial by-products;*
- *determination of the optimal conditions for synthesis with different types and concentrations of activator solutions;*
- *clarification of the relation between the method of synthesis, structure and the mechanic properties of the obtained geopolymer materials;*
- *the synthesis of new rapid hardened geopolymer materials with improved characteristics and properties.*

Conclusion. Based on the review of the materials submitted for participation in the competition, the relevance of the research topic, the level of the scientific research carried out, the meeting and exceeding of the minimum national requirements, laid out in DASRBA, its Implementation Rules and the requirements by IMC – BAS, with all due respect, I will recommend to the Scientific Council at the Institute of Mineralogy and Crystallography of BAS to elect Dr. Alexander Nikolov for the academic position Associate Professor in professional field **4.4. Earth Sciences.**

04.11.2022

Signature:

/Assoc. Prof. Dr. Yana Tzvetanova/