

OPINION

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regarding a competition for the occupation of the academic position "professor", for the needs Laboratory "Materials and Processes for Environmental Protection" at the IGIC-BAS under professional direction 4.2 "Chemical sciences", scientific specialty "Chemical kinetics and catalysis", published in the "State Gazette", no. 34 of 03.05.2022

Documents have been received for participation in the announced competition of only one candidate, Ass. Prof. Ivanka Petrova Spasova, Ph.D.

The candidate graduated in the year 1983 the University of Chemical Technology and Metallurgy, Sofia, in the specialty "Technology of Organic Synthesis and Fuels". She acquired Ph.D degree in 1998 with a defended PhD thesis on the topic "Synthesis and Catalytic Activity of oxide catalysts based on 3d-transition metals for the disposal of CO and NO at low temperatures".

Assoc. Prof. Spasova's scientific career began at IGIC-BAS as a chemist in 1984. Subsequently, she acquired the academic positions from Research associate, Assistant Professor to Associate Professor in 2012 in the "Materials and Processes for Environmental Protection" laboratory of IGIC-BAS, which shows her upward professional development. She is a member of the Union of Chemists in Bulgaria and the Bulgarian Catalytic Society.

Ass. Prof. Ivanka Spasova is the author of 71 publications, of which 59 are referenced and indexed in the global databases WEB OF SCIENCE and SCOPUS. She participates in this competition with 33 of these articles, distributed among journals by quartiles as follows: Q1-14; Q2-13; Q3-4 and Q4-2 articles. In 12 of these articles, she is in the first or second place in the author's team, which is indicative of her leading role in the research done and the processing of the obtained results. The number of citations noticed on all the candidate's publications is 596, of which 256 are on publications included in the contest. Some of the research results have been presented at 79 national and international scientific forums at home and abroad. The candidate's H-index, assessed by SCOPUS, is 12. Ass. Prof. Ivanka Spasova has participated in 17 scientific projects, co-authored 3 inventions, which is indicative of her active participation in the scientific investigations and the applied research. She was the supervisor of one graduate student and one PhD student. The presented data show that all the indicators for the fulfillment of the minimum requirements of "Regulations for the Conditions and Order for Occupying Academic Positions" in BAS and IGIC are covered, with the total number of points from all indicators being 1603 and exceeding more than 2 times the minimum requirements of IGIC for occupying the academic position "professor" .

The detailed review of the results summarized by the candidate, reflected in the **Habilitation Thesis** and the **Author's Reference**, outlines a certain orientation of her scientific research activity towards the development of innovative catalytic and adsorption materials for the control of harmful emissions in the environment. The presented results are up-to-date and of interest, both from a fundamental and from a scientific-applied point of view, and correspond to the subject of the announced competition.

The Habilitation work of Ass. Prof. Ivanka Spasova summarizes research on the preparation of catalysts containing transition metals and/or rare earth elements, coated on individual and composite (hybrid) supports and their catalytic behavior in the processes of

oxidation of CO and CH₄, removal of nitrogen oxides - reduction of NO with reducing agents CO and CH₄ and decomposition of NO_x. The submitted reference is indicative that the requirement of the IGIC regulations in a competition for a professor has been met, that the candidate has a clearly defined scientific topic in which he is a leading researcher. A review of the presented articles in the habilitation work shows that several main research contributions can be highlighted.

An original approach has been proposed to reduce the concentration of nitrogen oxides in waste gases, through integrated disposal, in which the products of the catalytic decomposition of methanol are used as reducers of nitrogen oxides.

Of interest are the studies related to increasing the efficiency of CuCo₂O₄/Al₂O₃ catalysts by modifying them with rare earth elements such as Ce, Nd, La, Gd. It has been established that the type of the formed oxide phase of the rare earth element is decisive for the effectiveness of the catalysts in the oxidation reactions.

Also original are the studies on the possibility of combining the hydrophilic mesoporous SiO₂ and Al₂O₃ carriers with hydrophobic porous carbon materials in order to improve the catalytic efficiency of the deposited on them catalysts for the reduction of NO with CO.

Original scientific contributions can also be noticed in joint research studies with scientists from other scientific organizations that are outside of the habilitation work. In them, the expertise of Ass. Prof. Ivanka Spasova is essential for clarifying the influence of the adsorption-textural parameters of materials of different composition on their target properties with a view to their application in the environmental protection, clean energy production, and biomedicine.

Research on catalysts supported on carbon-containing materials for the protection of the environment and for clean energy production is of significant scientific and practical interest. Here, the main emphasis is on the precise adsorption studies carried out, through which the essential role of the textural characteristics of activated carbons (AB) from waste biomass, polyolefin wax, motor oil and coal tar on the formation of catalytic centers in the case of deposited metal or metal oxide catalysts for the decomposition of methanol, and hence on their catalytic properties.

Very interesting and with practical potential are the studies on materials with biomedical application. MCM-41 and HMS-type mesoporous silica materials have been found to be a promising carrier for human drug delivery due to the specificity of their porous structure.

I have personal impressions of the candidate's professional development from the time he joined the IGIC-BAS in 1984 until now. Over the years, she has grown into a good experimenter and established specialist in the field of environmental catalytic research. She has a high reputation among her colleagues at the institute, which is reflected in her election in 2019 as vice-chairman of the Scientific Council of the IGIC-BAS. That is why I am convinced that Ass. Prof. Ivanka Spasova has the necessary qualities to develop perspective scientific topics and to attract young scientists around her, whom she can be successfully lead to high scientific achievements.

Conclusion

The presented materials for the publication activity and the obtained results fully correspond to the theme of the announced competition and exceed all the required indicators according to LDASRB, the Regulations for its application, the relevant Regulations of the BAS, as well as

the specific requirements of the Regulations of the IGIC-BAS for occupying the academic position "professor". When reviewing them, the impression remains that Ass. Prof. Ivanka Spasova is a leading scientist with significant contributions in her scientific field. This gives me the reason to give my positive assessment and to propose to the respected members of the Scientific Jury and the Scientific Council of the IGIC-BAS to support the candidacy of Assoc. Prof. Ivanka Spasova and vote for awarding the academic position "Professor" in professional direction 4.2 "Chemical Sciences" and scientific specialty "Chemical Kinetics and Catalysis".

22.08.2022

Member of the Scientific Jury:

/Prof. PhD Plamen Stefanov/