

REVIEW

Prof. Dr. Rositca Dimitrova Nikolova,

Faculty of Chemistry and Pharmacy, Sofia University "St. Kliment Ohridski "

regarding the submitted documents of Assistant Professor Dr. Stanislava Borisova Tomova-Yordanova in a competition for an **Associate professor** in a professional field 4.2. Chemical Sciences, scientific specialty Organic Chemistry (Organic Photochemistry) for the needs of the Department of Organic Chemistry and Pharmacognosy of the Faculty of Chemistry and Pharmacy, Sofia University "St. Kliment Ohridski "

announced in the State Gazette, issue 103 / 12.12.2023

The only candidate who applied and was admitted participating in the competition is Assistant Professor Dr. Stanislava Borisova Tomova-Yordanova, who works in the group of "Organic Photochemistry" at the Department of Organic Chemistry and Pharmacognosy of the Faculty of Chemistry and Pharmacy.

Personal data of the candidate

Stanislava Tomova-Yordanova graduated with a bachelor's and master's degree in Chemistry in 2009 and 2011, respectively, at the Faculty of Chemistry of Sofia University. Her MSc thesis is on "Solvent Influence on the Photophysical Properties of Bridged Styrylpyridinium Salts" in the MSc Organic Materials in Advanced Technologies. Since 2011, she has been a full-time doctoral student at the Department of Organic Chemistry at the SU with scientific supervisor Prof. Ivan Petkov. Her PhD thesis on "Light-Driven Molecular Devices for Rapid Environmental Monitoring" was successfully defended in 2014. In the same year, she was appointed after a competition as an assistant, and since 2015 until now she has been a chief assistant in the Department of Organic Chemistry and Pharmacognosy.

General characteristics of the received materials and admissibility

Dr. Stanislava Tomova-Yordanova has submitted all the required documents in electronic format, which are in accordance with Law, its rules, the Rules for the terms and conditions for the acquisition of scientific degree and occupation of academic position in SU "St. Kliment Ohridski" and the Recommendations for the criteria for acquiring scientific degrees and holding academic positions at SU for the professional direction "Chemical Sciences", related to the procedure for holding the academic

position "Associate Professor". The presented documentation is prepared according to all requirements and recommendations, but unfortunately at times it gives the impression of carelessness.

Attached are:

- **According to indicator A1.** 50 points

Candidate Stanislava Tomova-Yordanova defended her dissertation on "Light-Driven Molecular Devices for Rapid Environmental Monitoring" in 2014, developed in the Department of Organic Chemistry of Faculty of Chemistry and Pharmacy at Sofia University.

- **According to indicator C4.** 112 points

A 25-page habilitation thesis is presented. The habilitation thesis is based on the most significant part of the candidate's research, published in 6 scientific publications in international journals. The importance of the topic is emphasized in view of the possibilities of application of the synthesized derivatives of 7-nitrobenzofurazan, 1,8-naphthalimides and dendrimers in biomedicine, ecochemistry, etc. An interesting decision of the author is that she considers only her own results and did not title the habilitation thesis.

All publications are in accordance with of the competition, printed in specialized international journals, referenced in SCOPUS and ISI Web of Science and have an impact factor, of which one with Q1 (17%), three with Q2 (50%), one with Q3 (17 %) and one with Q4 (17%). According to this indicator, the candidate exceeds the minimum requirements of 100 points.

- **According to indicator D7.** 225 points

In the current competition, 13 scientific publications were presented, 1 of them was published in a specialized international journal with Q1 (8%), 4 - in journals with Q2 (31%) and 8 in a magazine with Q3 (61%). And according to this indicator, the candidate also exceeds the minimum requirements under the Law by 200 points and meets the requirements of the FCP Regulations of 220 points

- **According to indicator E7.** 200 points

Until the submission of the papers, 109 citations registered in Scopus were noticed. The minimum requirements for this indicator for FCP are 70 points, the applicant has submitted 100 citations, which almost triples the requirements.

- **According to indicator G**

100 points

Includes additional requirements of the Faculty of Chemistry and Pharmacy.

The H-index of Dr. Tomova-Yordanova in Scopus is 7. The candidate has also submitted two diploma theses and one scientific project to the Scientific Research Institute of SU, of which he is the supervisor.

Dr. Tomova-Yordanova exceeds the required minimum of 70 points.

- Author's reference for main scientific contributions in a volume of 8 pages;

The report on scientific contributions emphasizes the personal contributions of the candidate to the field of organic photochemistry and molecular spectroscopy and includes the synthesis, photophysical measurements, and sensing capability of a series of monomeric and dendrimeric compounds, as well as their metal complexes with potential for practical application.

- Abstracts of scientific publications
- Reference for teaching activity (included in the CV)

The analysis of the presented results shows that Dr. Tomova-Yordanova not only fulfills, but in most indicators exceeds the minimum requirements of the competition.

The submitted scientific communications of the candidate are in the scientific field for which the competition has been announced.

The scientific research of Dr. Stanislava Tomova-Yordnova are in the field of organic photochemistry and molecular spectroscopy and are mainly related to the synthesis and study of photophysical characteristics of newly synthesized compounds in solvents of different polarity, their sensory properties to different metal ions, the influence of the pH on absorption and fluorescence intensity, as well as investigation of microbiological, antimicrobial and antibacterial properties of the newly synthesized ligands, and of their copper and zinc complexes. The main groups of compounds with which the applicant has worked and the results obtained can be summarized as:

- Synthesis and study of 1,8-naphthalimide derivatives

New 1,8-naphthalimide and bis-1,8-naphthalimide derivatives were synthesized and their photophysical properties in organic solvents of different polarity were investigated. It was found that polar solvents probably destabilize the planarity of the chromophore system, through hydrogen bonding between the ligands and the solvent. The influence of the substituent in the C-4 position of the

naphthalimide structure was investigated and it was found that in the presence of tertiary amino groups connected to the chromophore system through an ethylene bridge, the fluorescence intensity strongly depends on the polarity of the medium. This can be used in the design of sensor systems based on photoinduced electron transfer.

The effect of different metal ions on the fluorescence intensity of model compounds was also tested. The results were also confirmed with the help of quantum-chemical spillovers.

Cu (II) and Zn (II) complexes of some of the investigated compounds were obtained and characterized, and it was shown that their photophysical properties depend strongly on the polarity of the solvent.

An in vitro antimicrobial screening of the newly synthesized metal complexes was also performed, which showed activity against bacteria and antifungal activity against certain strains, with the results for Cu(II) complexes being better compared to Zn(II) and suggesting the potential for the use of these compounds as antimicrobial agents.

Good results were also obtained with the less studied 3,4-disubstituted 1,8-naphthalimides, where the presence of a second substituent affects the photophysical properties.

- Synthesis and study of dendrimers of different generations

First and third generation dendrimers modified with substituted 1,8-naphthalimides and their Cu (II) and Zn (II) complexes were synthesized and characterized. Their photophysical properties were investigated in solutions of different polarity, where positive solvatochromism was observed. A nonpolar environment is shown to favor the quantum yield. It was found that the modified cationic dendrimer emits blue fluorescence, the intensity of which depends on the pH of the medium – in acidic medium, the emission maxima are high, a fact that defines it as a potential pH sensor in aqueous solutions.

Interesting results were also obtained in the peripheral modification of second-generation dendrimers with 4-chloro-7-nitrobenzofurazan. In organic solvents, the dendrimer emits yellow-green fluorescence, the intensity of which strongly depends on the polarity of the medium. When checking its sensing capacity, it was found that it has the best effect with respect to Fe(III).

The in vitro antimicrobial screening of the newly synthesized dendrimer metal complexes showed promising antibacterial and antifungal activity. Similar results were obtained after deposition of the newly synthesized compound on cotton fabric, preventing the formation of a bacterial biofilm on the textile surface. The resulting antibacterial cotton fabrics can be used to make wound dressings or medical textiles for use in clinical practice

- Study of dyes

The photophysical characteristics of eosin Y functionalized with a quaternary ammonium group in different solvents were investigated. Intense fluorescence and good antimicrobial activity were found both in solution and after its deposition on a cotton surface.

Styryl dyes containing benzothiazolium crown ethers, water-soluble anthraquinone S3 modified with a quaternary amino group, asymmetric monomeric monomethine cyanine dyes containing halogen substituents were also synthesized and studied under different conditions. All of them show promising results in terms of both their photophysical and antibacterial properties.

- Investigation of other compounds

An efficient low-temperature procedure for the functionalization of silica airogel with [Eu(phen)₂](NO₃)₃ has been developed. The functionalized airogel composites exhibit bright red luminescence suitable for UV-sensing applications.

Ethanol extracts of *O. grandiflora* (L.) Hoffm. and *A. Podagraria* and were found to have high antioxidant activity.

The solvatochromic properties of homodimeric styrylpyridinium salts were studied.

Scientific results have been presented at over 10 national and international conferences as poster presentations and oral presentations.

The only remark I have about the candidate is related to the preparation of the documentation for the competition.

Teaching activity

Since joining the Faculty of Chemistry in 2014, Dr. Stanislava Tomova-Yordanova has been actively involved in the teaching activities of the Department of Organic Chemistry and Pharmacognosy.

As an assistant, she conducts exercises and seminars in Organic Chemistry - Part I and II for undergraduate students of FHF and BF of SU, students of the master's program Pharmacy, seminars and exercises in Organic Photochemistry for all chemical specialties of FHF, full-time education.

Dr. Tomova-Yordanova actively participates in the teaching activity also as a scientific supervisor of graduates - she was the supervisor of 6 graduates from the master's and bachelor's programs who successfully defended their degrees.

Dr. Tomova-Yordanova is distinguished by her good theoretical preparation in the field of organic chemistry, creative approach to solving scientific and educational problems. The serious attitude towards the learning process and the good attitude towards both colleagues and students are the basis of the authority he enjoys as a teacher of organic chemistry.

In conclusion, I am convinced that Dr. Stanislava Tomova-Yordanova meets all the requirements of the Law on holding the academic position of Associate Professor of Organic Chemistry - scientific achievements and teaching activity, having also fulfilled all additional recommended criteria accepted by the Scientific Council of the Faculty of Chemistry and Pharmacy of Sofia University "St. Kliment Ohridski".

Based on the attached documents and my long-term direct impressions, I confidently propose to the honorable Scientific Jury and the Scientific Council of the Faculty of Chemistry and Pharmacy to award the scientific title "Associate Professor" to Dr. Stanislava Tomova-Yordanova in professional direction 4.2. Chemical Sciences, scientific specialty Organic Chemistry (Organic Photochemistry).

Sofia, 14.04.2021

Signature: