STATEMENT

regarding the competition for academic position “Professor" in the field of higher education No5 "Technical sciences", professional direction No5.6 "Materials and Materials Science", in the scientific speciality "Materials science and technology of the manufacturing materials", announced in SG (official State Gazette) No53 from 12.06.2020 for the Department "Dental materials science and propaedeutics of prosthetic dentistry", Faculty of Dental Medicine, Medical University “Prof. P. Stoynov” - Varna with a sole applicant Tsanka Dimitrova Dikova, Assoc. Professor, PhD, DSc, MEng.

by Roussi Minev Minev, Associate Professor, PxD, MEng, University of Ruse “A.Kanchev”, Bulgaria

1. General description of the content of documents presented by the applicant

Assoc. Prof. Dikova has presented 29 scientific papers for participation in the competition. The scientific works are: dissertation for awarding "doctor" degree (PhD); dissertation for the award of the scientific degree "Doctor of Science"; two monographs; 9 publications referenced in world databases (SCOPUS, WoS); 12 publications in peer-reviewed editions, 4 textbooks. All articles are up-to-date, published after 2009, but mostly after 2012. All materials are in the field of the announced competition and are beyond those already reviewed in the dissertation for the “Doctor" degree, the procedure for "Associate Professor" and the dissertation for the "Doctor of Science" degree. The presented citations by other authors of works of Dr. Dikova are a total of 34.

For the last almost 14 years Assoc. Prof. Dikova has been a lecturer at the Faculty of Dental Medicine at the Medical University of Varna, she has held administrative positions (Deputy Dean). She has supervised four successfully defended doctoral students and a co-author of 4 textbooks. She is a member of the World Academy of Materials Science and Mechanical Engineering WAMME and a national expert in Materials Science and Heat Treatment of Metals for the Scientific and Technical Unions - Manufacturing Engineering department. She is awarded the gold badge "Prof. Asen Zlatarov" of the Federation of Scientific and Technical Unions in Bulgaria.

In the presented documents it is stated that Assoc. Prof. Dikova has managed a national project under the National Scientific Fung. She had many specializations abroad (Japan, USA, Russia). She has won a Fulbright Scholarship (2011-2012) and a Matsumae Scholarship (2005).

Assoc. Prof. Dikova has 23 publications, reflected in SCOPUS and h-index = 4, and in Google Scholar h = 8.

The candidate participates in the editorial boards of three journals and is a reviewer in 10 international scientific journals.

2. General description of the scientific activities of the candidate

The table below shows a summary of the materials and publications submitted by the applicant for the competition. They are compared with the minimum requirements for the academic position of "Professor" in scientific area 5. Technical Sciences according to the “Regulations for the Implementation of the Law on the Academic Career Development” in Bulgaria and the rules of the Medical University - Varna. It can be seen that all of the requirements are fully satisfied.

Group		Minimum number of points needed	Applicant’s achievement
A	Dissertation for the award of a PhD degree	**50**	**50**
B	Dissertation – monography (1)	**100**	**100**
C		**200**	**294**

	Monography Publications in referenced and indexed journals in recognised world databases (9) Publication in peer-reviewed editions or in edited collective volumes (12).		*30* *143,3* *120,67*
D	 Citations or reviews in publications, referenced and indexed in world databases or monographs and collective volumes (14 citations) Citations in peer reviewed editions (3 citations) Citations in no peer reviewed editions (17 citations)	**100**	**183** *150* *9* *34*
E	 "Doctor of Science degree" Textbooks (4) Supervised and successfully awarded PhD students (4) Nationally funded scientific project	**150**	**370** 40 160 160 10

3. Analysis of the scientific and applied achievements of the candidate, presented for participation in the competition

According to the presented references and other documents, the more detailed classification of the scientific work of the candidate Assoc. Prof. Tsanka Dikova covered 7 thematic areas. In more general view the research and other activities of the candidate could be classified into two main groups:

(A) Application of 3D technologies with concentrated energy sources and software in dentistry and mechanical engineering.

(B) Nanomaterials, coatings, apparatus and technologies in mechanical engineering, general and dental medicine.

Among all the scientific contributions of the candidate mentioned in the report, I can distinguish the following as particularly important:

Group A

(1) In her works the candidate revealed the leading role of the optical properties of the dental plastics for obtaining details with high accuracy through the process of stereolithography.

(2) It has been established that the increased roughness of dental alloys made by layering technologies determines higher adhesion strength of the porcelain coating with an advantage for non-removable metal-ceramic prostheses.

Group B

(3) For the first time carbon nanotubes have been synthesized on the surfaces of pure titanium and Ti-6Al-4V alloy. The stages of their nucleation and growth have been observed and different mechanisms of their formation have been studied.

(4) Nanoparticles of CdSe and gold have been synthesized by various chemical methods and a comparative analysis of their optical properties has been made.

(5) The structural features of martensite and residual austenite phases in surface treated with concentrated energy cast irons has been revealed. The mechanism and morphology of the changes of ferrite under laser and electron beam action of Fe-C alloys have been established.

The more important scientific and applied contributions of the applicant are:

Group A

(1) The structure and properties of two groups of dental materials - dental plastics and dental alloys, produced with additive technologies - stereolithography, layering of material and selective laser melting, have been defined.

(2) It has been established that the technologies for 3D printing provide higher accuracy, mechanical, tribological and anti-corrosive properties of the dental constructions.

Group B

(3) The technological parameters for formation of oxide layer on pure titanium and Ti-6Al-4V alloy in the form of titanium nanotubes have been established.

(4) A coatings of titanium nanotubes on pure titanium and Ti-6Al-4V alloy were made by anodizing. The morphology, chemical and phase composition of the surface oxide layers have been defined.

(5) The morphology, topography and chemical composition of surfaces of pure titanium and Ti-6Al-4V alloy treated with a picosecond laser have been established.

(6) The surface morphology and the corrosion behavior in different media (physiological solution and artificial saliva) of laser fused austenitic stainless steel layers have been established.

A total of 15 applied contributions are listed in the report. Among them I consider the following to be especially important:

Group A

(1) Correction coefficients and algorithms for design of virtual models and technologies for production of temporary and permanent non-removable prosthetic structures through layering technologies have been developed.

(2) Using 3D printing technologies some clinical and laboratory protocols for treatment with non-removable prosthetic constructions (crowns and bridges) have been created for dentists and dental technicians.

(3) A critical assessment and comparison of the systems for photopolymerization of dental composites has been made.

(4) It is substantiated that dental ceramics are one of the most promising restorative materials. Some important issues of ZrO_2 usage; restoration of dental tissues with thin ceramic facets and CAD-CAM technologies for their production has been determined.

Group B

(5) New technologies and equipment for "deep surface reinforcement" of large rotary parts and tools made of different steels have been developed and implemented in production.

(6) The structural changes and the mechanisms of formation and development of the cracks in austenitic X6CrNiMoTi17-12-2 (1.4571) and austenitic-ferritic steel 105MA (1.4892) parts due to high

temperature corrosion in a gaseous medium and cyclic thermo-mechanical impact has been revealed.

(7) A methodology for designing equipment for cold sheet forming processes has been developed. These methodologies contain comparative tables of the materials designations according to different standards: BDS, GOST, DIN, EN and AISI.

4. Reflection of the candidate's results on the works of other authors (citations)

According to the candidate, her works have been cited at least 34 times. 14 of the citations are in publications reviewed in international databases. Most of the publications are cited 2-3 times. The citations in publications with IF and SJR are 17 in total. According to the presented report on the scientific contributions, by the middle of 2020 Assoc. Prof. Dikova has been cited a total of 196 times only in publications included in Web of Science and Scopus.

In many of the works the candidate is a co-author with colleagues from other research organizations in the country and abroad, which speaks of her significant participation in joint research, and that the results are widely popularized among the scientific community.

5. Critical remarks and recommendations

I do not have any significant critical remarks to the materials provided in the competition by Assoc. Dikova. My main recommendations are - to continue to be useful with her work for students, graduates, postgraduates and doctoral students, as well as to continue to be focus on modern materials and digital technologies in dentistry. If possible, to supervise and consult doctoral students who are external to MU - Varna.

6. Personal impressions

I know Assoc. Prof. Dikova personally from her scientific and publishing activities and I have the impression that she is a correct colleague who treats her scientific production responsibly. I was a member of the scientific board (jury) for awarding to Dr Dikova the "Doctor of Science" degree and I have positive impressions of her research and achievements. As a result of the various specializations that she conducted abroad she is familiar with the state of the art (in Europe and the world) in the scientific field in which she works. All this makes her an excellent specialist in the field of materials science and especially in matters related to dental materials and technologies.

7. Conclusion

From all above and based on the presented evidences of the scientific and professional activities of the candidate I propose to the committee to make an official proposal to the Scientific Council the academic position "Professor" in the scientific specialty "Materials science and technology of the manufacturing materials" for the department of "Dental materials science and propaedeutics of prosthetic dentistry", Medical University - Varna, Faculty of Dental Medicine to be awarded to the candidate Tsanka Dikova.

14.10.2020 Reviewer:

(R. Minev, Assoc. Prof., PhD, MEng)