

**REPORT**

of dissertation for the acquisition of:

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

**Author of the dissertation:**

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

**Topic of the dissertation:**

Synthesis and photophysical investigation of new fluorescence sensors based on 1,8-naphthalimide architectures

**Scientific area:**

5	Technical sciences
code	name

**Professional area:**

5.10	Chemical technologies
code	name

**Scientific specialty:**

Fine Organic and Biochemical Synthesis Technology

**The report was written by:**

Assoc. Prof.	Dr.	Stanimir	Stoyanov	Stoyanov	Sofia University "St. Kliment Ohridski"
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 candidate has submitted the compulsory dissertation for the award of educational and scientific degree "Doctor" and three publications:

- 2 in international journals, referenced and indexed in Scopus/Web of knowledge, each with two more co-authors ( $2 \times (40/3) = 26.6$  pts.)
- 1 in proceedings of a national conference, not referenced in Scopus/Web of knowledge, with one co-author ( $20/2 = 10$  pts),

which fully satisfies the requirements of 50 points for indicator 1 and 30 points for indicators 5-11. It should be noted that the two articles in international journals have already received the attention, as the one from 2019 have 7 citations in refereed journals (related citations excluded), and even the more recent publication from 2022, has already 2 such citations.

## 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	
B) The topic is relevant and results from other authors are known	6 points	X
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 presented dissertation is in an extremely relevant and widely studied in the last two decades topic, namely the design and synthesis of organic fluorophores, appropriately modified for application as optical sensors. The 1,8-naphthalimide architecture was chosen as a core structure for functionalization, which continues to be one of the most studied, because of its excellent photophysical properties and the potential for introducing various substitutes.

## 3. Type of research:

A) Theoretical	4 points	
B) Applied	4 points	
C) Theoretical with application elements	4 points	X
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.

The studies described in the dissertation are at a very high level, applying state-of-the-art techniques of fine organic synthesis and spectral methods of analysis, and are interesting from both a fundamental and applied point of view.

## 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"
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Objectives must be specified. The type of the set objectives must be justified.

The objective of the presented dissertation is the synthesis and spectral studies of new 1,8-naphthalimides, including water-soluble representatives. The scientific tasks include the preparation of target structures with sensory properties operating through different combinations of photoinduced electron transfer, intramolecular charge transfer and solid-state emission. The objectives thus set represent both scientific and applied interest, in both sub-directions – the search for new functional compounds and the development of techniques for their synthesis, as well as the study of their sensory properties in solution and solid state.

### 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.

Sixteen PET sensors were synthesized, two more operating through intramolecular charge transfer, as well as three water-soluble sensors. Five of the twenty-eight compounds obtained are new and not described in the literature. For the first time, the chemosensory properties of these naphthalimide derivatives were investigated in solid state. Conclusions are drawn about the influence of different types of architectures on the observed changes in spectral properties, in the absence and presence of acids, bases, water, change in viscosity of the medium, etc. The results achieved contribute to a better understanding of the processes studied and open the door to new scientific searches in this field. At the same time, they have a potential for practical application in the field of optical sensors, logic schemes and biolabeling.

### 6. Conclusion

A) The evaluation of the dissertation is <b>POSITIVE</b>	This evaluation is assigned to a total number of at least 40 points	X
B) The evaluation of the dissertation is <b>NEGATIVE</b>	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

The dissertation submitted fully meets the requirements for acquiring the educational and scientific degree "Doctor" both in terms of quantity and quality of the achieved scientific and applied results. The quality of the research is confirmed by the publications in prestigious international journals in the field and the citations already noticed. The dissertation is written and edited very well, with a comprehensive literature review and an appropriate illustration of the results achieved.

<b>03.01.2024</b>	The report was written by:	
date		signature