

REPORT

For a competition for the academic position "Associate Professor", professional field 4.2 Chemical Sciences, scientific specialty "Inorganic Chemistry"

Announced in State Gazette issue 98 of 17.11.2020.

Applicant Dr. Lubomir Ivov Aleksandrov, Assistant Professor of IGIC-BAS

Member of the scientific jury: Dr. Georgy Vyacheslavovich Avdeev, Associate Professor of IPC-BAS

1. General description of the basic and applied research of the applicant.

The submitted materials under the competition for the academic position "Associate Professor" are from a single candidate, Assistant Professor. Dr. Lubomir Ivov Aleksandrov. They comply with the requirements of the ADASRB (Act on the Development of the Academic Staff in the Republic of Bulgaria), the Rules for its implementation, the Regulations of BAS and the Regulations on the terms and conditions for acquiring scientific degrees and occupying academic positions at in the IGIC-BAS. The total number of publications of the applicant is 62, of which 50 are published in journals included in the Scopus database. The total number of citations (without all authors' autoquotes) is 292. The candidate participates in the competition with 30 scientific publications. Of these, 10 are thematically united and presented as equivalent to habilitation thesis (group B) and another 20 outside of the thesis in group D. All works are published in high-quality scientific journals, and the quarters have the following indicators: Q1-11, Q2-10, Q3-3, Q4-3, SJR - 3 reference publications. This reference testifies to a high level of results obtained and published, as well as relevance of the subject.

The materials presented in the competition cover and even exceed significantly the minimum national requirements and those of the BAS and IGIC: group A-50 points (minimum 50), group B-205 points (minimum 100 points), group G-381 points (minimum 220 points), group D-566 points (minimum of 60 points), group J-281 points (minimum 70 points). In the case of 500 points required to hold the position of "Associate Professor", the applicant has submitted documents proving the presence of 1483 points.

2. Basic scientific and applied contributions

The main part of the candidate's contributions is in the field of synthesis and characterization of molybdenum and tungsten glasses which belong to the group of so-called non-traditional glassy systems. This type of glass differs from traditional silicate, borate, and phosphate glasses, due to the fact that MeO_3 (Me=Mo and W) cannot form an amorphous network independently and are not glazed when applying low cooling rates of preparation. The systems that have been studied are:

$\text{MoO}_3\text{-Ln}_2\text{O}_3\text{-B}_2\text{O}_3$, Ln=La and/or Nd; $\text{MoO}_3\text{-ZnO-B}_2\text{O}_3$; $\text{MoO}_3\text{-SiO}_2\text{-B}_2\text{O}_3\text{-Na}_2\text{O-ZnO-Nd}_2\text{O}_3$; $\text{WO}_3\text{-La}_2\text{O}_3\text{-B}_2\text{O}_3$; $\text{WO}_3\text{-MoO}_3\text{-La}_2\text{O}_3\text{-B}_2\text{O}_3$; $\text{WO}_3\text{-Nb}_2\text{O}_5\text{-La}_2\text{O}_3\text{-B}_2\text{O}_3$

For each of these systems, the regions of vitreous formation and liquid-phase separation are determined. In the course of the research, a reproducible method for glass synthesis has been developed. A variety of thermal characteristics of glass are determined by Differential Thermal Analysis (DTA/TG). Data about structure and amorphous networks of the glass are obtained by infrared (IR), Raman, UV-visible (UV-Vis), and X-ray photoelectron (XPS) spectroscopy. The impact of the local structure of molybdenum on the processes of liquid-phase separation and crystallization is studied in more detail. Based on the experimental data obtained, structural models describing the near and average order of the amorphous state are proposed., The crystallization ability of the synthesized glass has been researched through X-ray phase analysis (XRD) and temperature regimes for the production of glass-ceramic materials are developed. The optical properties of individual compositions of glass and glass-ceramic samples have been studied.

In addition to the results described in Dr. Aleksandrov's habilitation reference, he conducted successful research on obtaining glass in boron-bismuth systems, with the addition of molybdenum and tungsten (7 publications), amorphous hybrid materials (4 publications) and laser-induced formation of two-dimensional structures from nanoparticles in boron-silicate glasses (8 publications).

From the above reference, it is clear that Dr. Alexandrov is a leading researcher in this perspective field of research. New unexplored materials have been synthesized. During his research, the candidate, in addition to good theoretical justifications, seeks a real applied effect of the recently obtained materials.

My personal impressions of the candidate are excellent. Dr. Alexandrov and I worked 6 years in the IGIC-BAS, performing common tasks more than once. He was always able to quickly find the right solutions for them as a result his good theoretical and technical knowledge. At a later stage, his acquired experience in Japan raises his capabilities well above the average of most scientists working in this field.

I believe that the candidate's personal contribution to the published works is essential.

3. Response to the applicant's scientific papers in Bulgarian and foreign literature

The reference made in the Scopus database (10.03.2021), shows that the candidate's independent citations are above 191 and h-index 10. This, in itself, is quite indicative of the relevance of the research conducted by Dr. Lubomir Ivov Aleksandrov. The author's publications are actively read and cited by other researchers. Obviously, the field in which he works is relevant, and the methods of synthesis and research used are attractive for obtaining new materials with interesting properties.

4. Critical remarks and recommendations

No critical notes or recommendations.

CONCLUSION

The materials presented on the publication activity and the results obtained confirm my personal impressions of the candidate. It is evident that Dr. Lubomir Ivov Aleksandrov is a leading scientist with significant contributions in the field in which he works, in addition, his indicators exceed the minimum national requirements established by the Act on the Development of the Academic Staff in the Republic of Bulgaria and the IGIC-BAS.

Taking into account the conclusions made, I strongly recommend to the honorable Scientific Jury to support the candidacy and to suggest to the Scientific Council of IGIC-BAS, Assistant Professor. Dr. Lubomir Ivov Aleksandrov to be elected to the academic position of "Associate Professor" in the professional direction 4.2. Chemical Sciences.

10.03.2021 r

Georgi Avdeev