

REPORT

of dissertation for the acquisition of:

educational and scientific degree " doctor "	X
scientific degree " Doctor of Science "	
	the true is indicated by the sign "X"

Author of the dissertation:

		Vencislav	Venelinov	Bakov	UCTM
academic position	scientific degree	name	middle name	last name	workplace

Topic of the dissertation:

Synthesis and photophysical investigation of novel fluorescence sensors based on 1,8 naphthalimide architectures
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Scientific area:

5	Technical Science
code	name

Professional area:

5.10	Chemical Technology
code	name

Scientific specialty:

Technology of fine organic and biochemical synthesis
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The report was written by:

Professor	PhD	Anton	Hristov	Georgiev	UCTM
academic position	scientific degree	name	middle name	last name	workplace

1. Meeting the minimum requirements under the Regulations:

A) The candidate meets the minimum requirements	20 points	X
B) The candidate doesn't meet the minimum requirements	0 points	
		one of the answers given is marked with the sign "X"

It is mandatory to fill in if answer B is marked. The publication activity of the candidate is analyzed. The response of the results achieved (quoted) is analyzed.

The dissertation by assistant professor Eng. Ventsislav Bakov for obtaining the Ph.D. degree, meets and exceeds the minimum requirements according to the Law for the Development of Academic Staff in the

Republic of Bulgaria and the Regulations for the Acquisition of Scientific Degrees and Occupation of Academic Positions at UCTM. The dissertation is presented base on the two papers refereed in Scopus and Web of Science with quartile Q2 (ChemistrySelect and Photonics) and one article in Proceedings of XIX National Youth Scientific and Practical Conference. According to the Scopus and Web of Science databases, the papers have been cited more than 9 times, indicating the relevance and high scientific value of the dissertation.

2. The relevance of the topic of the dissertation:

A) The topic is relevant and new (there are no known results on the topic by other authors)	8 points	X
B) The topic is relevant and results from other authors are known	6 points	
C) The topic is not relevant, but results from other authors are known	2 points	
D) The topic is not relevant and no results from other authors are known	1 point	
E) The topic does not correspond to the level of dissertation	0 points	
		one of the answers given is marked with the sign "X"

The evaluation of the relevance of the dissertation must be substantiated

The design and synthesis of the new 1,8-naphthalimide fluorophores was based on a careful analysis of known results in the literature. The goal was the study of new 1,8-naphthalimide sensor architectures, which exhibit high response in sensing activity by different cations, operating in a wide pH range and emit in the solid state. Solid-state sensing activity is rarely effect. The presence of solid-phase sensing activity in the synthesized compounds indicates excellent planning of the synthesized structures and proves the high level of knowledge of assistant professor Eng. Bakov in the chemistry and photophysical behavior of 1,8-naphthalimide fluorophores. The achievements of the above-mentioned effects in the newly synthesized sensor architectures are novel. The dissertation is clearly written and contains all requisites (introduction, literature review, results and discussion, experimental part). The objectives are stated clearly and precisely. Assistant professor Eng. Bakov possesses a high level of chemical literacy, handles the material fluently, able to interpret the obtained results, expresses himself clearly, concretely and consistently.

3. Type of research:

A) Theoretical	4 points	
B) Applied	4 points	X
C) Theoretical with application elements	4 points	
D) It does not correspond to the level of dissertation	0 points	
		one of the answers given is marked with the sign "X"

The level of research must be substantiated if answer D is marked.

Assistant professor Eng. Bakov has synthesized 16 (sixteen) new comounds of 1,8-naphthalimide derivatives. He carried out a series of photophysical measurements (absorption and emission) in solution under different conditions, as well as a study of the spectral behavior in the solid phase (film deposition and crystalline phase). In the results and discussion, the PhD student has clearly analyzed the applicability of the observed effects and the behavior of fluorophores as sensors. I consider that the presented results are useful for application.

4. Objectives of the research:

A) Realistic and of scientific and / or applied interest	8 points	X
B) Realistic, but not of scientific and / or applied interest	3 points	
C) Unattainable (unrealistic)	0 points	
		one of the answers given is marked with the sign "X"

Objectives must be specified. The type of the set objectives must be justified.
The main idea and objective of the thesis are clearly formulated, namely the synthesis and photophysical investigation of novel fluorescent sensors based on 1,8-naphthalimide architectures, which are achieved by fulfilling the following objectives: <ul style="list-style-type: none"> ➤ Synthesis and investigation of 1,8-naphthalimide sensor architectures operating simultaneously via solid-state emission and photoinduced electron transfer; ➤ Synthesis and investigation of 1,8-naphthalimide sensor architectures operating simultaneously via solid-state emission and intramolecular charge transfer; ➤ Synthesis and investigation of novel water-soluble 1,8-naphthalimide sensor architectures operating simultaneously via solid-state emission and intramolecular charge transfer.

5. Contributions of the dissertation:

A) With lasting scientific and / or applied response, they form the basis for new research and applications	20 points	X
B) They are of significant scientific and / or applied interest, complete and / or summarize previous research	16 points	
C) They are of scientific and / or applied interest	12 points	
D) Lack of significant contributions	8 points	
E) Lack of contributions	0 points	
		one of the answers given is marked with the sign "X"

Contributions must be specified. The type of results achieved must be justified.
Contributions and conclusions are drawn based on the obtained results and analysis of the behavior of fluorophores, where the competence and high chemical knowledge of the PhD student to summarize the results and to freely handle the matter have been shown: <ul style="list-style-type: none"> ➤ Sixteen novel 1,8 naphthalimide derivatives photoinduced as electron transfer (PET) based sensors have been synthesized and their chemosensing properties have been investigated for the first time in the solid state; ➤ Two 1,8 naphthalimide sensors operating based on intramolecular charge transfer (ICT) have been synthesized and their chemosensing properties and application in the solid phase have been investigated for the first time; ➤ Three new water-soluble 1,8 naphthalimide sensors operating simultaneously based on solid-state emission have been synthesized. Their chemosensing properties and application in both solution and solid state have been investigated. <p>The obtained results are relevant to the contributions and conclusions drawn. They based on the synthesis and photophysical studies of the fluorophores, which are adequate to the conclusions. The presented conclusions and contributions have a potential to be involved into HiTech.</p>

6. Conclusion

A) The evaluation of the dissertation is POSITIVE	This evaluation is assigned to a total number of at least 40 points	X
B) The evaluation of the dissertation is NEGATIVE	This evaluation is assigned to a total number below 40 points	
		one of the answers given is marked with the sign "X"

To be filled in at the request of the member of the scientific jury
In conclusion, I believe that assistant professor Eng. Ventsislav Venelinov Bakov has a high level of competence in organic synthesis and photophysical measurements. He is able to use terminology accurately and clearly as well as to analyze the obtained results and the observed effects. He meets and exceeds the requirements for the PhD according to the Law. I feel strongly that he is a promising researcher and teacher who will build on his independence, critical thinking, and creativity. This gives me a reason to give a positive evaluation of the dissertation of assistant professor Eng. Ventsislav Bakov.

19.12.2023	The report was written by:	
date		signature

19.12.2023 r.

X 

Anton Georgiev
Associate Professor
Signed by: Anton Hristov Georgiev