

OPINION

of Prof. Dr. Violeta Georgieva Koleva, IGIC-BAS

on the competition for occupation of the academic position "Associate Professor"
for the needs of the Institute of Organic Chemistry with the Center for Phytochemistry, BAS
in the professional field 4.2. "Chemical Sciences", specialty "Organic Chemistry"

In the competition for Associate Professor in the professional field 4.2. "Chemical Sciences" (Organic Chemistry) announced in Newspaper of State, issue 55, dated 15.07.2022 and on the website of the Institute of Organic Chemistry with the Center for Phytochemistry (IOCCP), BAS for the needs of the Laboratory of Organic Reactions on Microporous Materials participates one candidate – Ch.Assist. Prof. Dr. Gloria Said Issa-Ivanova from IOCCP-BAS.

1. General presentation of the procedure and the applicant

Ch. Assist. Prof. Dr. Gloria Issa is the only candidate in the announced competition. After receiving a bachelor's and master's degree in the Faculty of Chemistry and Pharmacy at SU "Kl. Ohridski" (2009 and 2011, respectively) she entered as a full-time PhD student at IOCCP - BAS, where she defended her doctoral dissertation for the acquisition of the educational and scientific degree "doctor" (2015). After that she successively held the academic positions "Assistant Professor" (2015) and "Chief Assistant Professor" (2017).

The set of materials presented by Dr. G. Issa is in accordance with the "The Regulations for the Terms and Rules for Occupation of Academic Positions in IOCCP-BAS, and meets the criteria of IOCCP-BAS for occupying the academic position of "Associate Professor".

2. General characteristics of the applicant's activities

In the Scopus database, Dr. G. Issa is visible with 30 articles for the period 2013-2022 and according to the applicant's data, they are 46. She participates in the present competition with 19 articles (outside those included in the doctoral dissertation), which are accepted for assessment. They are published in the period 2017 - 2022 after acquisition the academic position "Ch. Assist. Prof." and are distributed by journal quartiles as follows: 7 in journals with Q1, 3 - with Q2, 2 – with Q3, 5 – with Q4 и 2 – with SJR. The scientific publications presented as a Habilitation work (group B.4.) are 7 and they form 125 points (required 100 points). The scientific publications outside the Habilitation work (group D.7.) are 12 and they cover the required 220 points. All articles are a result of collective work and more than half of them are with seven or more authors. Dt. Issa is the first author in 7 articles and corresponding author in six of them, as well as the second author in 5 articles (63% of articles in total), which shows her significant role in the research teams.

According to Scopus database the citations of all papers are 199, the candidate's Hirsch index being 8 and it exceeds the minimum of Hirsch index 5 required according to the Regulation of IOCCP. For the competition Dr. Issa has presented a list with 131 citations (262 points for indicator D of required 70 points) received after 2017 on 18 papers, of which: 17 citations are from 7 of the candidate's articles, 73 citations are from 4 papers involved in the doctoral dissertation, but not used in the previous procedure and the remaining citations are from the other papers of the

applicant. Dr. G. Issa has participated in 48 international and national scientific forums, of which 12 are oral presentations. She is the leader of 3 research projects (two of them are on the competitions for funding research of young scientists and postdoctoral fellows and a project is funded by the Ministry of Education and Science) with a total of BGN 60 000 acquired and is a participant in 6 other projects (12 points for indicator E). The overall assessment amounts to 669 points and it exceeds the minimum requirements of the Regulation of IOCCP for the academic position "Associate Professor" (required 440 points).

The research activity of Ch. Assist. Prof. G. Issa is on important topic related to environmental protection and hydrogen production as an ecologic fuel. The investigations on the competition are in two directions: (1) Development of massive nanostructured metal oxide catalysts (mono-, two- and three-components) with application for complete oxidation of ethyl acetate and decomposition of methanol; (2) Development of activated carbon supported oxide nanocomposites for hydrogen release from methanol. Research is focused on MnOx, binary oxides based on Ti-Ce, Ce-Mn, Ti-Zr, Ti-Sn, ternary composites CuO-CeO₂-TiO₂ and CuO-ZrO₂-TiO₂, and various ferrites supported on activated carbon from waste biomass.

The presented materials confirm an active research activity of high quality with the main contributions as follows:

- The influence of the preparation method, phase composition and the ratio between the components within wide limits in the cases of two- and threecomponent catalysts on the structural, texture, morphological, surface and oxidation-reduction characteristics of the catalysts, and hence on the catalytic properties, has been established. The information about these complex relationships which are specific and characteristic of each of the studied oxide systems, allows both optimization of the catalysts and control of the catalytic activity and selectivity in total oxidation of ethyl acetate and methanol decomposition.

- It has been shown that the isomorphous substitution of Ce and Zr ions in the TiO₂ crystal lattice induces a large amount of surface defects that significantly change the redox and acid-base properties of the two-component catalysts.

- The hydrothermal synthesis has been reported to provide the formation of highly defective TiO₂-SnO₂ rutile-like solid solutions with increased dispersity and specific surface area, but with reduced Lewis acidity and oxygen mobility compared to the individual oxides, which results in lower catalytic activity and changes in the product selectivity during the catalytic reactions.

- The advantage of the "chemisorption-hydrolysis" technique compared to the traditional "wetness impregnation" in the preparation of the ternary catalysts CuO-CeO₂-TiO₂ and CuO-ZrO₂-TiO₂, has been demonstrated. This technique ensures high specific surface area and pore volume, uniform and finely dispersed CuO particles with high activity and reduction ability, due to the facilitated electron transfer in conjugated Cu-Zr(Ce)-Ti centers in the interface layer. The application of combined hydrothermal synthesis/impregnation and hydrothermal synthesis/chemisorption-hydrolysis techniques leads to extremely high catalytic activity owing to the improved texture characteristics and the specific interaction of CuO particles with the support.

- Nanoporous activated carbons have been synthesized from waste biomass (used motor oil and diverse plastic residues as well as from peach stones) and they have been successfully used as

supports for catalysts based on Fe-Cr mixed oxides and various ferrites containing Cu, Zn, Ni and Mn for clean hydrogen production via methanol decomposition.

I have no personal impression on the candidate and I have no critical remarks and recommendations.

3. CONCLUSION

The results of Ch. Assist. Prof. Dr. Gloria Issa achieved in her research activity completely meet the specific requirements of the Regulations of IOCCP-BAS for the occupation of the academic position "Associate Professor". Based on the materials presented for the competition and analyzing the candidate's scientific achievements and science-metric indicators I propose to the members of the Scientific Jury and the Scientific Council of IOCCP that

Ch. Assist. Prof. Dr. Gloria Issa to be elected as "**Associate Professor**" of Organic Chemistry in the professional field 4.2. "Chemical Sciences" at the Institute of Organic Chemistry with the Center for Phytochemistry, BAS.

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Prepared the opinion:

(Prof. Dr. Violeta Koleva)