

REVIEW
on dissertation work
for acquiring the educational and scientific degree "Doctor" in

area of higher education – 7. Healthcare and sports
professional direction – 7.2. Dental Medicine
doctoral program – „Therapeutic dentistry”

Author: George Plamenov Georgiev, Master - Dentist

Theme: „Problems related to photopolymerization in dental medicine ”

Reviewer: Professor Jordan Todorov Maksimov, DSc, PhD

1. Actuality of the dissertation work

Over the last half century, and especially the last two decades, the materials sciences have developed at a pace comparable to that of the information technologies. Long ago, material science left the narrow confines of the mechanical form of motion of matter and formed as a multidisciplinary science. Since our (visible) world is material, there is no field of human activity that has not taken advantage of the latest advances in materials science, and in particular, the development and application of various types of composites. Dental medicine is no exception. Photopolymerizing dental composites solve many problems that arise when using amalgam, for example. The dissertation studies the correlation between the factors influencing the photopolymerization process on the one hand and the behavior of composites on the other hand. The ultimate goal is ultimately to improve the dental health of patients as a consequence of the prerequisites for the production of quality composite fillings. In the aspect of the above, I believe that the relevance of the dissertation is not in doubt.

2. Does the PhD student know the state of the problem

The studying, substantiations and researches made in the dissertation go beyond the usual framework of the scientific specialty “Therapeutic Dentistry” and concern other areas of the entire human knowledge, such as materials science, lighting engineering and technologies, statistical methods for analysis and optimization. In this aspect the dissertation has a poly-disciplinary character. Given the latter, and judging by the references used, I believe that the doctoral student is thoroughly familiar with the problem.

The list of used literature contains a total of 178 titles (of which 174 are in English and 4 in Bulgarian) – books, monographs, textbooks, scientific articles and reports. In other words, the achievements of the scientific community on the problem are known to the author of the dissertation. On this basis, the doctoral student defines the main goal and

the tasks that are solved to achieve the goal, thus increasing what has been achieved so far.

3. Method of study

Taking into account the specifics of the treated problem, a combination of natural experiments and statistical methods for processing the obtained information are chosen correctly (experimental design, regression analysis, analysis of variance ANOVA, optimization approach).

4. Brief description of the material on which the contributions are formulated

The text of the dissertation is structured in a logical sequence, but (for reasons unknown to me) the individual chapters (3 in number, according to what I see) are not explicitly separated.

Chapter 1 („Literary Survey” – pp 7-51) traces briefly the history, composition, application, polymerization and behavior of dental composites. Much space and attention is paid to photopolymer lamps, the factors influencing the degree of polymerization of dental composites, and the results of a statistical study on the knowledge of dentists on these issues. Based on the literature survey, the doctoral student formulates the purpose of the dissertation and identifies four tasks whose solutions will achieve the defined aim: the first two tasks examine the light intensity of wireless LED photo-polarizing lamps as a function of battery charge and period of use; the third task is dedicated to the experimental study of the polymerization process of three dental composites; the fourth task is a continuation of the third – on the basis of the obtained experimental results optimization tasks are set and solved.

Chapter 2 („Materials and Methods” – pp 52-68) presents the materials and the methods for solving the defined four tasks.

Chapter 3 (its content corresponds to the title: Results and Discussion – pp 69-151) is dedicated to the results and their analysis obtained from the solution of the tasks defined in Chapter 1. As a result, the relevant conclusions have been made, from which, later, the contributions of the dissertation have been derived.

4. Contributions to the dissertation

Regardless of the author's view, I have supplemented, summarized and classified the contributions to the dissertation as follows:

A. Scientific and applied contributions

A.1. Creating new classifications, methods, constructions, models, etc.

◆ A two-purpose optimization approach based on scalarization of the vector optimization criterion and a program in MatLab environment that implements the optimization.

◆ Correlation in qualitative aspect between the time and regime of operation of LED photopolymerization lamps on the one hand, and their intensity on the other hand.

A.2. Obtaining and proving new facts

- ◆ Significance and optimal values of the governing factors of the photopolymerization process by the criterion of maximum micro-hardness under imposed restrictions.
- ◆ Time-dependent behavior in the micro-hardness aspect of UPC Evetric.

A.3. Obtaining confirmatory facts

- ◆ Under the "micro-hardness" criterion, the descending order of the three groups of studied composites is as follows: BPC, UPC, TFC.

B. Applied contributions

I accept the three applied contributions as defined by the PhD student.

5. Publications on the dissertation

The author has published a total of 6 scientific works on the dissertation, distributed as follows:

1) Scientific articles in scientific journals published in Bulgaria – 3 pieces:

- Scripta Scientifica Medicinae Dentalis, edition of the Medical University of Varna – 1 article;
- International Scientific Journal “Materials Science. Non-Equilibrium Phase Transformation”, publication of the scientific and technical unions in machine-building, Sofia – 1 article;
- Journal of Technical University of Gabrovo – 1 article;

2) Scientific reports at scientific conferences in Bulgaria – 3 pieces.

All publications are in English.

Based on the above data, it can be concluded that the results of George Georgiev's dissertation have been announced and discussed well enough.

6. Authorship of the obtained results

The dissertation was developed under the expert guidance of the supervisors Prof. Vladimir Panov and Prof. Tsanka Dikova. I think that everything that should have been done personally by the doctoral student has been performed.

7. Autoreferat

The autoreferat reflects the essence of the dissertation and is made according to the requirements established over the years.

8. Remarks on the dissertation

The dissertation is structured and written very well. I highly appreciate the experimental research. The latter are extensive and thorough. I have no remarks of a principled nature.

Since the doctoral student obviously has an affinity for science (and in time he himself will supervise doctoral students), I allow myself to note the following:

- 1) The title of the dissertation is too general, without specifics that are characteristic (must be) for PhD dissertation.
- 2) There is no specificity in the defined goal. The investigation, in itself, is a process that achieves a goal, but the research itself cannot be a goal. It is significant that both the

goal and the tasks for achieving the goal (which are presumably from different categories) begin with "To explore ...".

3) The citation in the dissertation is made in the version of the Oxford system, which is a suitable choice for monographs, books, dissertations. However, I notice a lack of style and mistakes: for example, when there are two authors – X et Y, 20., instead of X and Y, 20..., no distinction is made between direct and indirect citation, etc. It is good that these technical issues are cleared up in the future.

4) When a figure is included in the text, it must be mentioned in the text (which is not done for figures 1 and 2, for example).

5) On page 46 the significance of the initial temperature of the composite is justified, but it is not specified in the specific case what the situation is.

6) Unnecessary repetition has been made of formula (1) and the corresponding text (p. 35), and the formula could simply be quoted.

7) Carrying out optimization (analysis, research, etc.) is not a contribution. Contribution is the result obtained from the optimization (respectively the analysis, research, etc.).

9. Other questions

I definitely believe that the educational function of doctoral education has achieved its goal. The doctoral student has significantly increased his knowledge in the field of the dissertation. On the other hand, I highly appreciate the achieved scientific-applied and applied contributions, which directly serve the dental practice.

10. Personal impressions

Unfortunately, I do not know the doctoral student personally. My impression is based on the dissertation and the feedback I received from its supervisors. I believe that Master Georgi Georgiev, a dentist, is a researcher with an affinity for scientific work, initiative, with the ability to analyze, with good skills for working with applied computer programs, with excellent foreign language training (English). I sincerely hope that the management of the faculty will appreciate these qualities and will give him the opportunity for future performance as a teacher both in the educational process and in science.

11. Conclusion

I believe that the presented dissertation meets the requirements of the Law for the Development of the Academic Staff in the Republic of Bulgaria. The achieved results give me grounds to propose to the respected scientific jury to award the educational and scientific degree "Doctor" to George Plamenov Georgiev, Master - Dentist, in area of higher education - 7. Healthcare and sports, professional direction – 7.2. Dental medicine, doctoral program – „Therapeutic dentistry”.

22.04.2021

Reviewer:



Gabrovo

Professor Jordan Maximov, DSc, PhD