**Appendix 12d**

**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 | Assist. Prof. | PhD | Tsvetelina | Georgieva | Foteva | University of Chemical Technology and Metallurgy |
| № | academic position | scientific degree | name | middle name | last name | workplace |

**Scientific area**:

| | |
|---|---|
| 5 | Technical sciences |
| code | name |

**Professional area**:

| | |
|---|---|
| 5.11 | Biotechnologies |
| code | name |

**Scientific specialty**:

| |
|---|
| Technology of biologically active substances |

**The competition has been announced:**

| | | | |
|---|---|---|---|
| 96 | 17.11.2023 г. | Biotechnology | Faculty of Chemical and Systems Engineering |
| in SG issue | date | for the needs of the Department | Faculty |

**The report was written by**:

| | | | | | |
|---|---|---|---|---|---|
| Assoc. prof. | PhD | Zlatka | Miltcheva | Alexieva | Institute of Microbiology - BAS |
| academic position | scientific degree | name | middle name | last name | workplace |

**1. Report for the candidate:**

| | | | | | |
|---|---|---|---|---|---|
| Assist. Prof. | PhD | Tsvetelina | Georgieva | Foteva | University of Chemical Technology and Metallurgy |
| 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" |

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|---|
| 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. |
| All formal requirements specified in the Law on the Development of the Academic Staff in the Republic of Bulgaria, the Rules for its Implementation, and the Rules for the Terms and Conditions for Acquiring Scientific Degrees and Holding Academic Positions at the University of Chemical Technology and Metallurgy have been fulfilled. |

**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 | |
| 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. |
|---|
| The creation of innovative hybrid materials with metal nanoparticles included in them is of great importance for current research in the fields of modern medicine and environmental biotechnology. In this context, the topic on which Dr. Foteva works is extremely current, multidisciplinary, and has a high potential for future development. Similar studies that have not been conducted by other researchers are not indicated. |

**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 |
|---|
| Most of the research is focused on the creation of hybrid materials containing inorganic, organic, and metal nanoparticles possessing antimicrobial properties, low cytotoxicity, and potential biocompatibility. This is an interesting and promising direction of research, with the aim of solving a number of medical and biotechnological problems.<br>Another important and promising aspect of the research, with the participation of Dr. Foteva, is dedicated to the synthesis, characterization, analysis, and activity research of biomolecules with the aim of their application in medicine, pharmacy, and diagnostics.<br>From the presented materials, the objectives of the conducted research can be assessed as realistic and of significant scientific and applied interest. |

**1.4. Candidate research contributions:**

| | | |
|---|---|---|
| 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. |
|---|

In the candidate's documents, the main scientific contributions are formulated, which are divided into three main areas: Antimicrobial activity of polymeric materials containing metal ions; Biocompatibility and cytotoxicity of hybrid materials; Synthesis, characterization, analysis, and activity research of biomolecules for the purpose of their application in medicine, pharmacy, and diagnostics.

I would highlight the following as the most significant of them:

Three types of inorganic-organic hybrid materials based on silica, hydroxypropyl cellulose (HPC), hydroxypropyl methylcellulose (HPMC), carboxymethyl cellulose (CMC), and incorporated silver nanoparticles (AgNPs) were obtained by the sol-gel method. A detailed characterization of the hybrid materials was made using infrared spectroscopy, atomic force microscopy, scanning electron microscopy (SEM), transmission electron microscopy (TEM), and Brunauer-Emmett-Teller (BET) analyses. Along with the obtained hybrid materials based on SiO2, various cellulose derivatives and silver nanoparticles, as well as those containing other antimicrobial agents such as zinc nanoparticles and copper ions, were also synthesized by the sol-gel method. They were structurally characterized by means of XRD, IR, TEM, DTA/TG, and UV-Vis analyses.

A high biological effect of the hybrid materials has been proven against test cultures of prokaryotic, eukaryotic, and mouse fibroblasts.

In connection with the cytotoxicity and biocompatibility studies, it has been shown that hybrid materials with silver nanoparticles induce strong cell proliferation of 3T3 cells in 48 hours. The level of cell damage is related to the concentration and morphology of the silver particles. The obtained zinc-containing hybrid materials, which show good antibacterial results, are at the same time biocompatible and do not lead to changes in the actin cytoskeleton. The hybrid materials containing SiO2/pectin and up to 1 wt.% silver, which showed a good antifungal effect against the growth of C. albicans strain 74, at the same time had better biocompatibility with mouse fibroblasts. It has been proven that the hybrid materials SiO2/HPC/2.5% Ag and SiO2/HPMC/2.5% Ag demonstrate an anti-adhesion effect, reducing the thickness of the biofilm formed by Pseudomonas aeruginosa PAO1 by more than 30%.

A significant contribution is made by the results investigating the impact of the SiO2/cellulose hybrid containing copper from different sources on two cancer cell lines. The thus synthesized composite materials have a significant cytotoxic effect, and the material obtained with Cu from CuSO4.5H2O is more cytotoxic.

The anticancer potential and cytotoxicity of newly obtained bioconjugates of monofluorinated analogues of BIM-23052 containing a second pharmacophore, naphthalimide, caffeic acid, or the tripeptide Arg-Gly-Asp are shown. Mathematical docking calculations show good selectivity results for some of the somatostatin receptors.

The antitumor activity, antibacterial properties, antiproliferative effect, and cytotoxicity of all newly synthesized analogues and conjugates of the antimicrobial peptide (KLAKLAK)2-NH2 were investigated. Peptides containing the second pharmacophore 1,8-naphthalic anhydride or caffeic acid showed the highest antifungal activity against C. albicans (74).

Original and of important public and health importance are the developed and validated liquid chromatography methods with UV detection, as well as a GC/MS method for determining a number of prohibited active substances, including steroid structures in food supplements offered as natural products for weight loss, erectile dysfunction, sportsmen, etc.

**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" |

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| Critical notes must be provided if one of the items C or D is marked.<br>The presented scientific works and accompanying documentation from assistant professor Dr. Tsvetelina Foteva prove a personal contribution to the experimental development, analysis, interpretation, and publication of the scientific results. The author's report on the results of the research work and scientific contributions presents in detail the scientific, scientific-applied, and methodical achievements in the majority of the presented research activities. |

**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 | **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. |
| |

**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" |

| |
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| Critical notes must be provided if one of the answers C, D or E is marked. |
| I have no comments or recommendations regarding the presented materials and documentation. |

**1.8. Conclusion**

| | | |
|---|---|---|
| A) The evaluation of the candidate's activity is **POSITIVE** | This evaluation is assigned to a total number of at least 50 points | |
| B) The evaluation of the candidate's activity is **NEGATIVE** | 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 |
| Dr. Foteva fulfills the requirements for each of the presented groups of indicators necessary for occupying the scientific position of "Associate Professor" and generally scores more than the sum of points from the mandatory national minimum. According to indicators 6a to 6g, 434.1 items were collected. Regarding the additional criteria for holding the scientific position "Docent" at HTMU, it can be noted that the criteria have also been fulfilled.<br>In his experimental work, Dr. Foteva uses a rich arsenal of modern analytical methods. She stands out as a thorough and active researcher in the field of the creation of antimicrobial hybrid materials, with opportunities and prospects for new research on current problems, which are indicated in Dr. Foteva's plans for future research activities.<br>The candidate's works have original scientific and applied contributions that have been published in reputable scientific journals and have received international recognition, as expressed in the citations found in the authoritative databases Scopus and Web of Science.<br>Assistant professor Dr. Tsvetelina Foteva is distinguished by her active teaching activity, |

having led lecture courses for full-time students in the specialty Chemical Engineering with teaching in German (Technical Microbiology; Biochemistry and Biological Basics; Biochemical Productions), as well as a lecture course on Industrial Biotechnology in English for Erasmus students. Ch. Associate Professor Foteva also led lecture courses on industrial biotechnology and Microbiology for students in full-time and distance learning in Biotechnology.

The average annual study load for Dr. Foteva is over 600 hours. In addition, 13 diploma theses were defended under her supervision (10 for the bachelor's degree and 3 for the master's degree). Also, she was a consultant to seven graduates.

Based on the contributions noted above, the overall documentation for the competition, and the undoubted qualities of the publications presented for the competition, I give a positive assessment of the participation of assistant professor Dr. Tsvetelina Foteva in the competition. I strongly support the candidacy and propose to the members of the scientific jury to vote for awarding the scientific position of "Associate Professor" to Dr. Tsvetelina Foteva.

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| **19.02.2024** | The report was written by: | |
| date | | signature |