OPINION

on dissertation work for obtaining
educational and scientific degree "Doctor"

Author of the dissertation: **Gabriela Viktorova Kotseva**

Title of the dissertation: **Mechanical and tribological studies of polymers and composites produced by 3D printing**

Doctoral program: **Automated information processing and management systems**

Professional field **5.2. Electrical engineering, electronics and automation**

Member of scientific jury: **Prof. DSc Eng. Ivan Stoyanov Yatchev**

1. Relevance of the problem developed in the dissertation

The topic of the dissertation is focused on the study of polymers and composites obtained through 3D printing with an emphasis on their mechanical and tribological characteristics. Considering the rapid global development of this technology and the importance of improving the characteristics of new materials, including their impact on energy efficiency, it can be said that the dissertation work is dedicated to solving an actual problem.

2. Degree of knowledge of the state of the art of the problem

The author has demonstrated a very good knowledge of the problem. A bibliographic reference of 226 sources is presented, of which 13 are in Bulgarian, 3 in French and 210 in English, including 61 websites.

The aim of the dissertation work is formulated in several sentences - using studying the mechanical and tribological properties of polymers and composites obtained by 3D printing, innovative applications to be created, technological processes to be optimized, new approaches to be developed in the design of functional polymer and composite materials produced by additive technologies. To achieve this goal, 8 tasks have been posed and solved.

3. Scientific-applied contributions of the dissertation work

Main scientific-applied contributions:

- Approaches have been developed for studying the tribological properties of 3D printed materials through experimental procedures for determining the coefficients of sliding and rolling friction, and the coefficient of elastic restitution;
- An approach has been developed for quantitative determination of the hardness and uniformity of the studied materials using specific scientific equipment;
- Using the developed approaches, experimental studies of mechanical and tribological properties of polymers and composites obtained by 3D printing have been carried out;
- Computer models have been developed and simulation of tribological processes has been implemented on their basis. The validity of the models has been confirmed through experimental studies, and their accuracy is sufficient for engineering practice.

4. Evaluation of publications on the dissertation work

7 publications have been made on the dissertation work – one in a journal in Bulgaria, four in proceedings of international conferences abroad and 2 in proceedings of international conferences in Bulgaria. All publications are in English. All publications are collective – one with 2, five with 3 and one with 4 authors, with the author of the dissertation work being in first place in 5 publications.

The minimum national requirements, those of PURPNSZAD of the BAS and the specific conditions of IICT are met, and for the indicators on group Г there is a significant (2 times) exceeding of the required minimum of 30 points.

5. Critical remarks and recommendations

It is recommended that the purpose of the dissertation be formulated more compactly.

It would be good if the list of references was arranged in alphabetical order.

CONCLUSION

The dissertation is very well structured. The detailed outline of directions for future research also makes a good impression.

Taking into account the results and contributions obtained in the dissertation, as well as the quantity and quality of the publications to it, I give a **positive** assessment of the dissertation and strongly suggest that **Gabriela Viktorova Kotseva** be awarded the educational and scientific degree "Doctor" in the field of higher education 5. Technical sciences, professional field 5.2. Electrical engineering, electronics and automation, doctoral program "Automated information processing and management systems ".

На основание
ЗЗЛД

Date: 27 Jan 2026 **MEMBER OF TH**