

STATEMENT

on the competition for the occupation of the academic position "Assoc. Prof. "

in the professional field 4.2 "Chemical Sciences",

scientific specialty "Physicochemistry",

published in the Newspaper of State no. 35/10.05.2022,

for the needs of the Institute of Optical Materials and Technologies (IOMT)

"Acad. J. Malinowski", Bulgarian Academy of Sciences

the only candidate: Bilyana Chavdarova Georgieva, Ph.D.

Member of the Scientific Jury: Prof. DSc Vera Marinova - IOMT, BAS

Dr. Bilyana Chavdarova Georgieva is the only candidate in the competition for the academic position "Assoc. Prof.", announced in the Newspaper of State no. 35/10.05.2022, for the needs of IOMT - BAS.

1. General characteristics of the presented materials.

In the competition for the academic position "Assoc. Professor" Dr. Bilyana Georgieva participated in a total of 19 scientific publications, among them:

- 5 publications published in journals with an impact factor (referring to indicator B4) are presented for Habilitation work
- and 14 publications in journals with an impact factor/impact rank (referring to indicator Г).

The habilitation thesis (indicator B4) includes 5 publications, 3 of them published in Q1 category and 2 in the Q2 category. The publications were published in the period 2017-2020 and are related to the investigations of the morphology, structure and phase composition of inorganic, organic and biological objects in forms of thin layers and nanoparticles, using the methods of Transmission Electron Microscopy (TEM) and Electron Diffraction.

The publications list outside the Habilitation work are total of 14 (referring to indicator Г), all of which are published in refereed journals and indexed in the worldwide databases Web of Science and Scopus), including 1 publication in category Q1, 6 publications in category Q2, 1 publication in category Q3, and 3 publications in category Q4. In two of them, the candidate Dr. Georgieva is the first author.

There are 46 citations noted under the competition procedure.

The number of participations in conferences is 73.

The PhD thesis on the topic "Vacuum-deposited Sn-O-Te layers as sensors for moisture and reduction gases" was written and defended on the basis of 6 publications in journals with impact factor/impact rank and 11 participations in international conferences .

Until now, Dr. Bilyana Georgieva is a co-author in a total of 53 scientific articles, 42 of which were published in journals with impact factor/impact rank, 140 citations were noticed, the h-factor is 6.

In accordance with the requirements for holding the academic position "Assoc. Prof.", laid down in the Law on the Attainment of the Academic Staff in the Republic of Bulgaria (ZRAS RB) and the rules for the condition and procedures for acquiring scientific degrees and holding academic positions from IOMT-BANS, the candidate Dr. Bilyana Georgieva presented:

to indicator A - 50 points (from a minimum of 50 points)

to indicator B - 115 points (from a minimum of 100 points)

to group of indicators Г - 226 points (from a minimum of 220 points)

Г 7. 14 scientific publications in publications referenced in Web of Science and Scopus, outside the habilitation thesis - 226 points

to indicator Д - 92 points (from a minimum of 60 points)

Citations in scientific publications, monographs, collective volumes and patents - 92 points

The science metric indicates that the candidate Dr. Bilyana Georgieva fully meets the requirements for occupying the academic position "Associate Professor" laid down in the Regulations of ZRAS RB, ZRAS-BAS and IOMT-BAS.

2. General characteristics of the candidate's scientific, scientifically applied and pedagogical activities

Dr. Bilyana Georgieva completed her master's degree in chemistry at Sofia University "St. Kliment Ohridski", Faculty of Chemistry in 1997. In 2000, she started working as a chemist in the Central Laboratory of Photoprocesses (currently IOMT), and later on started a full-time doctorate in the same scientific organization. The scientific-research activity is focused on vacuum-evaporated thin films from the Sn-O-Te system, measuring electrical resistance and studying the gas-sensing properties of thin metal oxide films. In 2012, he successfully defended the ONS "doctor" on the topic: "Vacuum deposited Sn-O-Te layers as sensors for moisture and reducing gases" on the basis of 6 publications with an impact factor and 11 participations at international conferences.

Currently, the candidate participates in 5 research projects funded by the National Institute of Scientific Research, as well as participation in the national scientific infrastructure INFRAMAT.

Dr. Bilyana Georgieva was the coordinator for IOMT in 4 projects, including a project under the Operational Program "Development of Human Resources. She is currently the administrator for IOMT at the "National Center for Mechatronics and Clean Technologies"

Teaching and lecturing activities:

Dr. Bilyana Georgieva participated in two Spring Seminars for PhD students and young scientists from BAS "Interdisciplinary Chemistry", where she presented lectures on the basics and applications of Transmission Electron Microscopy as well as in the School of "Electron Microscopy" in 2019 with a lecture on the topic: "Preparative technique for TEM analysis of fragile and brittle materials". She regularly participates in the presentation of the Transmission Electron Microscope to the high school and University student groups, as well as to young scientists, visiting IOMT.

3. Basic scientific and/or scientific-applied contributions with an assessment to what extent they are the candidate's personal work.

The main scientific activity of Dr. Bilyana Chavdarova Georgieva is in the field of nanomaterials and nanostructures based on oxide materials. The candidate uses the methods of Transmission Electron Microscopy (TEM) and Electron Diffraction (SAED) to study the morphology, structure and phase composition of nanostructures of different oxide materials (for example metal oxides such as zinc oxide, thin films of Nb-, Ta-V-oxides, etc.) for applications in sensors.

Dr. Georgieva has many years of experience related to evaporation of films and synthesis of thin layers, for example Sn-O-Te, measurement of electrical resistance and study of their gas sensing properties. From the documents, submitted to this application it is clear that Dr. Bilyana Georgieva has mastered the above mentioned techniques as well as has an essential role in having the obtained results published in prestigious journals.

A. Major Scientific Contributions

The main scientific contributions of Dr. Bilyana Georgieva can be summarized in the following areas, all based on the information that Transmission Electron Microscopy and Electron Diffraction provide:

- the presence of silver nanoparticles in zinc oxide nanostructures obtained by pulsed laser deposition at room temperature and subsequent annealing with nanosecond pulses has been demonstrated. Their morphology in the zinc oxide matrix, as well as the morphology of the zinc oxide itself, was established. The effects of silver concentration and laser annealing on the morphology and optical properties of embedded Ag/ZnO nanostructures were determined;

- the formation of nanostructures of ZnO, ZnO doped with Au, TiO₂, SnO₂ and MoO₃ obtained for the first time by the method of pulsed laser deposition in air is shown, and their morphology, structure and phase composition are determined
- the morphology, structure and phase composition of the active component of an applied catalyst supported by activated carbon obtained from pits of Bulgarian peaches were determined;
- **new data were obtained** on the type of adsorption of water molecules on the surface of thin polyimide and SnO₂ films. Predominant physical adsorption has been demonstrated for organic films. **For the first time**, the presence of both electronic and ionic conductivity has been demonstrated by impedance spectroscopy
- resistive humidity sensor elements based on thermal-vacuum deposited organic and inorganic thin films were developed and demonstrated
- the morphology and structure of dense and mesoporous Nb-, Ta- and V-oxide thin films, with controllable porosity, obtained by sol-gel and spin-coating methods are shown. The studied films were further structured with different co-polymer mesopores, which were characterized by TEM and SAED, evaluating the size of the mesopores, their arrangement, and proving the amorphous structure of the thin oxide films.
- **for the first time**, using the methods of Transmission Electron Microscopy and Electron Diffraction, the morphology, structure and phase composition of silver nanoparticles obtained by "green" synthesis in water extracts from waste products of the flowers of Rosa Damascena, Achillea millefolium and Lavandula angustifolia are shown and proven, all of them used as essential oil industry.

4. Reflection of the candidate's scientific publications in our and foreign literature:

The indicated number of citations in scientific publications with which the candidate participated in the competition according to Web of Science and Scopus are 46.

The total number of citations of all scientific publications of the candidate is 140.

5. Critical notes of the reviewer on the presented works, including the candidate's literary awareness

In some parts the described scientific contributions have a narrative character, which detracts from the essence of what was achieved. This, of course, does not detract from the value of the candidate's research and contributions.

6. Personal impressions of the reviewer about the candidate

I know Dr. Bilyana Georgieva from almost the beginning of her scientific career. Her research activity is based on an excellent experience of TEM analysis and preparation of the studied samples. Dr. Bilyana Georgieva takes a very responsible

approach to her professional commitments, and I believe that she is a very valuable member of every scientific team.

7. Reasoned and clearly formulated conclusion.

The submitted materials and scientific works of Dr. Bilyana Georgieva characterized the candidate as a very well-qualified specialist in studying the morphology, structure and phase composition of thin layers and nanoparticles using the methods of Transmission Electron Microscopy (TEM) and Electron Diffraction. Here I would also like to note the active participation of Dr Bilyana Georgieva in various projects, as well as the desire to introduce possibilities of Transmission Electron Microscopy and Electron Diffraction to students and younger colleagues.

The above data show that the scientific indicators of Dr. Bilyana Georgieva fully satisfy the requirements for holding the academic position "Associate Professor" laid down in the Law on the Regulation of the Academic Staff in the Republic of Belarus (ZRAS-RB) and the regulations on the terms and conditions for acquiring scientific degrees and holding academic positions of the IOMT - BAS.

Based on the above, I express my full support to the application of Dr. Bilyana Georgieva and with conviction I recommend to the honorable Scientific Jury to support and propose to the Scientific Committee of IOMT-BAS Dr. Bilyana Georgieva, to be elected to the academic position of "Associate Professor" in the Professional field: 4.2 "Chemical Sciences".

07.09.2022

statement written by:

/Prof DSc Vera Marinova /