OPINION

by prof. Dr. Anton Naydenov

regarding the scientific and scientific-applied contributions of the works of Assoc. Prof. Dr. Dimitrinka Nikolova, submitted for participation in a competition for a "professor" in the field 4.2 Chemical Sciences (Chemical Kinetics and Catalysis) for the needs of the laboratory "New Heterogeneous Catalysts for Clean Energy and Environmental Protection", in the thematic area "Design of Metal and Metal Oxide Systems with Application in Energy and Improving the Quality of Life", published in the "State Gazette", issue 82 of 7.10.2025.

Presentation of the candidate
In 1995, Assoc. Prof. Dr. Dimitrinka Aleksieva Nikolova graduated from the University of Chemical Technology and Metallurgy - Sofia, majoring in "Inorganic and Electrochemical Productions", Specialization "Technology of Inorganic Materials". Since 2016, she has been an associate professor at the Institute of Chemistry - BAS.

Scientometric data and assessment of scientific research activity
The candidate participates in the competition with 21 publications in publications that are referenced and indexed in world-renowned databases of scientific information (Q1, Q2, Q3, Q4), 1 book chapter, 2 patents and 1 patent application. The total number of citations for the period 2016 - 2025 is 216, and on the publications under the competition is 110. She is the Chairman of the Association "Bulgarian Catalytic Society". She is the supervisor of two graduate students for the period 2024 - 2025. At the moment, the candidate has 62 publications, the number of citations noted is over 280, H-index: 9. Participant and supervisor in seven international and a large number of national projects and international and national scientific forums.

Scientific and applied scientific achievements
The scientific contributions of Assoc. Prof. Dr. Dimitrinka Aleksieva Nikolova are in the field of two main research areas: development and research of rhenium-containing catalysts for the production of pure hydrogen through the process of conversion of CO into CO_2 with water vapor, conversion of CO with water vapor into a conventional gas mixture, conversion of CO with water vapor into a gas mixture with sulfur-containing components and development and research of non-noble electrocatalysts for the production of green energy through hydrogen fuel cells and green hydrogen, including solid oxide fuel cells, alkaline fuel cells and electrolysis.

The research is aimed at optimizing the activity and stability of catalysts for the efficient production of hydrogen and its transformation into green energy. The important requirements for increasing the activity of Re(Mo) catalysts promoted with K and Co have been determined: The catalyst composition has been modeled to achieve an optimized balance in the active redox structures Re^{4+}/Re^{7+}, Co^{2+}/Co^{3+} and Mo^{4+}/Mo^{6+}, as well as the associated electronic properties. The necessary activation conditions, such as the choice of reducing agent, optimal duration and temperature for increasing the catalytic activity, have been shown.

The potential of the CoRe configuration is demonstrated by the achieved high conversion of carbon monoxide. A stress test has been performed, which shows that the degree of conversion of the KCoRe catalyst remains high and constant until the end of the test upon returning to the initial space velocity. This is explained by the stability of the active forms

under the oxidative action of water vapor and CO_2 in the absence of H_2S in the reaction mixture. The stability of the KCoRe system under potential emergency deactivation conditions has been confirmed. The resulting KCoRe catalyst provides high activity and stability in the presence of sulfur impurities in the technological infrastructure, which defines it as a sulfur-resistant catalyst for effective purification of hydrogen-containing gas streams from CO and for obtaining additional amounts of hydrogen.

The presence of metallic nickel both inside and on the surface of the Ni/BCY15 catalyst synthesized in ethylene glycol medium was confirmed. The residual metallic nickel helps to form active sites for dissociative hydrogen adsorption. The resulting active hydrogen atoms migrate to the surface and reduce Ni^{2+} ions, thereby supporting the autocatalytic reduction of NiO and accelerating this process. The obtained results prove the stability of the obtained metallic nickel in ethylene glycol medium as a key factor for the adsorption, dissociation and oxidation of hydrogen, as well as for ensuring stable electronic conductivity of the anode.

New research work has been initiated in the field of applying a simplified and scalable co-electrodeposition strategy to obtain unique 3D-NiCoP coatings with bi-functional activity at high current densities for the production of green green hydrogen. Scientific contributions include the design and development of catalyst compositions that have not been published, as they represent the intellectual property of the company GenCell LTD, Israel. These studies were carried out within the framework of an assigned project of the Institute of Chemistry and Technology of the Bulgarian Academy of Sciences for the period 2021–2025.

Assessment of the fulfillment of the minimum national requirements and the recommended requirements of the Institute of Catalysis, Bulgarian Academy of Sciences
The comparative analysis of the quantitative performance of Assoc. Prof. Dr. Dimitrinka Aleksieva Nikolova against the minimum national requirements for holding the academic position of "Professor", as well as against the recommended requirements of the Institute of Chemistry and Technology of the Bulgarian Academy of Sciences shows that the candidate fulfills and exceeds the above-mentioned requirements.

Conclusion
The scientific research of Assoc. Prof. Dr. Dimitrinka Aleksieva Nikolova fully meets the subject matter of the announced competition for awarding the academic position of "Professor". The publication activity, citations of the published results, participation in projects of Assoc. Prof. Dr. Dimitrinka Aleksieva Nikolova fully meet all the requirements of the Act on the Development of the Academic Staff and the Regulations on the Terms and Procedure for Acquiring Scientific Degrees and Holding Academic Positions in the Institute of Catalysis - BAS. Therefore, I strongly recommend that the members of the esteemed Scientific Jury and the esteemed Scientific Council of the Institute of Catalysis - BAS award Assoc. Prof. Dr. Dimitrinka Aleksieva Nikolova the academic title of "professor" in field 4.2. Chemical Sciences.

Sofia, 14.01.2026

Signature: