

**REVIEW**

to occupy the academic position:

"Professor"	<b>X</b>
"Associate Professor"	
	one of the academic positions indicated shall be marked with the sign "X"

**Candidates to occupy the position:**

1	Associate Professor	doctor	Nikolai	Iliev	Georgiev	UCTM
№	academic position	scientific degree	name	middle name	last name	workplace

**Scientific area:**

5	Technical sciences
code	name

**Professional area:**

5.10.	Chemical technologies
code	name

**Scientific specialty:**

Technology of fine organic and biochemical synthesis
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**The competition has been announced:**

23	19.03.2024	Organic synthesis	Faculty of chemical technologies
in SG issue	date	for the needs of the Department	Faculty

**The review was written by:**

Professor	doctor	Vanya	Bogdanova	Kurteva	IOCCP-BAS
academic position	scientific degree	name	middle name	last name	workplace

**1. Review for the candidate:**

Associate Professor	doctor	Nikolai	Iliev	Georgiev
academic position	scientific degree	name	middle name	last name

**1.1. Completion of the provided documents:**

A) The competition documents are in full compliance with the Regulations	3 points	<b>X</b>
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B) The documents are complete but do not fully comply with the requirements of the Regulations	2 points	
C) The documents are not completed in accordance with the requirements of the Regulations	0 points	
		one of the answers given is marked with the sign "X"

Missing documents and violated requirements must be described if response C is marked. All required documents are presented, which are in accordance with the Act for the Development of the Academic Staff in the Republic of Bulgaria (ADASRB), the Regulations for the application of the ADASRB and Rules for acquiring scientific degrees and occupying academic positions in UCTM for professional field "Chemical Technologies", related to the procedure for occupying the academic position " Professor".
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### 1.2. 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 must be filled in if answer B is marked. The publication activity of the candidate is analyzed. The response of the results achieved (quoted) is analyzed.
The applicant meets the minimum requirements of ADASRB, the Regulations for the application of the ADASRB and Rules for acquiring scientific degrees and occupying academic positions in UCTM for professional field "Chemical Technologies", related to the procedure for occupying the academic position "Professor". The candidate participates in the competition with a total number of points of 953 with minimum requirements for 550 points, covering not only the general requirements, but also those for the individual indicators, namely: Indicator 1 – 50 items with minimum requirements for 50 items. Indicators 3 or 4 – 177 items with minimum requirements for 100 items. 10 articles are presented, of which 15 with 3 authors, 2 with 5 and 2 with 8. The main part (9 items) were published in journals with an impact factor (IF) and 1 in a journal without IF but referenced in the Scopus database with quartile Q3. The distribution of IF articles according to journal rank is: 4 articles in Q1 journals (40%), 3 with Q2 (30%) and 2 with Q3 (20%). Indicators 5–11 – 226 items with a minimum requirement of 200 items. 19 articles are presented, of which 6 with 3 authors, 1 with 5 and 3 with 4. All 19 articles are published in IF journals. Their distribution according to journal rank is: 8 articles in journals with Q1 (42%), 8 with Q2 (42%) and 3 with Q3 (16%). Indicators 12–15 – 350 items with minimum requirements for 100 items. 35 citations in international publications are presented. A check of the world's databases shows that the citations of the articles featuring the candidate far exceed this number; a total of over 1500 citations with a h-index of 26. Indicators 16–28 – 150 points with a minimum requirement of 100 points. Includes supervision of 1 successfully defended doctoral student (Indicator 16; 40 points), participation in 3 national projects (Indicator 18; 30 points), published university textbook (Indicator 23; 40 points), and a recognized application for a utility model (Indicator 25; 40 points).

### 1.3. Relevance of scientific and / or applied research:

A) The research is relevant. Part of the research is pioneering (no results are known on the topic by other authors)	7 points	
B) Research is relevant. Results from other authors are known for each of the topics and / or applications studied.	5 points	X
C) Most of the research is relevant, but also some results are presented that have no scientific and / or applied value	3 points	
D) The smaller part of the research is relevant	2 points	
E) Research is not relevant	0 points	
		one of the answers given is marked with the sign "X"

The evaluation of the relevance of the research must be substantiated.
Assoc. Prof. Georgiev's research is in the field of obtaining functional fluorescent compounds of the 1,8-naphthalimide, 9-phenylxanthene and perylenes classes and studying their photophysical behaviour in search of new molecular sensors and logic devices for rapid diagnostics in analytical chemistry, biology and medicine. The results are published in 78 articles, 71 of which in international journals with an impact factor (total impact factor 282.6), and in the current competition he participates with 29 of them with a total impact factor 107.9.
These areas are very topical and large groups worldwide are working on similar topics. However, this does not detract from the high scientific level and the significance of the achievements contained in the articles presented at the competition, which include a large number of compounds not described in the scientific literature. The latter is also supported by the wide response of the candidate's articles; over 1500 citations, giving it a h-index of 26.

#### 1.4. Knowledge of the problems subject of research:

A) The candidate knows in detail the achievements of other authors on the researched topics and/or applications	6 points	X
B) The candidate is partially familiar with the achieved results on the researched topics and / or applications	4 points	
C) The candidate has no prior knowledge of the status of the researched problems	0 points	
		one of the answers given is marked with the sign "X"

The evaluation must be substantiated if answer C is marked.
Assoc. Prof. Georgiev is familiar with the scientific achievements in the field of synthesis and photophysical properties of derivatives of 1,8-naphthalimides, 9-phenylxanthenes and perylenes in detail, which is clearly demonstrated in the attached reference to the candidate's scientific contributions. The introductory sections of the scientific communications with which he participates in the competition show a detailed knowledge of the issues and the achievements in them on a global scale.

#### 1.5. Type of research:

A) Theoretical	4 points	
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B) Applied	4 points	
C) Theoretical with application elements	4 points	X
D) It does not correspond to the level specified in the Act for the Development of the Academic Staff in the Republic of Bulgaria and the Regulations	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 candidate's research is mainly of a fundamental nature, but the results have significant potential for applied developments, which is proven by the published invention Reg. No. 3652 U1 "Sensor for detection of spoiled meat and fish". His researches fully correspond to the level defined in the requirements of ADASRB, the Regulations for the application of the ADASRB and Rules for acquiring scientific degrees and occupying academic positions in UCTM.

#### 1.6. 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	4 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 goal of Assoc. Prof. Georgiev's research is to obtain new functional fluorescent materials and verify their effectiveness as molecular sensors and logic devices. A large number of articles have been published on the subject, incl. all 29 papers with which he participates in the contest, which shows that the set goals are completely realistic and fulfilled at the level. The wide response of these articles in the world scientific literature proves that the developments represent a serious scientific contribution.

A request for a utility model is recognized, proving the applied value of the research.

#### 1.7. Methods of research:

A) Adequate to research and set scientific objectives and /or applications	8 points	X
B) Partially appropriate, enabling part of the scientific objectives and / or applications to be achieved	4 points	
C) Inappropriate methods	0 points	
		one of the answers given is marked with the sign "X"

Methods must be specified. The type of methods used is justified.

Research methods are adequate to the set goals. Synthetic protocols are optimized to obtain maximum yields. The obtained products are characterized by modern spectral methods. The photophysical properties of the compounds are investigated, for which a variety of modern experimental and theoretical techniques are applied.

### 1.8. Candidate research contributions:

A) With lasting scientific and / or applied response, they form the basis for new research and applications	20 points	
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	X
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.

The candidate's scientific contributions are in the field of obtaining new functional fluorescent compounds and studying their photophysical properties, which fall into three narrower areas:

A series of *multichromophore systems for energy transfer* at the molecular level are synthesized, in which pH-sensitive fluorescent sensors based on the absence of photoinduced electron transfer are obtained. Fluorescent sensor systems have also been developed, allowing the determination of the presence of water in organic solvents. A light-harvesting antenna capable of transporting light energy to a rotor with a switching mechanism has been obtained, in which a purposeful combination of a light-harvesting system, a molecular rotor and a molecular switch in a multi-component molecular device has been achieved for the first time.

New *fluorescent molecular sensors* operating by means of photoinduced electron transfer, intramolecular charge transfer, fluorescence resonance energy transfer, intramolecular proton transfer and excimer formation have been obtained. The products are excellent indicators for the detection of protons, and some of them also have the potential to determine a variety of metal ions. Water-soluble FET sensor systems have been developed that allow selective determination of the pH of the environment in 100% aqueous solutions, incl. fluorescent micelles with good cell penetration and low cytotoxicity with potential application as diagnostic indicators in medicine and biology. For the first time, FET sensors with solid-state emission with excellent reversibility are synthesized and successfully applied as chemosensors for rapid detection of vapours of acids and bases with the possibility of repeated use.

New *molecular logic devices and apparatuses* based on molecular sensors have been obtained. Devices have been developed to compare at the molecular level (digital comparator) along all possible logic paths. On the way, a digital comparator was obtained through the use of two molecular gates, giving the possibility of obtaining a digital comparator through negative molecular logic. The first tutorial review on molecular digital comparators has been published, summarizing the principles applied in building comparators, as well as the basic mechanisms used in the field of molecular logic. A molecular-level logic gate operating via 4 inputs is reported for the first time.

In the field of fluorescent materials and the study of their properties, intensive work is done worldwide, which is why it cannot be assumed that the research with the participation of Assoc. Prof. Georgiev represents a basis for qualitatively new scientific directions. From the summary of the results and scientific contributions, it is clear that a wide range of experimental and theoretical research is currently being conducted for the design of future more efficient objects, which is an indication that the research is ongoing and cannot be considered to complete and/or summarize previous research.

**1.9. Participation of the candidate in the achievement of the presented results:**

A) The candidate has at least an equal participation in the submitted papers	8 points	
B) The candidate has at least an equal participation in most of the submitted papers	7 points	
C) The candidate has a secondary participation in most of the submitted papers	4 points	X
D) The candidate participation is unnoticeable	0 points	
		one of the answers given is marked with the sign "X"

Critical notes must be provided if one of the items C or D is marked.

In the 29 articles presented for participation in the competition, Assoc. Prof. Georgiev is the lead author (corresponding author) together with Prof. Bojinov in only 4 articles. No article has been submitted in which he is an independent lead author. He is the first author in 11 of the 29 articles presented.

I am convinced that Assoc. Prof. Georgiev has a significant participation in carrying out the activities described in the presented articles, but the main weight, ideas and concepts, obviously belong to Prof. Bojinov due to the above information.

**1.10. Pedagogical activity:**

A) The candidate has effective and sufficient pedagogical activity at the university. The textbooks issued are modern and useful (they meet the requirements of the Regulations). The work with undergraduate and doctoral students is at a high professional level.	8 points	X
B) The candidate has sufficient pedagogical activity at the university. The textbooks issued satisfy the requirements of the Regulations.	6 points	
C) The pedagogical activity and / or textbooks issued are insufficient (do not meet the requirements of the Regulations)	0 points	
		one of the answers given is marked with the sign "X"

Critical notes must be provided if one of the items B or C is marked.

The candidate has lecture employment in the last 5 academic years, which significantly exceeds the requirements; 286 hours with a required 130 hours. Leads 6 lecture courses for bachelor students with a total horary of 200 hours, respectively in Fine Organic Synthesis (45 hours), UV-absorbers and antioxidants for cosmetic purposes (30 hours), Technology of organic synthesis I (45 hours) and II part (30 hours), Synthetic organic products and additives (30 hours) and Explosive substances (20 hours), and 4 courses for master's students with a total horary of 86 hours, New directions in organic synthesis (21 h), Organic products in high technologies (20 h), Antioxidants and UV-absorbers (20 h) and Technology of high energy materials part I (25 h).

He independently published a textbook (textbooks) "Individual high-energy materials (Explosives)", which is included in the publishing plan of HTMU in February 2024.

He trained 1 successfully defended doctoral student and 47 graduate students.

**1.11. Critical notes:**

A) Lack of critical notes	8 points	
B) Critical notes of a technical nature	7 points	<b>X</b>
C) Critical notes that would partially improve the results achieved in a small part of the research	5 points	
D) Critical notes that would partially improve the results achieved in most of the research	3 points	
E) Significant critical notes	0 points	
		one of the answers given is marked with the sign "X"

Critical notes must be provided if one of the answers C, D or E is marked.

I have no substantive critical notes, but I do have some minor notes of a technical nature. The list of citations included in the contest does not include the names of the literary sources, which makes it impossible to track in which Indicator (12–15) the corresponding citation falls and requires a search in the databases by title. It would be good if the points on the individual Indicators, especially on Indicators 16–28, are listed in more detail in the table, or at least the relevant documents are placed in properly named directories. Spelling errors are noticeable in places, which is good to avoid. I would recommend Assoc. Prof. Georgiev to be more active in terms of ideas and to develop his own topic in which he would have the leading role.

**1.12. Conclusion**

A) The evaluation of the candidate's activity is <b>POSITIVE</b>	This evaluation is assigned to a total number of at least 65 points	<b>X (85 points)</b>
B) The evaluation of the candidate's activity is <b>NEGATIVE</b>	This evaluation is assigned to a total number below 65 points	
		one of the answers given is marked with the sign "X"

To be filled in if requested by the reviewer

The candidate meets all indicators, and in some seriously exceeds the requirements. Based on the assessment of the presented materials with a total point asset of 953 points, it is indisputable for me that Assoc. Prof. Nikolay Georgiev is a productive researcher and teacher with established qualities and a promising career. Considering the scientific achievements of the candidate, the topicality of the topics in his research activity, his active teaching activity and his personal skills, I consider that the candidate meets all the requirements of the Act for the Development of the Academic Staff in the Republic of Bulgaria, the Regulations for the application of the ADASRB, Rules for acquiring scientific degrees and occupying academic positions in UCTM for professional field "Chemical Technologies", related to the procedure for occupying the academic position "Professor", and I strongly recommend the Faculty Council of the Faculty of Chemical Technology at UCTM to award to

Associate Professor Dr. Nikolai Iliev Georgiev

the academic position "Professor" in the field of higher education 5. Technical sciences, professional field 5.10. Chemical technologies, scientific specialty Technology of fine organic and biochemical synthesis.

23.07.2024	The review was written by:	
date		signature