

OPINION

by competition for the occupation of an academic position "associate professor" in the field of higher education 5. Technical sciences, professional direction, 5.1. Mechanical Engineering, Faculty of Mechanical Technology, Department of "Materials Science and Materials Technology" at the Technical University - Varna, in the study discipline "Materials Technology"

announced by the Technical University - Varna in the "State Gazette" issue No. 2 of 05.01.2024 with a single candidate Assistant Professor Tatiana Mitkova Mechkarova

Member of the scientific jury: Ass. Prof. Ph.D. Eng. Vladimir Petrov Dunchev, Technical University – Gabrovo

1. Overview of the content and results in the presented papers

As. Ph.D. Tatiana Mitkova Mechkarova participated in the competition with 48 scientific papers. All works deal with issues related to the theme of the competition.

They are grouped in: Group B.4. - Habilitation thesis - related scientific publications in international scientific journals, indexed by Scopus and Web of Science, united as equivalent to a habilitation thesis on the topic: "Researching the structure and properties of materials"; Group Г.8. - Publications in non-refereed publications with scientific review.

Peer-reviewed publications can be classified as:

- Scientific publications in journals that are referenced and indexed in world-renowned databases with scientific information (Scopus and Web of Science) - eleven issues. One of them is in the journal Material, MDPI, with a high for technical publications IF 3.4, Q1, two in the TEM Journal (WoS, Scopus) with an IF of 0.6.
- Scientific publications in non-refereed journals with scientific review or in edited collective volumes - 37 issues.
- Independent publications – 4 issues.
- Publications in co-authorship – 33 issues, in 13 of which the candidate is the first author.

Evidence of the level of the candidate's scientific production is the -18 citations in indexed publications.

The candidate, Tatiana Mitkova Mechkarova, assistant professor, Ph.D., repeatedly fulfills the minimum requirements for indicator Ж of TU - Varna, and the reported points in this indicator are 500 with the minimum required 30.

The scientific works of the candidate can be attributed to the following thematic directions: 1) Research of the structure and properties of materials [B.4.1- B.4.11, Г.8.1, Г.8.6 - Г.8.9, Г.8.14 - Г.8.16 , Г.8.22, Г.8.25 – Г.8.37]; 2) Research and modeling of technological processes [Г.8.10, Г.8.13, Г.8.16, Г.8.18, Г.8.20, Г.8.21, Г.8.23, Г.8.24]; 3) Experimental statistical modeling [Г.8.2 – Г.8.5, Г.8.17, Г.8.19, Г.8.22].

The reference under Art. 2b of ZRASRB, art. 60, para. 3 of PPZRASRB and Art. 1, para. 2 of PUZAD in TU - Varna proves that the candidate fulfills the minimum national requirements for occupying the academic position "associate professor".

2. General characteristics of the candidate activity



2.1. Educational and pedagogical activity (work with students and doctoral students)

The candidate holds the position of assistant in the Department of Materials Science and Materials Technology, Faculty of Mechanical Technology of the Technical University - Varna. The disciplines on which she gave lectures are: 1) Materials science; 2) TECHNMAT; 3) PTM; 4) OMPD. The candidate led exercises on: 1) YM; 2) OMPD; 3) Materials science; 4) TECHNMAT, 5) TMSPO, 6) PROPERTY, 7) TIZ, 8) TRZ. assistant professor Dr. Mechkarova is the supervisor of 10 graduates who have successfully defended their diplomas, 5 in the BA "Bachelor" and 5 in the "Master" BA.

2.2. Scientific and scientific-applied activity

Assistant Ph.D. Mechkarova is the head of 9 research projects:

1) Project DP-1 (2023); 2) Project KD-5 (2023); 3) Project NP-7 (2023); 4) Project PD-12 (2023); 5) Project DP-1 (2022); 6) Project KD-6 (2022); 7) Project NP-7 (2021); 8) Project DP-2 (2021); 9) Project KD-5 (2021).

2.3. Activity on modernization of the laboratory base

This activity of the candidate is related with the construction and maintenance of a laboratory for "Structural analysis, filming and research of technological objects" at TU Varna in terms of:

- 1) Construction of a research complex for three-dimensional modeling of technological objects;
- 2) Construction of a research complex for three-dimensional scanning of technological objects;
- 3) Construction of a research installation for creating hologram clips and images;
- 4) Construction of a research complex for three-dimensional shooting with a drone and subsequent processing with software in order to create photogrammetric three-dimensional objects.

The candidate also contributed to the construction of the "Laboratory for macro- and micro-metallographic analyses" and the "Research Complex for the Student Maritime Club".

3. Contributions (scientific-applied, applied)

In general, I accept attribution for original contributions. More generally, the contributions in the works of assistant Dr. Mechkarova are:

3.1 Scientific applied contributions

- 1) An algorithm was developed for computer modeling of processes related to multicycle fatigue and its influence on the initiation and propagation of cracks [B.4.8 – B.4.10];
- 2) The correlation between the composition of the matrix and the type of the reinforcing phase of composites with a polymer matrix and the obtained mechanical properties was established [B.4.6 – B.4.7, B.4.11];
- 3) Benches for mechanical corrosion and stress corrosion tests have been developed [Г.8.10, Г.8.13, Г.8.16, Г.8.18, Г.8.20, Г.8.21, Г.8.23, Г.8.24];
- 4) The correlation between the technological regimes of various processes and the structure and mechanical properties of various materials has been established [Г.8.10, Г.8.13, Г.8.16, Г.8.18, Г.8.20, Г.8.21, Г.8.23, Г. 8.24];

5) Methodologies for studying the structure and properties of materials have been developed [Г.8.1, Г.8.6 - Г.8.9, Г.8.14 - Г.8.16, Г.8.22, Г.8.25 - Г.8.37];

6) Regression models of the influence of the technological parameters of various processes and the structure and properties of the materials were obtained [Г.8.2 – Г.8.5, Г.8.17, Г.8.19, Г.8.22].

3.2 Applied Contributions

1) Mechanical characteristics and structures of welded joints were obtained experimentally, which can be used in the design of machines and equipment from the chemical, oil and gas industry [B.4.3-B.4.5, B.4.9 – B.4.10];

2) The resulting composites with a polymer matrix with optimal mechanical properties can be used in the construction of elements of small-tonnage shipbuilding and the chemical industry [B.4.6 – B.4.7, B.4.11];

3) Data were experimentally obtained for the study of various mechanical characteristics of materials, which were implemented in developed algorithms for evaluating their influence on the change in structure and operational behavior [Г.8.10, Г.8.13, Г.8.16, Г.8.18, Г.8.20, Г.8.21, Г.8.23, Г.8.24];

4) The correlation between the technological parameters of various processes and the obtained quality characteristics of the surface layers was established [Г.8.2 – Г.8.5, Г.8.17, Г.8.19, Г.8.22].

4. Evaluation of the candidate's personal contribution

Publications in journals referenced in Scopus and Web of Science (eleven in number) prove the quality of the presented research. The personal participation of the candidate can be judged by the number of articles in which she is the first author, 13 in number, as well as her independent ones - 4 pcs. from a total of 48 pcs. presented in the competition. These circumstances give me reason to assume that the contributions presented are largely made by the candidate.

5. Critical notes and recommendations

I recommend to the candidate: 1). To develop a textbook and/or study aids for the study disciplines led by her; 2). To use high-end software products to develop simulation models.

Conclusion:

Bearing in mind the above, I propose Assistant Professor Tatyana Mitkova Mechkarova, PhD, to be elected as an "associate professor" in the field of higher education - 5. Technical sciences, professional direction - 5.1. Mechanical engineering, in the study discipline "Materials Technology" at the Faculty of Mechanical Technology of Technical University - Varna.

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