

Report

Re: Competition for the academic position “Professor” in the area of higher education: 4.2. Chemical Sciences (Thermochemistry of Natural and Synthetic Inorganic Substances); announced in the State Gazette, issue 81/ 15.10.2019.

Candidate: Assoc. Prof. Dr. Eng. Vilma Petkova Stoyanova

Member of the Scientific Jury: Assoc. Prof. Dr. Eng. Svetla Zhelyazkova Todinova, Institute of Biophysics and Biomedical Engineering (IBFBMI) – BAS.

The competition was announced for the needs of the Experimental Mineralogy and Crystallography department, Institute of Mineralogy and Crystallography “Acad. Ivan Kostov”, Bulgarian Academy of Sciences. The only candidate in the competition is Assoc. Prof. Dr. Vilma Petkova Stoyanova. The submitted documents show that the procedure for opening and announcing the competition has been observed. The documents have been prepared in accordance with the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria (LDASRB or ZRASRB) and the regulations for its implementation.

Assoc. Prof. Vilma Petkova graduated from the University of Chemical Technology and Metallurgy in Sofia and obtained her PhD degree at the same university. She has successively occupied the following academic positions: Associate Researcher (Central Laboratory for Physico-Chemical Mechanics (CLFMM) - BAS, Sofia; IMC - BAS, Sofia); Assoc. Prof. (IMC-BAS, Sofia); Assistant Professor (IMC-BAS, Sofia); Associate Professor - (New Bulgarian University). She is also a lecturer at the Doctoral School of the BAS Training Center. She has held the following management and administrative positions: Head of the Thermal Analysis Laboratory at IMC-BAS, Scientific Secretary of IMC-BAS. She is also a member of the Executive Board of the Fund for Science Research, with a term of office until September 2021. Assoc. Prof. Petkova has 31 years of academic work experience, as well as over 6 years of teaching experience – as associate professor. She is fluent in two languages: English and Russian.

The submitted materials include her curriculum vitae and lists of publications, presenting the participation of Assoc. Prof. Dr. Petkova for the acquisition of ESD “doctor”, for the academic position of Associate Professor and likewise for the competition for acquiring the academic post “Professor”. The abstracts of her dissertation for the acquisition of ESD “doctor”, as well as abstracts and copies of the scientific publications used for this competition are attached. The publications included in the previous two procedures, have already been positively assessed.

For the current competition the candidate has presented 26 papers in total, all with impact factor. Many of the papers have been published in prestigious international journals as: Journal of Thermal Analysis and Calorimetry; Thermochimica Acta, Ceramics International, Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy etc. The results of her habilitation work are published in 6 scientific articles, with total IF of 10.684. The publications with IF apart from the habilitation work are 17, of which 1 in journal with rank Q1, 5 in Q2, Q3 and 8 in 3 in Q4, with a total impact factor of 18,856.

The originality of the research and the contributions made therein is also reflected in the large number of citations. At present, 448 citations from foreign authors have been noted, 96 of them from the articles included in the competition for the academic position of "professor".

Assoc. Prof. Petkova's Hirsch Index is 11 according to Scopus and 13 according to Web of Knowledge.

Noteworthy are the significant number of projects of which Assoc. Prof. Petkova was the head - 2 international and 4 national scientific projects. She has also been a participant in 5 other national scientific projects.

The total number of points on indicators A, B, G, D, and E is 1109.63 points, while the national requirement for obtaining the academic position of "professor" is 600 points. The scientific indicators show the high level of Assoc. Prof. Petkova's scientific results.

Prof. Dr. Vilma Petkova has one PhD student with successfully defended thesis.

Assoc. Prof. Petkova has developed her research work in three main scientific areas. The publications from the first one - Ecological and biochemical applications of modified natural mineral and technogenic systems - are not included in this competition. The second direction - Modeling of natural mineral and technogenic systems with construction application, thematically unites the publications included in the habilitation work. The main contributions are related to the optimization of cement compositions, the enhancement of their physicochemical parameters, their chemical activity and the binding properties of the additives and fillers used by various activation methods. The evaluation of the results obtained is based on the application of crystalchemical, spectroscopic, microscopic and thermal methods, which are important for clarifying the formation of crystalline and X-ray amorphous hydrate phases, for the different stages of thermal decomposition. The third direction - Structural-phase, crystal-chemical and thermal studies in natural and synthetic samples of the Ca-P-O system with the participation of SiO_2 , CaCO_3 , F^-/OH^- and others, includes publications which unite four fields. The following scientific contributions deserve special attention: 1) It has been shown that the introduction of CO_3^{2-} , CaF_2 in the anionic sublattice of the used apatites from Tunisia, Syria and Estonia alter the crystal field of the PO_4^{3-} groups, weakening the oxygen bond of the PO_4^{3-} -group of calcium ions, resulting in a significant increase in its solubility; 2) The application of innovative acid-free methods for the rehash of natural phosphates discovers a promising direction for the treatment of phosphate raw materials by tribothermic treatment aimed at producing condensed phosphates suitable for use as slow acting fertilizers and soil improvers. As a result, a methodology for the production of modified apatite materials for use in bio-agriculture has been developed; 3) It has been demonstrated that the application of thermos-triboactivation of mixtures of Tunisian phosphorite and ammonium sulphate results in an increase in the reactivity of the phosphorite and the production of solid-phase reactions between the components of the system, which is a significant advantage over pure thermal treatment; 4) Using physical methods (X-Ray, infrared spectroscopy and thermal analysis) the optimal conditions for the conversion of non-digestible P_2O_5 in absorbable form to the plants are established, applying Tribochemical reaction (non-traditional solution to solve raw material problems in order to convert the non-digestible P_2O_5 into digestible plant form) on natural phosphates and zeolites.

Taking into account the complexity of the systems of cement composites under consideration, as well as natural apatites with impurities and additives, it is evident that a large volume of experimental material was analyzed for presentation of the developed hypotheses in the scientific publications of Assoc. Prof. V. Petkova. On this basis, the desire to elucidate the reaction mechanism of ongoing solid-phase reactions in periods of activation and subsequent thermal decomposition is outlined, which is a recognizable approach and scientific contribution to her articles. Along with the relevance of these studies, their applied focus in addressing environmental and raw material issues should be emphasized.

CONCLUSION:

The candidate's experimental and theoretical research work is closely related to the topic of the "Experimental Mineralogy and Crystallography" department, for the purposes of which this competition was announced. The scientific indicators of Assoc. Prof. Eng. Petkova completely cover the national demands for acquiring the academic position of "Professor", as well as the requirements, specified in the Regulations for the implementation of ZRASRB in the IMC-BAS. Assoc. Prof. Petkova is a very good researcher and manager in science, proof of which are the many scientific projects of which she was a leader or participant. She successfully combines research, teaching and administrative activities.

In view of the above, I strongly recommend that the members of the scientific board and the Scientific Council of IMC-BAS vote positively and elect Assoc. Prof. Dr. Eng. Petkova for the academic position of Professor.

Заличено
съгласно чл.2 от
ЗЗЛД

03.02.2020

/ Assoc. Prof. Dr./Eng. S. Todinova/