

I. IDENTIFICATION DATA

Thesis title:	QCM analysis of nanoparticles and molecules.
Author's name:	Xie Chen
Type of thesis :	bachelor
Faculty/Institute:	Faculty of Electrical Engineering (FEE)
Department:	Electrical Power Engineering department
Thesis reviewer:	Bohuslav Rezek
Reviewer's department:	Physics department

II. EVALUATION OF INDIVIDUAL CRITERIA

Assignment	challenging
<i>How demanding was the assigned project?</i>	
The work has been based on a relatively simple experimental outline and QCM device measurements. Yet the student had to master QCM operation under air and liquid conditions, explore and identify suitable experimental methodologies (coating as well measurements), deal with various practical problems that arose (such as adhesion, contamination, reproducibility), work out non-trivial evaluation of the data and learn a lot about QCM and complementary measurements (optical, SEM). Thus in the end I would denote the assignment as more challenging than ordinary bachelor thesis.	

Fulfilment of assignment	fulfilled
<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 student completely fulfilled all points as stated in the work assignment.	

Activity and independence when creating final thesis	A - excellent.
<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 was very active and independent, with positive attitude and put in a large amount of work and effort. She efficiently and on time completed the assignments for samples preparation and measurements, continuously processed and presented data, came up with her own proposals for experiments and for solving practical problems that arose during the work. She regularly consulted her work, coming well prepared.	

Technical level	A - excellent.
<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>	
Professional level of the presented work is at a high level and it is technically sound. The measurements methodology was optimized, reproducibility was validated and explanation of the various observed effects was thereby provided. As also stated above, the student had to work out non-trivial evaluation of the data and learn a lot about making suitable samples, QCM measurements and interpretation.	

Formal level and language level, scope of thesis	A - excellent.
<i>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?</i>	
The student wrote the thesis very independently. During the writing process I provided her consultations, revisions and recommendations that she aptly implemented. In my opinion, the work is produced in a high quality and extent, in the amount of 47 pages including appendices and with a number of nice own illustrations, photographs, diagrams and graphs. English is very well readable and conclusions are clearly presented.	

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?

The work contains 51 citations from professional literature and other sources. The student used all relevant sources and cites them appropriately within the work. In the thesis, own results are clearly distinguished from information taken from other sources. The citations are fully in accordance with the citation practices in the field.

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.

Let me appraise here again that the student was very active, skilled, communicative and able to work very independently. I was highly content with her performance and attitude. The work and thesis was in the end rather challenging as it identified by thorough work and validation various critical aspects of the making and measurements of QCM sensor system with nanodiamonds and molecules. Thereby the work and its conclusions very usefully complement our broader research of these nanomaterials and their interaction with molecules for electrical sensors.

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

Summarize your opinion on the thesis and explain your final grading.

In my view, the work has been produced in a high quality and extent of 47 pages. I would especially highlight the experimental skill, own initiative and ideas, efficiency, effort and overall quality of the student. The student had to find solutions to a number of technical problems and learn a lot about QCM and evaluation of the obtained data. The results of the work showed several critical aspects of the making and measurements of QCM sensor system with nanodiamonds and molecules. Thereby the work and its conclusions very usefully complement our broader research of these nanomaterials and their interaction with molecules for electrical sensors.

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

Date: **22.1.2024**

Signature: