Институт по ФИЗИКОХИМИЯ при БАН
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ACADEMIC OPINION

on the competition for the academic position of Associate Professor in Professional Field 4.2. Chemical Sciences, Scientific Specialty Physical Chemistry

announced in the State Gazette, Issue No. 63, dated 10 June 2026

Candidate: Nikolay Bozhidarov Yordanov, PhD, Chief Assistant Professor
(full name, academic degree, academic position)

Member of the Scientific Jury: Aleksandar Nikolaev Nikolov, PhD, Associate Professor
(full name, academic degree, academic position)

1. General Assessment of the Candidate's Scientific Research and Applied Research Activities. The research activities of Dr. Nikolay Yordanov encompass fundamental and applied studies in physical chemistry and materials science. His main research interests include the kinetics of phase transformations, sintering and crystallization of glasses and glass-ceramics, and the development of functional materials from industrial waste. His research demonstrates a consistent progression from investigating physicochemical processes to applying this knowledge to develop materials with tailored properties.

The candidate has submitted five scientific publications equivalent to a habilitation thesis, corresponding to a total of 100 points. Additional scientific publications, excluding those included in the habilitation work and doctoral dissertation, account for 242 points. A further 166 points have been reported for citations. Thus, the candidate meets the statutory minimum requirements for the relevant groups of evaluation indicators. His research activities also include participation in 11 national and international research projects.

2. Main Scientific and Applied Research Contributions. The candidate's main scientific contributions concern the elucidation of sintering, crystallization, and foaming mechanisms in glass-ceramic materials derived from metallurgical waste. Particular attention has been devoted to the effects of gaseous atmospheres and oxidation–reduction processes on microstructural development. The role of the Fe(II)/Fe(III) redox couple in gas evolution and pore formation has been established. The results demonstrate that sintering and foaming processes can be controlled through appropriate selection of the processing atmosphere and thermal regime.

A significant contribution is the development of an experimental approach for the in situ investigation of these processes using a thermo-optical system under a controlled atmosphere. The effects of heating rate, pre-oxidation, and temperature conditions on sintering kinetics and the resulting material microstructure have been clarified.

The possibility of producing dense glass-ceramics, self-glazed glass-ceramics, and glass-ceramic foams from a single raw material system has been demonstrated. A high closed porosity exceeding 85 vol.% has been achieved. These findings also have practical significance, as they provide a basis for utilizing industrial waste in the production of functional thermal insulation materials.

Dr. Yordanov's individual contribution is particularly evident in the experimental investigation of atmospheric effects, sintering kinetics, and foaming mechanisms. He is the first author of three of the five publications submitted as the habilitation work, demonstrating his active role in the research.

3. Impact of the Candidate's Scientific Publications in Bulgarian and International Scientific Literature. The research findings have been published in established international scientific journals, including Ceramics International, Materials, Thermochimica Acta, and Heliyon. The submitted citation report accounts for 166 points, indicating interest in the candidate's research within the scientific community. His publication record and international collaborations further confirm the scientific relevance of the research conducted.

4. Critical Comments and Recommendations Regarding the Candidate's Scientific Publications. I have no substantial critical comments regarding the scientific publications submitted for evaluation. I recommend that future research focus on establishing more detailed quantitative relationships between pore structure and the mechanical and thermophysical properties of the developed materials, as well as assessing their potential for practical applications.

CONCLUSION

The submitted scientific publications demonstrate that Dr. Eng. Nikolay Yordanov is an established researcher with significant scientific and applied research contributions in physical chemistry and materials science. His research is characterized by scientific originality, sound experimental evidence, and potential for practical application. The candidate meets the minimum requirements of the Institute of Physical Chemistry at the Bulgarian Academy of Sciences (IPC–BAS) for appointment to the academic position of Associate Professor.

Based on the submitted materials and my positive assessment of the candidate's scientific achievements, I recommend that the Scientific Jury propose to the Scientific Council of IPC–BAS the election of Dr. Eng. Nikolay B. Yordanov to the academic position of Associate Professor in Professional Field 4.2. Chemical Sciences.

Date: 5.11.2026 Opinion prepared by: