

OPINION

of

Prof. DSc Elena Vadimovna Stoykova,

Institute of Optical Materials and Technologies, Bulgarian Academy of Sciences

regarding the competition for the academic position "Associate Professor" in the field of higher education 4. Natural sciences, mathematics and informatics, professional field 4.1. Physical Sciences (Electrical, Magnetic and Optical Properties of Condensed Matter), announced in SG, issue 57 of 26.06.2020 with a candidate Ch. Assistant Professor Dr. Ivan Panayotov Bodurov

1. Brief biographical reference and assessment of the publication activity

Ch. Assistant Dr. Ivan Bodurov was born on March 17, 1986. He graduated with honors from the Plovdiv University (PU) "Paisii Hilendarski" (bachelor and master), and in 2010 he obtained a professional qualification master in physics of condensed matter. In 2019, he obtained the qualification of "physics teacher" at the same university. In 2010, he specialized in the ERASMUS student and teacher mobility program at Corvinus University in Budapest, Hungary. In 2013, he successfully defended his dissertation for PhD degree on "Study of optical and holographic characteristics of nanostructures treated with corona discharge" at the Institute of Optical Materials and Technologies "Acad. Yordan Malinovski" - Bulgarian Academy of Sciences (IOMT-BAS), Sofia. The work experience of the candidate in the specialty with his doctoral studies included exceeds 10 years and has been acquired in the following positions - as a physicist (2012-2013), full-time doctoral student at IOMT-BAS (2011-2013), lecturer at PU "P. Hilendarski" as an assistant (2014-2016) and as a chief assistant from 2016 until now. Since the middle of 2019, he has been engaged in administrative activities at the Plovdiv University as a scientific secretary for organizing and administering research activities. Since 2018, he has been a physics teacher at the Professional School of Electrical Engineering and Electronics, Plovdiv.

Dr. Ivan Bodurov participates in the current competition with 48 papers, of which 43 scientific publications, 2 textbooks and 3 useful models. The complete list of his scientific works includes a total of 54 papers (49 publications, 2 textbooks and 3 useful models), of which 1 chapter in a book and 32 publications with impact factor and impact rank. From the presented list of publications for participation in the competition for "associate professor", 29 are publications with impact factor or impact rank (SJR). 24 of them fall into the Q category of Scopus and Web of Science (WoS) as follows: 2 publications Q1, one of which tops the rankings in the respective category, 2 Q2 publications, 9 Q3 publications and 11 Q4 publications. A chapter has been included in a book published by Nova Science Publishers. Four of the publications are in journals without impact factor and impact rank 4 full-text papers have been published in the proceedings of international conferences and 3 papers at national conferences. A list of 45 independent citations is presented, of which 30 citations are in impact factor publications and 8 impact rank publications visible in Scopus and WoS. Special mention should be made of one citation in a publication in Nature and 3 citations in publications in journals with an impact factor above 6. The candidate presents an official list of 14 participations in research projects and programs as follows: participation in the Competence Center "PERIMED", 3 projects to the National Science Fund of the Ministry of Education and Science, 8 projects to the Research Fund at the Plovdiv University "P. Hilendarski", in the National Program for Young Scientists and Postdoctoral Students and in a project for publishing a collection of the Faculty of Physics and Technology of Plovdiv University.

2. Review of research contributions of the candidate

Research activity of Dr. Ivan Bodurov is in promising areas of photonics and optical metrology, dedicated to production and characterization of thin films and coatings, measurement of physical, in particular optical parameters for quality assessment of food products and improvement of measurement methods. In accordance with these research fields, the scientific and applied contributions can be divided into several groups, given below (the indicated numbering of the publications corresponds to the numbering of the publications for the competition).

In the field of formation and characterization of composite thin films, the influence of the concentration of TiO₂ particles with an average size of 500 nm on the electret properties of polypropylene composite films was studied [4]. The surface properties, the refractive index and the contact angle of poly (methyl methacrylate) films [5] and the possibilities for modulation and fine tuning of the refractive index by adding different concentrations of nano-sized particles and processing in the electric field of corona discharge [10] have been studied. The mobility of silver in thin chalcogenide films was studied and holographic diffraction gratings were recorded by using an evanescent wave [7,9]. The refractive indices of different nanosized particles dispersed in water were determined using the Lorentz-Lorentz, Maxwell-Garnett and Brugemann equations [11]. The physical parameters of nanocrystalline GdAlO₃ with a particle size of 40 nm were studied [19]. Some electrical properties of polylactic acid composite films with different percentages of MgO particles have been studied [35].

A significant part of research activity of Dr. Bodurov is devoted to production and determination of the physicochemical properties of polyelectrolyte multilayer (PEM) thin coatings deposited on polymer substrates. The precise setting of thickness, hardness, stability, morphology and topography, the ability to mucoadhesion and the potential for topical drug delivery make these films promising biocoatings. The new moment in the research with the participation of the candidate is the treatment of the substrates with a corona discharge to improve the conditions of attachment of the PEM. A technology for obtaining corona-filled electret layers of polylactic acid has been developed and their structural, optical and electrical properties have been studied [2]. The influence of the type, structure and polarity of the substrate on the structure and stability of the PEM was studied [1,15]. The influence of pH and ionic strength on the deposition of chitosan and xanthan layers was studied. Various polymeric substrates such as polylactic acid (PLA), PLA with chitosan and lyophilized PLA) were obtained [17,18,23,34,38,43]. The formation of medical substrates as drug delivery systems by buccal mucosal adhesion for a substrate and alternating deposition of casein and chitosan on it has been analyzed. The method for preparing this multilayer structure is successive layer-by-layer deposition [39]. The immobilization of enzymes that are captured by multilayer xanthan and chitosan PEMs deposited by immersion on positively charged polylactic acid substrates was studied [25,29,36,37]. Particles of polyelectrolyte complexes were formed by mixing cationic chitosan and anionic alginate using the jet mixing technique, studying the effect of pH and ionic strength on particle size [40]. The effect of lyophilization on the electrical and dielectric properties of the polymer layers was evaluated [41]. Cross-linked chitosan / casein multilayer structures have been studied to increase the amount of immobilized drug [42]. The influence of low pressure on the surface potential of decomposition of polypropylene electrical layers between two electrodes with a short circuit of the plate at different air gaps between the charged surface of the electrets and the upper electrode was studied [24]. The influence of low pressure on the decrease of the surface potential of gamma-irradiated polymer layers of polypropylene and poly (ethylene terephthalate) was studied [27].

The candidate has participated in numerous tasks dedicated to quality assessment of various food products such as: monitoring the aging process of apples by electrical impedance spectroscopy [3], studying the chemical structure and olive oil content by measuring refractive index and dispersion curves [6], study of refractive index, fluorescence, thermal and rheological properties by laser refractometry, UV, VIS and FTIR spectroscopy, measurement of electrical conductivity and differential scanning calorimetry of 9 types of honey [8,30], detection of counterfeit cold press olive oil by measuring the refractive index, fluorescence spectra, color parameters and differential scanning calorimetry [13,16], determination of the size of casein micelles in cow's milk by turbidimetric method [14], refractometric characteristics of aqueous solutions of several used in practice sweeteners [28], determination of some physicochemical parameters of seaweed from the Bulgarian Black Sea [33].

Another activity of Dr. Ivan Bodurov is improvement of measuring methods such as the development of four-wave [46] and five-wave laser microrefractometer [12], modification of a conventional laser refractometer with CCD camera and motorized rotating table [22,48], development of a device for precise measurement of the piezoelectric coefficient d_{33} in thin films with a thickness of several micrometers [31,32,47]. A new type of ammonia sensor has been developed based on a composite layer between polyaniline dissolved in dimethylformamide and poly (DL-lactic) acid dissolved in chloroform [26].

The dissemination activity of Dr. Ivan Bodurov is very high and shows his active engagement in the research work. This activity fully corresponds to the theme of the competition. I believe that Dr. Ivan Bodurov has equal participation in all works in co-authorship, and in the 13 of the presented 48 works he is the first author. As a certain criticism, I will point out the lack of a habilitation reference for the works included in Indicator B for habilitation thesis in the attached Table for fulfillment of the national minimum requirements.

3. Teaching

Dr. Ivan Bodurov is a teacher with extensive and diverse experience not only in the field of physics, but also in disciplines requiring knowledge of specialized software and computer skills. As an assistant and chief assistant, he has taught full-time and part-time students of engineering physics, medical physics, engineering physics and communications / telecommunications and many other specialties in PU in many disciplines: *laboratory exercises* in general physics, optics, electricity and magnetism, semiconductor and dielectric physics, experimental methods of physics, semiconductor elements; *seminars* on specialized software application, introductory course in physics, optics, physics part II, technical documentation with AutoCad, optical communications; *lectures* on experimental methods of physics, interactive programming in Mathematica, technical documentation, optical communication systems. The candidate has developed curricula for 7 courses such as Optical Communication Systems, Metrology, Technical Documentation for Bachelor's Degree and Optical Methods of Experimental Physics and Optical and Spectral Properties of Food for Master's Degree and Optical Methods for Condensed Matter Research. doctoral training. The candidate has co-authored 2 textbooks and has 3 e-courses. He was the scientific supervisor of 7 diploma theses for the acquisition of a bachelor's degree. He is a co-author of two scientific papers on the role of project-based learning in higher education and extracurricular forms of education as a mutual learning method [20,21]. The teaching experience of Dr. Ivan Bodurov is over 6 years. According to the report on the academic work, Dr. Ivan Bodurov has 425-475 hours of teaching in the period 2014 - 2017 and 535-655 hours in the period 2017-2020.

In the last few years, Dr. Ivan Bodurov actively participated in the organization and conduct of the Student Scientific Session in Physics and Engineering Technologies, as well as in the School of Modeling

the Toxicity of Nanomaterials in 2015. He actively participates in student competitions and national competitions in physics.

4. Personal remarks

I know Dr. Ivan Bodurov from the period of his training as a doctoral student at IOMT-BAS. I have been strongly impressed by his professional knowledge, skills in using various measuring techniques, serious attitude to dissemination of results in the form of conference reports and publications. Dr. Bodurov can successfully work both individually and in a team. In my opinion, he is disciplined, communicative and organized, which undoubtedly helps him in teaching and administrative activities at PU "P. Hilendarski".

5. Conclusion

The achieved results of Ch. Assistant Professor Dr. Ivan Panayotov Bodurov in the applied research are at a high professional level, which is confirmed by the long list of publications with his participation in journals in the international databases Scopus and WoS and the high citation of the results. The candidate has a serious teaching activity in the field of the competition topic and works on many research projects.

The documents submitted at the competition give grounds to conclude that Dr. Ivan Bodurov fully meets the conditions for holding the academic position of "Associate Professor", according to the Law of Development of the Academic Staff in Republic of Bulgaria, the Rules for its implementation and the Rules for development of the Academic Staff in PU. He owns a doctor degree; in addition to the three years of full-time doctoral studies, he has over 8 years of work experience in the specialty, of which over 4 years of experience as a chief assistant. With a total of 662 points, Dr. Ivan Bodurov exceeds the minimum required 400 points for the academic position of "Associate Professor". The publications in this competition do not overlap with the works submitted for the acquisition of the doctoral degree.

Based on this, I express a positive opinion for holding the academic position of "Associate Professor" by Ch. Assistant Professor Dr. Ivan Panayotov Bodurov in the current competition in the field of higher education 4. Natural Sciences, Mathematics and Informatics, Professional field 4.1 Physical Sciences (Electrical, magnetic and optical properties of condensed matter) for the needs of the Faculty of Physics and Technology of PU "Paisii Hilendarski".

20th of October 2020

Signature: