

REPORT

on the competition for filling the academic position of a „Professor“
in the Professional Field 4.2. Chemical Sciences according to the Classifier of the Areas of
Higher Education and the Professional Fields (Thermochemistry of Natural and Synthetic
Inorganic Compounds)

Announced in the State Gazette No 81/15.10.2019

Candidate: Assoc. Prof. Vilma Petkova Stoyanova, PhD

Member of the Academic Jury: Prof. Neli Stoyanova Koseva, PhD

This report is prepared in response to Order № 561 RD-09/13.12.2019 issued by the Director of the Institute of Mineralogy and Crystallography “Acad. Ivan Kostov”, Bulgarian Academy of Sciences, following the decision made by the Academic Jury that was held on 20.12.2019. The Report is in compliance with *Development of Academic Staff in the Republic of Bulgaria Act, the Rules for the Application of the Development of Academic Staff in the Republic of Bulgaria Act, the Rules of BAS* and with the *Rules set at the Institute of Mineralogy and Crystallography, Bulgarian Academy of Sciences, for applying the Act aforementioned.*

Assoc. Prof. Vilma Petkova Stoyanova, PhD, participated in the competition for filling the academic position of "Professor" with 26 scientific publications. These publications are not included in the dissertation for acquiring a Doctor Degree, nor do they repeat the publications used by the candidate in the competition for filling the academic position of Associate Professor. Six publications are presented for evaluation within the indicator 4, Group B, one of which falls in Q1 quartile, three in Q2 quartile and two in Q3 quartile, which give a total of 115 points, with a minimum of 100 points required. Twenty publications are assigned to the indicator D.7: Additional publications outside of the habilitation work with the total number of points under this indicator being 311, with the minimum required 220 points.

The 26 articles presented in the competition have been published in specialized journals included and indexed in world-renowned scientific information databases and have an impact factor/SJR rank. The main part of the results of the research activity of Assoc. Prof. V. Petkova have been published in renown international journals such as Journal of Thermal Analysis and Calorimetry, Ceramics International, Construction and Building Materials and others.

The enclosed reference for the indicator D includes 96 citations in scientific publications, abstracted and indexed in WoS/Scopus, which yields 192 points for this indicator against 120 points needed. According to group E indicators, Assoc. Prof. V. Petkova collects 531.63 points (minimum of 150 points required) as a result of the following activities: co-supervisor of a successfully defended PhD student, a principal investigator of one and participation in three national scientific/educational projects, a coordinator of the Bulgarian team in 5 and

participant in 2 international projects, as well as attracted funds on projects coordinated by the candidate.

The total number of points that the candidate receives for the scientific production and the results achieved presented in the competition is **1199.63** points, i.e. it exceeds about twice the minimum number of points required for filling the position of "Professor" in accordance with the Rules for Acquisition of Academic Degrees and for Occupation of Academic Positions in the Bulgarian Academy of Sciences.

The main contributions of the publications presented under indicator B refer to elucidating the influence of various factors on the properties and behavior of building materials, mainly cement pastes. These studies are in line with current trends in the development of building materials science and in response to the global challenge of resource and energy efficiency. The contributions can be summarized as follows:

- The influence of the type and amount of additive (filler) to cement pastes such as natural zeolites, waste products from the construction or food industry, on the pozzolanic reaction and the physicochemical parameters of the cement composition has been clarified;
- The effect of different activation methods applied on the chemical activity of the investigated fillers in the reactions with the hydration products of cement was evaluated;
- Elucidation of the chemistry of thermal decomposition and solid-phase reactions in the thermal treatment or activation of the components of the cement paste, as well as determination of the diversity of crystalline and amorphous hydrate phases by varying the cement composition was clarified by applying methods of thermal analysis in combination with mass spectrometry and X-ray diffraction.

The publications included in the list for the evaluation under indicator 7 of group D are thematically related both to the objects of study - natural and synthetic apatites and their composites, as well as to the main method used - thermal analysis. The latter is combined with IR spectroscopy, mass spectral analysis and other physicochemical methods to achieve completeness and reliability of the research results. The contributions can be grouped as follows:

- Assignment of the studied natural apatites originating from North Africa and Europe to a particular type of apatite;
- Identification of the reactions and transformations of the minerals in the process of their thermal decomposition;
- Determination the effect of mechanochemical activation of the studied apatites on the degree of their modification and clarifying the reactions of solid-phase synthesis during the mechanochemical activation;
- The reactions conditions and products of solid-phase synthesis of triboactivated mixture of apatite type B (Tunisia origin) and ammonium sulfate (waste product from a number of industries) have been identified for the purpose of their use as complex fertilizers;
- Determination of conditions and reaction products of tribochemical activation of a mixture of natural minerals - apatite (origin of Tunisia) and clinoptilolite (origin of

Bulgaria) with the purpose of intensifying the processes of thermal decomposition and obtaining products with better solubility than apatite .

In addition to the scientific and fundamental character of the research of Assoc. Prof. Vilma Petkova Stoyanova, it should be noted that her investigations are strongly application oriented. The results demonstrate the applicability of tribochemical (mechanochemical) activation as an effective method for intensifying the processes and reactions for producing building materials or complex fertilizers - multi-ton scale productions with significant environmental impact. In addition, the possibility of using waste products from the construction and food industries, as well as natural zeolites as fillers to obtain building materials or plant-digestible components of complex fertilizers, has been demonstrated.

The candidate's documents are presented in full. There are some discrepancies in the data in Table 4 in the document "Reference for the scientific activity of Assoc. Prof. Dr. Vilma Petkova Stoyanova" and the table included in the document „The author's reference for the contributions of the candidate's publications“.

My personal impressions of Assoc. Prof. Dr. Vilma Petkova are about an extremely active and committed researcher and lecturer. The environmental and applied focus of her research is an attractive thematic area for PhD students - a circumstance that she could actively use in her future work.

CONCLUSION

Based on the presented materials and the quality of scientific production of Assoc. Prof. Dr. Vilma Petkova Stoyanova it is seen that the candidate's scientific indicators meet and exceed the requirements for occupying the academic position of "Professor" as defined in the Development of Academic Staff in the Republic of Bulgaria Act and the Rules for its implementation, as well as those specified in the Rules for Acquisition of Academic Degrees and Occupation of Academic Positions at BAS.

On the basis of the said-above, the overall assessment is positive and I would like to recommend to the Scientific Council of IMC-BAS to support the election of Assoc. Prof. Vilma Petkova Stoyanova, PhD at the academic position of a “Professor” in the Professional Field 4.2. Chemical Sciences (Thermochemistry of Natural and Synthetic Inorganic Compounds).

February 20, 2020

Report prepared by:

Prof. Neli Koseva, PhD

Member of the Academic Jury