

OPINION

by Assoc. Prof. Dr. Irena Lyubomirova Philipova

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Concerning the materials submitted for the competition for academic position "Associate Professor" within the Institute of Organic Chemistry with Center of Phytochemistry, Bulgarian Academy of Science (IOCCP-BAS) in professional field 4.2 Chemical Sciences: scientific specialty "Organic Chemistry" for the needs of the Laboratory "Bulgarian NMR Centre"

1. Evaluation of the documents in the procedure

In the competition for the academic position of "Associate Professor", announced in the Newspaper of State, issue 37 of 17.05.2022 and on the website of the Institute of Organic Chemistry with the Center of Phytochemistry - BAS (IOCCP-BAS) the only candidate is Assistant Professor Yavor Nikolaev Mitrev, PhD in Laboratory "Bulgarian NMR Centre" IOCCP-BAS. The scientific and administrative documents submitted by the candidate are in a compliance with the Regulations for the development of the academic staff and meets the criteria of IOCCP-BAS for the academic position of "Associate Professor".

Dr. Mitrev participates in the competition with a 16 scientific work outside his thesis for "Doctor", which are on the issues of the competition and are accepted for review:

- Publications equivalent to habilitation report (**Indicator C**) – **5 pieces, divided by the relevant Q factors as follows: - Q1 - 4 pcs., Q4 - 1 pc.**
- Publications outside the equivalent of habilitation report (**Indicator D**) – **11 pieces, divided by the relevant Q factors, as follows: Q1 – 7 pcs., Q2 - 2 pcs., Q3 – 1 pc. and Q4 - 1 pc.**

Dr. Mitrev holds 97 citations of his scientific publications. A check in the Scopus database shows that Dr. Mitrev holds an h factor of 6 (self-citations excluded), which meets the criteria of the IOCCP-BAS for the academic position.

The results of the investigations are presented at 14 national and international forums such as poster presentations and oral reports. Dr. Mitrev provides a list of 9 research projects he was involved in. From those, he is a PI in one project for young scientists funded by Bulgarian Academy of Sciences, Program for support of young scientists at BAS.

The presented articles as a number, as an impact factor and citations, meet the requirements set by IOHCF-BAS for holding the position of "Associate Professor".

2. General characteristics of the candidate's research activity

The candidate's scientific contributions are divided into three main sections – (1) Applied and methodological NMR investigations, (2) Application of solid-state NMR spectroscopy for

structural investigations of new mesoporous materials and (3) Application of NMR spectroscopy in solution for structural elucidation and study of molecular flexibility of organic compounds.

Significant contributions in the first direction from the research work of Dr. Yavor Mitrev are:

1. An NMR method has been developed to distinguish hexabromocyclododecane (HBCD) from bromine-containing polymers as flame retardants.

2. NMR analysis of weak intermolecular interactions was performed using slice-selective experiments *via* study of concentration gradients in agar gels. An analytical technique has been developed, an alternative to the conventional NMR titration in water, with the possibility of parallel analysis of a large number of samples, including in automatic registration mode.

3. Application of spatially selective NMR spectroscopy to study distribution phenomena in two-phase systems.

Contributions in the second strand of the candidate's research work can be summarized to:

1. As a result of structural characterization of functionalized silicates with morpholine or with 1-methylpiperazine and investigation of the mechanism of carbon dioxide adsorption by solid-state NMR spectroscopy, MCM-48 modified with 1-methylpiperazine was identified as an extremely promising adsorbent for carbon dioxide capture.

2. Using solid-state NMR spectroscopy, the aluminosilicate matrix of 5 new materials based on beta-type zeolite modified with Ni, Pt, Ru and combinations thereof was characterized with potential application as catalysts for the production of phenol from lignin biomass. On the basis of the received spectral data, specific structural changes have been deduced, depending on the type of metal used for impregnation.

The works outside the habilitation report of the candidate are related to the application of NMR spectroscopy in solution to prove the structure, configuration and study of the molecular flexibility of organic compounds.

A series of amino acid amides and substituted cinnamic acids were investigated with three different adamantane derivatives with potential antiviral and neuroprotective properties. NMR studies have been carried out to prove the structure of new zinc phthalocyanine dyes with potential application in the field of photodynamic therapy. NMR spectroscopy was used to determine the configuration of the double bond in chalcone as well as in trisubstituted polyhydroxy stilbenes. An NMR spectral study to determine the predominant tautomeric form of folic acid under physiological conditions found that the preferred tautomers in solution were the lactams. The properties of mixtures of glycerol with dimethyl sulfoxide in different ratios were investigated, and it was shown that the mixtures behave as a relatively homogeneous solvent, without concentration-dependent effects on their physical properties.

3. Critical notes and recommendations

I have no significant remarks to the presented materials with which Dr. Mitrev participated in the competition. However, I would like to point out that a habilitation report

would be better organized if the numbering of the publications corresponds to their numbering according to indicators C and D.

CONCLUSION

The documents and materials presented by Dr. Yavor Mitrev fully comply with the requirements of the Act for the development of the academic staff in the Republic of Bulgaria, The Regulations govern the implementation of the Act for the development of the academic staff in the Republic of Bulgaria, and meets the criteria of IOCCP-BAS for academic positions "Assistant Professor". Based on the materials presented in the competition and the scientific and scientific-applied contributions reflected in them, I am fully convinced to give my positive assessment and recommend to the other members of the Scientific Jury that a report-proposal be prepared to the Scientific Council of IOHTCF for conferment of the academic position "Associate Professor" of Dr. Yavor Nikolaev Mitrev in professional direction 4.2. "Chemical Sciences", scientific specialty "Organic Chemistry" for the needs of the "Bulgarian NMR Centre".

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