OPINION

For participation in a competition for "associate professor" academic position in professional field 4.2 "Chemical Sciences", scientific specialty "Physical Chemistry", announced by IOMT-BAS in SG No. 35 of 10.05.2022

by Assoc. Prof. Dr. Irina Dimitrova Stambolova,
Institute of General and Inorganic Chemistry- BAS,
member of the scientific jury, appointed by order № RD-315-462 of July 8, 2022,
of the Director of IOMT-BAS

The candidate Assist. Prof. Dr. Biliana Georgieva graduated from Sofia University "St. Kliment Ohridski", Faculty of Chemistry, Department of Inorganic Chemistry Master's degree in 1997. Successfully defended PhD thesis in 2012 for the acquisition of a scientific and educational degree "Doctor" on the subject "**Vacuum deposited Sn-O-Te Layers as Moisture and Reduction Gas Sensors**". Dr. Biliana Georgieva holds the position of Assist. Prof. at IOMT since 2013.

The scientific activity of the candidate covers a total of 53 publications (42 of them in journals with an impact factor or rank). Biliana Georgieva took part in the competition with 19 publications (5 of them are according to indicator "B" and 14 - indicator "D"). A predominant number of scientific works (12 articles out of 19 presented) were published in prestigious journals with a high impact factor (IF), Q1 and Q2 factor (Superlattices and Microstructures, Applied Surface Science, Biomass&Bioenergy, Microporous and Mesoporous Materials, Journal of Optoelectronics and Advanced Materials, etc.) which confirms their originality and topicality. The observed citations on the publications participating in the competition are 46, and the total number is 168. The candidate's Hirsch index (H index) according to data from Scopus and WoS is 6.

The candidate is the first or second author in 5 of the scientific works, (No. 6-8, 12, 15), which confirms her participation as a leading researcher.

The indisputable research activity of Dr. Georgieva is confirmed by the participation in 6 scientific projects financed by the National Institute of Scientific Research, as well as in 73 scientific conferences and forums in Bulgaria and abroad.

The scientific activity of Dr. Biliana Georgieva can be divided into three directions:

(i) A predominant part of the publications is devoted to the synthesis of optical sensors for ethanol and water vapor based on sol gel films of Ta_2O_5, Nb_2O_5, V_2O_5 sol gel films and vacuum deposited films of SnO_2, ZnO, TiO_2 and MoO_3.

An interesting approach in the synthesis of sol gel films is the introduction of three block copolymers containing hydrophilic and hydrophobic parts with different molecular weights (Pluronic), as well as di- and three- block hydrophilic copolymers as structural directing agents in order to achieve high sensitivity to the studied gases due to the formation of a mesoporous structure. The relationship between the type and concentration of the organic additive and the final optical and sensory properties of the films has been convincingly demonstrated. A significant contribution is also the proof of ionic and electronic conductivity in tin dioxide films measured by impedance spectroscopy, which give information about the type of adsorbed water molecules.

(ii) Another group of works concerns the application of green synthesis of silver particles using for the first time, plant extracts of rose damascena, yarrow and lavender. The resulting particles have potential for application as detectors for vanillin and hydrogen peroxide.

(iii) A significant part of the publications is devoted to the synthesis and study of notably promising metal oxide catalysts - ferrites and mixed ferrites on activated carbon support obtained from waste biomass (Bulgarian peach stones).

The main scientific contributions in the research activity of Biliana Georgieva can be summarized as:

- Physical and chemical synthesis of optical sensors for volatile gases based on oxide nanosized oxide films

- Structure and phase composition characterization and investigaion of the properties of the thin films by a wide range of spectroscopic (impedance spectroscopy, transmission electron microscopy, SEM), optical and other physicochemical methods in order to clarify the mechanism of action of the sensor films

- Synthesis and structural characterization of metal oxide catalysts for methanol decomposition and hydrogen production. Clarification of the reaction mechanism by means of TEM and electron diffraction methods.

- green synthesis of silver nanoparticles using a new type of plant extracts from Bulgarian plants.

Dr. Georgieva's scientific contributions prove her competence, scientific capacity for developing of the current scientific topics.

I have no critical comments on the presented materials.

Conclusion

The presented materials from Assist. Prof. Dr. Biliana Chavdarova Georgieva, fully correspond to all the minimum and mandatory criteria of DASRBA (Development of Academic Staff in the Republic of Bulgaria Act) and the specific conditions of the Regulations on the terms and conditions for acquiring scientific degrees and occupying academic positions at IOMT - BAS.

She is a scientist with excellent prospects for further development in the scientific field, in which she works. **On the base of this, I give a positive assessment** of the choice of Assist. Prof. Dr. Biliana Chavdarova Georgieva for "associate professor" in professional direction 4.2. Chemical sciences, specialty "Physical chemistry".

09/05/2022

Assoc. Prof. Dr. Irina Dimitrova Stambolova