

## REPORT

on the materials submitted for participation in the competition for the academic position "Associate Professor" in Natural sciences, mathematics and informatics, professional field 4.2. Chemical Sciences (scientific specialty "Solid State Chemistry, nanomaterials and minerals") for the needs of the Department of Structural Crystallography and Materials Science at the Institute of Mineralogy and Crystallography, BAS, published in the State Newspaper No. 106/15.12.2020

Candidate: Assistant Professor PhD Katerina Lyubomirova Zaharieva, Institute of Catalysis, BAS - the only candidate

Member of the Scientific Jury: Associate Professor PhD Luiza Dimova Terziyska, Institute of Mineralogy and Crystallography, BAS

### **1. General characteristics of the presented materials**

The results of the scientific activity of the candidate in the period 2007–2020 are presented in 69 publications, indicated in the author's habilitation reference №10a.

The publications submitted by the candidate for this competition are the following: 54 in international and Bulgarian journals, among them 32 are referenced and indexed in world-famous databases of scientific information (Web of Science and/or Scopus), 29 are in journals with impact factor (IF). The distribution in quartiles is as follows: 3 in Q1, 5 in Q2, 3 in Q3 and 18 in Q4. The candidate is a corresponding author in 21 publications, first author in 25 publications, second author in 24 publications, third author in 1 publication, fourth author in 2 publications and fifth author in 2 publications. The candidate is not an independent author in any publication. There are more than three co-authors in all of the 32 indexed articles - 11 articles of the 32 referred ones are united in habilitation work.

According to the submitted documents, the total number of noticed citations of publications with the participation of the candidate is 95. The citations in scientific journals, referenced and indexed in world-famous databases with scientific information (Scopus and Web of Science) are 84. The candidate's Hirsch index (h), according to the Web of Science database is 5, and according to Scopus is 4.

In the section "Information on participation in conferences and other scientific events" (after obtaining the educational and scientific degree "Doctor" and competition for the academic position of Chief Assistant) is presented a table with 102 participations in conferences, seminars, symposia and schools. There are 14 oral reports presented in this table.

The candidate was a manager of a project funded by the budget subsidy of BAS (2018-2020). The candidate has participated in 6 research projects in the period 2007-2017, funded by Bulgarian sources, one of which under the Operational Program "Human Resources Development" of the European Social Fund.

As follows from the candidate's submitted documents the formal scientific indicators cover or exceed the threshold values of the minimum national requirements, as well as of the higher criteria in BAS for holding the academic position "Associate Professor" in the professional field 4.2. Chemical sciences.

## **2. General characteristics of the scientific, scientific-applied and pedagogical activity of the candidate**

The scientific activity of the candidate is related to the synthesis and research of oxide nanomaterials, oxides, mixed oxides, composite materials based on oxides. Approaches to the synthesis of various oxide nanoscale materials have been identified and applied, as well as to synthesis of new ones, but with improved characteristics and properties. The scientific work has been done to clarify the relationships between the methods of synthesis, the structure, composition and photocatalytic efficiency of these materials.

The study and understanding of the relationships between the synthesis conditions, the physicochemical and catalytic properties of nanosized oxide materials makes them applicable in catalytic processes, which is relevant to ecology and environmental protection. The research results show that the new samples obtained are promising catalytic materials. The candidate participate in Projects aimed to obtain a clean energy, ecological improvements, environmental protection; by using waste biomass for energy and environmental purposes, nanosized oxides used in catalysis, electronics and ecology, as well as production, purification and storage of hydrogen and other energy sources based on biomass.

The candidate has not been engaged in educational activity so far.

## **3. Main scientific and/or scientific-applied contributions. Summary of the scientific achievement of the candidate**

Scientific contributions in the presented publications are aimed to synthesis optimization of various nanomaterials. The catalytic activity of the synthesized materials makes them attractive for environmental activities. The presented publications in which the candidate participates are collective and the scientific contribution in them is collective.

The candidate points as his own contribution the following achievements: the optimization of the synthesis conditions by using different methods (mechanochemical activation, co-precipitation, thermal treatment); the clarification of the synthesis/structure relations; the interpretation of the various analytical methods that have been applied during the scientific work, as well as the reveal of high catalytic activity of some of the obtained materials.

The candidate's personal contribution in the collective works cannot be clearly highlighted in the publications themselves. However, the thematic focus shows the candidate's interest in research related to the identification, combination and application of different approaches in the synthesis of various oxide nanoscale materials; the relationships between the synthesis, structure, physicochemical and catalytic properties.

Due to the lack of personal observations, my opinion on the personal contribution of the author is based on the comprehensive information of the candidate presented in point 10 of the submitted documents. I also take into account a presentation on the topic of scientific activity in which the

candidate participated. I believe that the candidate has contributed to the development of scientific knowledge in the presented field by enriching the methods for synthesis of relevant materials, as well as by studying and presenting new relationships and processes in their synthesis and characterization.

#### **4. Critical remarks and recommendations**

The author of the report has no significant remarks on the submitted works. There are small technical errors, as well as a certain overcrowding in the distribution of thematic guidelines in an attempt to characterize the scientific activity of the candidate. I recommend the candidate to continue developing his scientific topic in the next stages of work.

#### **5. Reasoned and clearly formulated conclusion**

The analysis of the scientific papers, as well as all documents submitted by the candidate, shows that Chief Assistant Dr. Katerina Lyubomirova Zaharieva covers the requirements for the academic position "Associate Professor" according to ZRASRB, the Rules for its implementation, as well as the Rules of BAS and IMC and also the presented materials correspond to the theme of the competition Solid State Chemistry, nanoscale and minerals. "

Based on the above mentioned, I give my positive opinion that Ch. Assis. Dr. Katerina Lyubomirova Zaharieva can take the academic position "Associate Professor" at IMC-BAS and I recommend the members of the esteemed scientific jury to vote with a positive assessment.

23.04.2021 г.

/Associate Professor Dr. Luiza Dimova Terziyska /