

REPORT

by Assoc. Prof. Dr. Rositsa Titorenkova
Institute of mineralogy and crystallography-BAS

for the academic position "Associate Professor", professional field 4.2. Chemical sciences, (Solid state chemistry, nanoscale materials and minerals) in IMC-BAS, department "Structural crystallography and materials science", announced in the SG no. 106/2020

Candidate: Dr. Katerina Zaharieva, Assistant Professor at Institute of catalysis-BAS

1. General characteristics of the presented materials

Dr. K. Zaharieva participates in the competition for the academic position of "Associate Professor", professional field 4.2. "Chemical Sciences", (Solid State Chemistry, Nanoscale Materials and Minerals) in IMC-BAS with 54 publications, 32 of which are published in scientific journals indexed by Web of science and SCOPUS (29 of them with impact factor, and according to the journal rank 3 in Q1, 5 in Q2, 3 in Q3 and 18 in Q4). 22 publications are published in journals without impact factor and SJR. The total number of publications so far of Dr. K. Zaharieva are 69. These publications have a total of 95 citations, 84 of which are published in journals referred to in Scopus and Web of science. The Hirsch index (h-index) of Dr. Zaharieva is 5 in the Web of Science. In 25 of the publications Dr. Zaharieva is the first author, and in 21 she is the corresponding author, which is an indicator of her leading role in these studies.

As additional materials the Abstract of the dissertation for acquisition PhD degree and a list of explanation for her personal participation in the collective publications are presented. The candidate has participated in 109 national and international scientific conferences with posters or oral presentations. She has participated in 5 scientific projects funded by National Science Fund, and two from other organizations.

According to the requirements, Dr. Zaharieva has attached a reference for fulfillment of the national minimum criteria and the higher requirements of BAS for the academic position "Associate Professor" in the professional field 4.2. "Chemical Sciences", which presents the points on the relevant indicators: according to indicator A - 50 points; indicator B - 178 points (required 100 points); according to indicator D - 232.8 points (required 220 points); according to indicator D - 710 points (required 120 points); according to indicator E - 285 points (required 150 points).

Dr. Zaharieva meet the national requirements and the rules in the Institute of Mineralogy and Crystallography, BAS for acquiring the academic position "Associate Professor", exceeding the minimum requirements for indicators B, D and E.

2. Main scientific contributions of the candidate

11 publications are presented for the Habilitation thesis (indicator B, point 4 in Table 2) with numbers 18 (B.4.1), 19 (B.4.5), 20 (B.4.10), 22 (B.4.4), 30 (B.4.2), 33 (B.4.6), 37 (B.4.9), 38 (B.4.11), 45 (B.4.8), 47 (B.4.7), 49 (B.4.3).

The research in this group of publications is on synthesis, characterization and photocatalytic properties of a large number of oxide nanoscale materials: copper and nickel ferrite materials ($\text{Cu}_x\text{Fe}_{3-x}\text{O}_4$; $\text{Ni}_{0.5}\text{Fe}_{2.5}\text{O}_4$); ZnO; manganese ferrite materials; mixed cobalt-copper ferrite materials; Cu, Mn, Ni-substituted magnetite type materials; substituted magnetite type materials; silver-doped Al_2O_3 and alumina; $\text{TiO}_2\text{-CeO}_2\text{-ZnO}$, $\text{TiO}_2\text{-ZnO}$ and $\text{TiO}_2\text{-CeO}_2$ nanocomposites; $\text{NiMnO}_3 / \text{Mn}_2\text{O}_3$, $\text{NiMn}_2\text{O}_4 / \text{NiMnO}_3 / \text{Mn}_2\text{O}_3$ and $\text{Ni}_6\text{MnO}_8 / \text{NiMnO}_3 / \text{Mn}_2\text{O}_3$ composites, and magnesium aluminate (MgAl_2O), respectively.

The main methods used to produce these materials are synthesis by co-precipitation, heat treatment and mechanochemical activation. For all materials, studies of their photocatalytic activity and ability to degrade various dyes were performed. Thematically, these publications are combined in the scientific field: Synthesis and research of oxide nanoscale materials (mixed oxides, oxides, composite materials based on oxides).

The scientific contributions of the candidate in the field are in:

- establishing and applying approaches for the synthesis of various oxide nanoscale materials;
- determination of optimal conditions for synthesis;
- clarification of the relation between the method of synthesis, the crystal structure, the composition and the photocatalytic efficiency of the obtained nanosized materials;
- the synthesis of materials with improved characteristics and catalytic properties.

The author presents 21 publications, outside the Habilitation work (indicator D, point 7 of Table 2).

The scientific contributions of the candidate from these publications are summarized in four groups:

- Photocatalytic studies of $\text{NiO}_{0.8} \text{ZnO}_{0.2} / \text{ZnO}$, calcium titanate doped with phosphorus TiO_2 , abiotic, biogenic material, lepidocrocite and hybrid nanocomposites (polybenzimidazole-ZnO, polydiphenylacetylene-ZnO in polystyrene matrix), (59-54);

- Mechanochemical activation of zinc oxide and ZnO doped with Ag, Ni or Co, calcium titanate and magnetite type materials (17, 32, 3, 51);

- Investigations of the phase composition and / or structure of photocatalysts and other materials (39, 40, 44);

- Synthesis of ferrite catalytic nanomaterials, nanosized iron oxy-hydroxides and composite photocatalysts based on nickel oxide and zinc oxide (3, 6, 21, 31, 41-43, 46, 48).

Two of the publications are reviews, summarizing data on the plasma chemical synthesis of nanosized powders (nitrides, carbides, oxides, carbon nanotubes and fullerenes) and on catalytic materials studied in relation to environmental protection.

The personal participation of Dr. Zaharieva in all publications is based on her qualification and experience in the synthesis of photocatalytic nanomaterials and in the study of their catalytic properties.

3. Conclusion

The presented materials, as well as the author metrics level of Dr. Katerina Zaharieva meet the national requirements and the Rules of IMC-BAS for the academic position "Associate professor" in the professional field 4.2. Chemical sciences, (Solid state chemistry, nanoscale materials and minerals).

In conclusion, as a member of the scientific jury, I propose to the members of the Scientific Council at the Institute of Mineralogy and Crystallography of BAS to elect Dr. Katerina Zaharieva for the academic position "Associate Professor".

21.04.2021

Member of the scientific jury:

Assoc. Prof. Dr. Rositsa Titorenkova