REVIEW

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on the materials submitted for participation in the competition for the academic position of 'Associate Professor' at Plovdiv University "Paisii Hilendarski" in field of higher education 4. Natural sciences, mathematics and informatics, professional field 4.1. Physical sciences (Electrical, optical and magnetic properties of condensed matter)

In the competition for 'associate professor', announced in the SG, no. 57/ 26.06.2O20 and in the website of Plovdiv University "Paisii Hilendarski" for the needs of the Department of Physics at the Faculty of Physics and Technology, as a candidate participates Ch. Assistant Professor Dr. Ivan Panayotov Bodurov from Plovdiv University "Paisii Hilendarski".

1. General description of the presented materials.

By order № P33-4125 of 24.08.2020 of the Rector of the University of Plovdiv "Paisii Hilendarski" (PU) I was appointed a member of the scientific jury of a competition for the academic position of 'associate professor' in PU in the field of higher education 4. Natural sciences, mathematics and informatics, professional field 4.1 Physical sciences (Electrical, optical and magnetic properties of condensed matter), announced for the needs of the Department of Physics at the Faculty of Physics and Technology.

For participation in the announced competition has submitted documents only candidate Ch. Assistant Professor Dr. Ivan Panayotov Bodurov from Plovdiv University "Paisii Hilendarski".

The set of materials presented by Ch. Assistant Professor Dr. Ivan Panayotov Bodurov is in accordance with the Regulations for the development of the academic staff of PU, and includes the following documents:

1. Application form to the Rector for admission to participate in the competition;
2. Curriculum vitae in European format;
3. Master's degree diploma
4. Master's degree diploma
5. Diploma for educational and scientific degree "Doctor"
6. List of scientific works
7. Information on compliance with the minimum national and additional faculty requirements;
8. Annotation of the materials under art. 65 (1), with which the candidate participates in the competition, incl. self-assessment of contributions;
9. Declaration of originality and authenticity of the attached documents;
10. Certificate of work experience;

11. Documents for educational work
12. Documents for research work
13. Other documents
14. Set of documents on paper carrier from item 1 to item 13 - 3 pieces;
15. Set of documents from item 1 to item 13 on electronic media - 8 pieces.

The candidate Ch. Assistant Professor Dr. Ivan Panayotov Bodurov has submitted a total of 43 scientific papers, 1 textbook, 1 manual for laboratory exercises, 3 registered utility models and a list of 14 research papers. These materials are not included in scientific publications for obtaining the educational and scientific degree "Doctor". 43 scientific papers are accepted for review, which are outside the dissertation and are taken into account in the final evaluation, 2 educational textbooks and 14 research projects. 6 scientific papers from the dissertation are not reviewed.

The candidate did not present in a separate list which publications are from conferences, so the classification below is at the discretion of the reviewer. The distribution of scientific papers by relevant sections, in the country and abroad, is as follows. 1 chapter of a book in English (published by Nova Science Publishers) is presented. Of the scientific publications, 6 are in international scientific journals with impact factor and quartiles, respectively Q1 (2), Q2 (2), Q4 (2). Another 10 publications are in a Bulgarian journal with impact factor and quartile Q4. Another 15 are conference papers, in reputable international journals with SJR, which publish conference proceedings. Three publications are in a referenced Bulgarian magazine and 8 in conference proceedings, two of which are with pedagogical topics. So far, 45 citations have been noticed. Bodurov has participated in a total of 14 research projects and three registered utility models. He is the co-author of a textbook and a manual for laboratory exercises. The presented reference for compliance with the minimum national and additional faculty requirements is filled in correctly as the presented materials with which Dr. Bodurov's applications fully cover the minimum required points for the various indicators and two indicators even exceed them twice.

2. **Brief biographical data of the candidate**
   (teaching, scientific and professional experience in connection with the announced competition course).

Ch. Assistant Professor Dr. Ivan Panayotov Bodurov graduated with a Master's degree in Condensed Matter Physics from Paisii Hilendarski University in Plovdiv in 2010. As a student he specialized in the ERASMUS student and teacher mobility program at Corvinus University. , Budapest. He continued his education as a doctoral student and in 2013 he defended his dissertation for the degree of Doctor of Science in Wave Process Physics. In 2019 he received a second degree Master's degree in Physics Teacher from Plovdiv University "Paisii Hilendarski".

Ch. Assistant Professor Dr. Ivan Bodurov began his teaching, scientific and professional career in 2014 as an assistant and chief assistant (since 2016) at the Faculty of Physics and Technology, Plovdiv University "Paisii Hilendarski". Since 2018 he has been teaching at the Vocational High School of Electrical Engineering and Electronics, Plovdiv.

3. **General characteristics of the candidate's activity**

Assessment of educational and pedagogical activity and preparation of the candidate

In addition to the scientific publications, one textbook and one manual for laboratory exercises are included in the submitted materials for participation in the competition. The candidate is very active in his teaching activity. The presented reference for the academic work shows a wide range of taught disciplines. Ch. Assistant Professor Bodurov has developed seven curricula for courses at the Bachelor's Degree, Master's degree in various specialties and the doctoral program "Condensed Matter Physics". Three e-courses have also been developed.

In addition to his scientific and teaching activities, Dr. Bodurov shows active methodological and organizational activities in working with students. He was the head of 7 successfully defended graduates. I want to emphasize his participation in the organization and preparation of the excellent team of the International Tournament of Young Physicists for 2013-2017. Certificates for participation in the organization of V, VII VIII national student scientific conference on physics and engineering technologies are presented.

Evaluation of the scientific and scientific-applied activity of the candidate

The scientific topics, which include the research of Ch. As Bodurov is the creation of new functional materials with controlled structure and properties on a micro- and nanoscale scale. This type of material is of major interest due to its use in biomedicine, pharmaceuticals, tissue engineering and regenerative medicine. The field of research is highly interdisciplinary, combining research on materials from the field of condensed matter, chemistry, biochemistry, biophysics, food and others. with physical methods of examination mainly of optical properties, dielectric and impedance spectroscopy. Research methods and equipment have been developed, which are registered as utility models: *Device for measuring piezoelectric coefficients of dielectric materials, Universal laser microrefractometer, Four-wave laser microrefractometer*.

The main part of the materials submitted for the competition includes a number of articles and conference papers, which can be classified by topic as follows.

A. Annotation of the materials and self-assessment of the contributions, according to art. 65 of PRASPU, articles number 1, 2, 15, 17, 18, 23, 25, 29, 34, 36-40,42, 43

This group of publications summarizes studies on the formation and physicochemical properties of polyelectrolyte multilayer films (PMFs) deposited on polymeric substrates, with potential use as a drug carrier on the oral mucosa. The novelty in the presented PMFs is the pre-treatment of the substrate with corona discharge, which guarantees an excess of charge on the surface of the substrate and improves the conditions of attachment of the polyelectrolytes. A method has been developed for applying the PMF layers with a technique that includes a wide range of materials and surfaces, thanks to which it is possible to make nanostructured multilayer coatings. Individual stages of this research have been published in the articles listed above in journals and conference proceedings. The publications include a book chapter (1), 3 articles in international journals with impact factor, 2 in a Bulgarian journal with impact factor, 2 in a Bulgarian refereed journal, 8 in conference proceedings published in a journals with SJR.

B. Annotation of the materials, numbers 4, 5, 7, 9,10, 11, 19, 35, 41

This group of materials includes studies on the properties of polymer-nanoparticle composites. The electret and optical properties of polypropylene (PP) and PMMA composite films with TiO_2 particles charged by the corona discharge method and the possibilities for modulation and fine tuning of their refractive index by adding different concentrations of nanosized particles were studied. Electrical, dielectric and impedance characteristics of polylactic acid composite films (PMA) with different percentages of MgO particles were studied. The dependence of the diffusion coefficient and the mobility of Ag, Au and Cr ions in nanosized layers of the As_2S_3 system when applying a corona discharge was studied. Nanocrystalline $GdAlO_3$ with a particle size of 40 nm was examined by dielectric spectroscopy. A new type of ammonia sensor based on a composite film between polyaniline (emerald base) dissolved in dimethylformamide and poly (DL-lactic) acid dissolved in chloroform has been proposed.

C. Annotation of the materials, numbers 3,6,8 13, 16, 28, 30, 33

Foods (honey, olive oil, apples, milk) were studied by physical methods, measuring the refractive index and dispersion curves, fluorescence spectra and DSC spectra, thermal and rheological properties.

D. Annotation of the materials, numbers 12, 22, 31, 32, utility models,

This group includes works on construction, modification and testing of equipment for measuring optical and dielectric characteristics. These include the registered as useful models: *Device for measuring piezoelectric coefficients of dielectric materials, Universal laser microrefractometer, Four-wave laser microrefractometer.*

Contributions (scientific, scientific-applied, applied) and citations

The candidate has submitted the required "Annotation of the materials under Art. 65 (1), with which the candidate participates in the competition, incl. self-assessment of the contributions", but it

does not summarize the results on the topics worked on, there are no explicitly defined contributions, as well as self-assessment of the contributions and the candidate's participation in the individual surveys. Therefore, below I will present an analysis in my opinion. Research contributions can be summarized in the following areas:

1. Scientific-applied contributions - All studies classified above in points A and B.

a. Studies on the formation and physicochemical properties of polyelectrolyte multilayer films (PMFs) deposited on polymeric substrates, with potential use as a drug carrier on the oral mucosa. The novelty in the presented PMFs is the pre-treatment of the substrate with corona discharge, which guarantees an excess of charge on the surface of the substrate and improves the conditions of attachment of the polyelectrolytes. The technology for obtaining PMF has been optimized. A scientific and applied contribution is that the polyelectrolyte structures formed by layer deposition are an extremely successful solution to the high demands of pharmaceutical science, where innovative systems are directed, which provide continuous release in a specific target area with improved efficiency of well-known medical substances.

b. A new type of ammonia sensor based on a composite film between polyaniline (emerald base) dissolved in dimethylformamide and poly (DL-lactic) acid dissolved in chloroform has been proposed.

c. It has been found that nanocomposite films of PMMA, in which with increased TiO_2 content and after corona discharge treatment an increase in the refractive index values is observed, have a potential application for optical devices.

2. Applied- contributions All studies classified above in points C and D.

a. application of physical methods for food research with significant contribution to the practice.

b. Development of equipment for measuring optical and dielectric characteristics of materials.

Thus, the generalized contributions can be attributed to proving with new means of essential new aspects of already existing scientific fields, problems, theories, hypotheses; creation of new classifications, methods, constructions, technologies.

So far, 45 citations have been noticed (without auto-citations and hidden citations). Most are in journals with a high impact factor, such as ACS Nano, Progress in Polymer Science, Journal of Food Engineering, Journal of Colloid and Interface Science. They are cited in reviews in the Journal of Cleaner Production Nanomaterials, Materials Research Express. Some publications have been cited a significant number of times, such as Article 10 has been cited 9 times. These facts show the significance of the developed scientific and applied problems, as well as the significance of the contributions. The quantitative indicators of the criteria for holding the academic position of "associate professor" on this indicator have been met.

4. **Assessment of the personal contribution of the candidate**

All materials submitted by the candidate are co-authored. This is common and unavoidable in an applied field of study. In the list of equivalent publications, summarized in the habilitation thesis by groups of indicators B and G7, the candidate is the first author in 10 of 25 articles. This can be seen as a criterion for the candidate's significant contribution to research.

5. **Critical remarks and recommendations**

I have no general and formal critical remarks and recommendations (to the scientific works and the activity of the candidate, the sets of materials. I would like to recommend the research of scientific and applied nature to continue due to the great potential for application for food control.

CONCLUSION

The documents and materials submitted by Ch. Assistant Professor Ivan Bodurov meet all the requirements of the Law for the Development of the Academic Staff in the Republic of Bulgaria (ZRASRB), the Regulations for implementation of ZRASRB and the respective Regulations of PU "Paisii Hilendarski".The candidate in the competition has submitted a sufficient number of scientific papers published after the materials used in the defense of ONS 'Doctor'. In the works of the candidate there are original scientific and applied contributions, which have received international recognition as a representative part of them are published in scientific journals published by international academic publishers. Its developments have practical applicability. Some of them are directly oriented to the educational work. The scientific and teaching qualification of Ch. Assistant Professor Dr. Ivan Bodurov is undoubted.

The achievements of Ch. Assistant Professor Dr. Ivan Bodurov in teaching and research fully comply with the specific requirements of the Faculty of Physics and Technology, adopted in connection with the Regulations of the University of Plovdiv for the application of ZRASRB.

After getting acquainted with the materials and scientific works presented in the competition, analysis of their significance and contained in them scientific, scientific-applied and applied contributions, I find it reasonable to give my positive assessment and recommend to the Scientific Jury to prepare a report-proposal to the Faculty Council of the Faculty of Physics and Technology for election of Ch. Assistant Professor Dr. Ivan Bodurov to the academic position of 'Associate Professor' at the University of Plovdiv "P. Hilendarski" by professional field 4.1. Physical sciences (Electrical, optical and magnetic properties of condensed matter).

21.10. 2020 Professor Evgenia Valcheva