

**REPORT**

to occupy the academic position:

"Professor"	
"Associate Professor"	X
	one of the academic positions indicated shall be marked with the sign "X"

**Candidates to occupy the position:**

1	Assistant professor	PhD	Ani	Angelova	Stoilova	UCTM
№	academic position	scientific degree	name	middle name	last name	workplace

**Scientific area:**

4	Natural sciences
code	name

**Professional area:**

4.1	Physical sciences
code	name

**Scientific specialty:**

Electrical, magnetic and optical properties of condensed matter
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**The competition has been announced:**

14	18.02.2022	Physics	Chemical technologies
in SG issue	date	for the needs of the Department	Faculty

**The report was written by:**

Professor	DSc	Assen	Angelov	Girginov	UCTM (retired)
academic position	scientific degree	name	middle name	last name	workplace

**1. Report for the candidate:**

Assistant professor	PhD	Ani	Angelova	Stoilova
academic position	scientific degree	name	middle name	last name

**1.1. 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 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.

Assistant professor Ani Stoilova, PhD presented a total of **21** publications for participation in the competition, of which **13** in journals with impact factor and **8** in indexed journals without impact factor.

It is worth noting that some of her research papers have been published in renowned specialized journals such as: *Spectrochimica Acta* (IF = 4.098), *Journal of Photochemistry and Photobiology* (IF = 3.982), *Optical Materials* (IF = 2.779), *Surface and Interface Analysis* (IF = 1,374), *The European Physical Journal* (IF = 0,993).

The national scientific journals in which the works of Dr. Stoilova are published are mainly: *Bulgarian Chemical Communications* and *Journal of Chemical Technology and Metallurgy*. Assistant prof. Stoilova has participated with reports at specialized scientific forums, which are printed in full text. In general, the subject of her research are complex systems, which require the use of a large number of different physical methods. This explains her collaboration with other researchers. There is no doubt, however, that Stoilova has a significant role in the presented scientific works.

The scientific activity of Dr. Stoilova is known to researchers working in the field of formation and application of chalcogenide materials. A total of **37** citations were noticed of the materials presented for the competition.

In conclusion, it can be noted that the materials with which assistant professor Ani Angelova Stoilova, PhD, participates in the competition exceed the minimum required points by groups of indicators for holding the academic position of "Associate Professor" in the field (4) "Natural Sciences", in the professional field (4.1) "Physical Sciences".

**1.2. 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)	8 points	
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B) Research is relevant. Results from other authors are known for each of the topics and / or applications studied.	6 points	X
C) Most of the research is relevant, but also some results are presented that have no scientific and / or applied value	4 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.

It should be noted that the area in which the main scientific and applied research results presented by Dr. Stoilova have been achieved is both very **relevant** and **important**. It is relevant because it is closely related to the creation and study of the properties of new polarization-sensitive materials for the needs of optics and opto-electronics. Studying the kinetics of the formation of this type of material and establishing their basic characteristics are essential for creating effective and sustainable commercial products. In this sense, the formed bulky and thin amorphous layers are a very interesting object for both basic and applied research. They provide an opportunity to study their behavior in conditions of migration of electrical loads across different phase boundaries.

The subject of the research is also very important, because these materials are crucial for innovation and technological progress, and they have already been successfully implemented in many different industries. This is the reason why the progress of research and development activities related to these materials is becoming increasingly important.

The conducted systematic research on the propagation of polarized light in some histological systems, in turn, reveals real opportunities for the creation of new, non-invasive methods for medical diagnosis.

### 1.3. 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

In general, the presented scientific and research activity of Dr. Stoilova is homogeneous. The main goal of research is the synthesis of new innovative materials for the needs of optics and opto-electronics. The conducted investigation of these materials is connected to the detailed research of the processes of their formation, studying their composition and properties. The conducted research is well planned and is carried out on the basis of a thorough and in-depth literature review. It provides a critical analysis of the state of the problems, and the research objectives are strictly limited and clearly motivated. The logical sequence of research and presentation of results is also worth noting.

The set and achieved goals of the conducted scientific and applied research can be summarized in two main directions: Synthesis, structure, properties and application of new, polarization sensitive materials and Research of the possibilities for using polarization methods in visualization of changes in biological tissues.

#### 1.4. 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	X
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.

The presented by assist. prof. Stoilova reference accurately and completely reflects the scientific and applied contributions in her works. They can be briefly summarized in two main areas:

#### **I. Obtaining new, polarization-sensitive materials and studying their structure and properties**

For the first time, the structure of bulk chalcogenide materials from the Ge-Se-In, Ge-Se-B and Ge-Te-Cu systems were synthesized and studied, and the main crystallographic parameters of the identified phases were determined. The kinetics of evaporation (and condensation) of vacuum-thermal evaporation of thin amorphous layers of the Ge-Se-In system was studied. Different methods were used to obtain the layers: vacuum-thermal evaporation, centrifugal application and electrosputtering. As a result, new thin-layer composite materials based on the newly synthesized chalcogenides were obtained with additional doping with azo dye (PAZO polymer).

The energies of evaporation and condensation are determined depending on the content of the chalcogenide in order to optimize the conditions for obtaining and applying

this type of thin layers with predetermined properties. Some basic optical parameters have also been determined: the refractive indices, the extinction coefficients, the absorption coefficients, the band gap of these newly synthesized chalcogenide thin film materials and the corresponding composite layers.

The obtained new polarization sensitive materials, as well as the determination of their structure and properties gives a real perspective for their successful application as functional materials in the field of optics.

## II. Polarization methods for visualization of changes in biological tissues

Systematic studies have been performed on changes in polarized light during its propagation in some histological specimens. Based on statistically processed data, new, non-invasive methods for medical diagnosis are proposed. The possibility to visualize with better contrast the patho-morphological changes in the tissues as a result of various diseases is presented, after appropriate reconstruction of the images obtained with polarized light. The obtained polarization images visualize pathomorphological changes in histological specimens of the lung (and liver) with significantly higher contrast than those obtained with unpolarized light.

### 1.5. 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	X
C) The candidate has a secondary participation in most of the submitted papers	4 points	
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.

### 1.6 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	
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B) The candidate has sufficient pedagogical activity at the university. The textbooks issued satisfy the requirements of the Regulations.	6 points	X
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.

#### 1.7. Critical notes:

A) Lack of critical notes	8 points	X
B) Critical notes of a technical nature	7 points	
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.

#### 1.8. Conclusion

A) The evaluation of the candidate's activity is <b>POSITIVE</b>	This evaluation is assigned to a total number of at least 50 points	X
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B) The evaluation of the candidate's activity is <b>NEGATIVE</b>	This evaluation is assigned to a total number below 50 points	
		one of the answers given is marked with the sign "X"

To be filled in if requested by the member of the scientific jury
<p>The scientific and applied results presented by assistant professor Stoilova are obtained in an important field of materials science, related to the creation of new functional materials with application in optics and opto-electronics. The invention of this type of new materials in recent years has emerged as a rapidly developing part of materials science. Dr. Stoilova has made an in-depth analysis of a number of problems in the studied areas and has focused systematically on solving them. The results have been achieved through a large volume of sophisticated research on complex systems. They are relevant and important, and are obtained based on high-level research. Stoilova's scientific contributions have received good international acclaim. At this stage, Dr. Stoilova is definitely a scientist who can set and perform important scientific and applied tasks.</p> <p>Her scientific activity, contributions, indicators (impact factor, citation rate) and competence fully meet the requirements of the Regulations on the terms and conditions for holding academic positions at UCTM. Therefore, I confidently and with pleasure allow myself to recommend to the Honored Scientific Jury to propose to the Scientific Council of the Faculty of Chemical Technology to give the academic position of ASSOCIATE PROFESSOR to <b>assistant professor eng. Ani Angelova Stoilova, PhD</b> in the professional area 4.1 "Physical Sciences", Scientific specialty "Electrical, magnetic and optical properties of condensed matter".</p>

date	The report was written by:	signature
10.06.2022	Prof. DSc Assen Girginov	