

## I. IDENTIFICATION DATA

<b>Thesis title:</b>	<b>The Effect of Growth Phase and Illumination on the Antibacterial Effect of Photoactive Nanoparticles</b>
<b>Author's name:</b>	<b>Eva Rychlíková</b>
<b>Type of thesis :</b>	master
<b>Faculty/Institute:</b>	Faculty of Electrical Engineering (FEE)
<b>Department:</b>	Circuit Theory
<b>Thesis reviewer:</b>	David Rutherford
<b>Reviewer's department:</b>	Physics

## II. EVALUATION OF INDIVIDUAL CRITERIA

<b>Assignment</b>	<b>extraordinarily challenging</b>
<i>How demanding was the assigned project?</i>	
The project was extremely challenging with respect to the volume of experimental work involved and the fact that experiments had to be performed across consecutive days, and for multiple weeks, in order to generate a sufficient data set for analysis. The experimental work was also technically difficult to ensure accurate results and prevent contamination.	

<b>Fulfilment of assignment</b>	<b>fulfilled</b>
<i>How well does the thesis fulfil the assigned task? Have the primary goals been achieved? Which assigned tasks have been incompletely covered, and which parts of the thesis are overextended? Justify your answer.</i>	
The thesis successfully fulfilled the assigned task of investigating how bacteria from different phases of growth differ in their response to antibacterial (photosensitive) nanoparticles under constant illumination. Detailed experimental protocols were developed to recover bacteria from different growth phases that were subsequently used in the main exposure treatments. These protocols offer a step-by-step guide and will serve as good standard operating procedures for future research at the Department.	

<b>Activity and independence when creating final thesis</b>	<b>A - excellent.</b>
<i>Assess whether the student had a positive approach, whether the time limits were met, whether the conception was regularly consulted and whether the student was well prepared for the consultations. Assess the student's ability to work independently.</i>	
The student's approach was faultless and her dedication to the research was obvious. The Gantt charts that she created enabled her to efficiently complete an extensive amount of experimental work within a relatively short time, whilst still allowing enough time for data analysis and writing the final thesis. The student was always prepared for meetings to discuss results or the background theory and concept of the project. The majority of the experimental work was done independent of my supervision since most of the training on how to use the equipment had been done during a previous project (Bachelor final year). The student showed a high level of competence working alone in a laboratory environment.	

<b>Technical level</b>	<b>A - excellent.</b>
<i>Is the thesis technically sound? How well did the student employ expertise in his/her field of study? Does the student explain clearly what he/she has done?</i>	
The thesis is well written and structured logically. The methods section provides minute detail of complex techniques that were developed for this research similar to a typical 'standard operating procedure' (SOP) commonly used in industry. The experimental work required a high level of skill, accuracy and concentration which the student had in abundance. I believe that the thesis does clearly explain the scientific work that the student did, and highlights the importance of such fundamental research.	

<b>Formal level and language level, scope of thesis</b>	<b>B - very good.</b>
---	-----------------------

*Are formalisms and notations used properly? Is the thesis organized in a logical way? Is the thesis sufficiently extensive? Is the thesis well-presented? Is the language clear and understandable? Is the English satisfactory?*

The thesis is well-presented and extensive, with a particularly detailed 'Appendix' which includes all raw data and images from the experimental work. The student chose to write the thesis in English to make the process of publishing the research in a peer-reviewed journal easier. The language used to describe complex, multistep experiments is clear and easily understandable. One minor drawback is the different formatting types used in the Table of contents for section headings instead of one uniform format that would improve the readability.

**Selection of sources, citation correctness**

**A - excellent.**

*Does the thesis make adequate reference to earlier work on the topic? Was the selection of sources adequate? Is the student's original work clearly distinguished from earlier work in the field? Do the bibliographic citations meet the standards?*

Literature relating to the effects of growth phase on bacteria sensitivity towards nanoparticles is limited, however suitable references were included that relate to other antibacterial treatments. The variety of sources was good, from peer-reviewed research and review articles to chemical material safety data sheets and equipment. The referencing style throughout the thesis meets the desired standard and the bibliography appears complete.

**Additional commentary and evaluation (optional)**

*Comment on the overall quality of the thesis, its novelty and its impact on the field, its strengths and weaknesses, the utility of the solution that is presented, the theoretical/formal level, the student's skillfulness, etc.*

The results from this research is sufficiently novel to be presented at the International Conference on Nanomaterials (Brno) later this year and submitted for publication in a scientific journal.

**III. OVERALL EVALUATION, QUESTIONS FOR THE PRESENTATION AND DEFENSE OF THE THESIS, SUGGESTED GRADE**

*The thesis is a comprehensive body of research that found differences between bacteria from different growth phases towards ZnO nanoparticles under illumination using white light. This finding is important for antibacterial treatments, in particular those that use nanoparticles with photoactive properties. The student excelled with the technical tasks in the laboratory and showed good analytical skills with evaluating the data and writing the final thesis.*

The grade that I award for the thesis is **A - excellent**.

Date: **28.5.2024**

Signature: