

# REVIEW

by Prof. Dr. Ing. Emilia Dimitrova Naydenova-UCTM, Sofia

Member of the Academic Jury set to render a decision on the competition for filling the academic position of Associate Professor in the Professional Field 4.2. Chemical Sciences (Organic photochemistry) at the Faculty of Chemistry and Pharmacy, Sofia University "St. Kliment Ohridski"

This Review is prepared in response to Order № ПД 38-14/10.01.2024 issued by the Rector of Sofia University and the decision of the meeting of the Academic Jury of 21.02.2024. The Review is in compliance with Development of Academic Staff in the Republic of Bulgaria Act (DASRB), the Rules for the Application of the Development of Academic Staff in the Republic of Bulgaria Act, the Rules of Sofia University "St. Kliment Ohridski", for applying the Act aforementioned.

The competition for filling the academic position of "Assoc. Professor" in the Professional Field 4.2. Chemical Sciences (Organic photochemistry) was announced in State Gazette, issue N:103 on 12. 12. 2023, for the needs of the Department of Organic Chemistry and Pharmacognosy, Faculty of Chemistry and Pharmacy, Sofia University "St. Kliment Ohridski". Only one candidate participates in the competition – Assist. Prof. Stanislava Borisova Yordanova-Tomova, Ph.D.

The set of documents presented by Assist. Prof. Dr. S. Yordanova-Tomova, is in accordance with the Rules for the Development of the Academic Staff at Sofia University "St. Kliment Ohridski" and meets the requirements for occupying the academic position of "Associate Professor".

## **Personal data of the candidate**

Assist. Prof. Stanislava Yordanova-Tomova graduated with a bachelor's degree in Chemistry from the Faculty of Chemistry at Sofia University in 2009. She graduated as a Master in Chemistry, specialty Organic materials in higher technologies with thesis topic: "Influence of the solvent on the photophysical properties of bridged styryl pyridinium salts" in 2011.

Since 2011 she has been a full-time doctoral student at the Department of Organic Chemistry at Sofia University with research supervisors Prof. Ivan Petkov, Prof. Dr. Ivo Grabchev. She successfully defended her doctoral dissertation on "Light-driven molecular devices for rapid environmental monitoring", 4.2 Chemical Sciences (Organic Chemistry) in 2014.

In 2014, she was appointed as an assistant in the Department of "Organic Chemistry and Pharmacognosy", at the Faculty of Chemistry and Pharmacy and in 2015 (to the present), after a competition as senior assistant. She was on maternity leave for 2 years.

## **General characteristics of the applicant's activities**

Assist. Prof. Dr. Stanislava Yordanova-Tomova is a co-author of 24 scientific publications, of which 22 are in journals, referenced and indexed in global databases of scientific information (Web of Science and Scopus).

In the current competition she participates with a total of 19 articles in refereed and indexed scientific journals, holding IF and SJR, and falling into quartiles from Q1 to Q4 according to the grouping of scientific journals.

The distribution of scientific publication according to the rank of the journal in which they are published is as follows: 2 articles in journals with rank Q1, 8 with Q2, 8 with Q3 according to Scimago Journal & Country Rank (<https://www.scimagojr.com>) and 1 article with Q4. Articles number 16 and 18 have no IF, only SJR that's why they get 10 points each.

At the time of submitting the documents a total of 147 citations were noticed. The total number of citations excluding self-citations of all authors on the scientific publications submitted for participation in the competition is 109. The Hirsch index is 7. According to the requirements, she also presented a habilitation thesis.

The presented materials bring to Dr. Stanislava Yordanova-Tomova 700 points, which exceeds the required 510 points for candidates to occupy the academic position "Associate Professor", according to the requirements of DASRB and the rules for occupying academic positions at the Faculty of Chemistry and Pharmacy, Sofia University "St. Kliment Ohridski".

The distribution by indicators is as follows: indicator A - 50 points; indicator C - 112 points; indicator D - 220 points; indicator E - 218 points; and indicator G - 100 points.

**Indicator A1.** *Dissertation for awarding the educational and scientific degree "doctor".*

The candidate Assist. Prof. Dr. Stanislava Yordanova-Tomova successfully defended her PhD thesis on "Light-driven molecular devices for rapid environmental monitoring", (50 points).

**Indicator group C.4** - *Habilitation work, scientific publications in journals that have been referenced and indexed in world-renowned scientific information databases (Web of Science and Scopus)*

With respect to this indicator Dr. Stanislava Yordanova-Tomova has presented a total of 6 publications, of which 1 in journals with rank Q1, 3 with rank Q2, 1 with rank Q3 and 1 with rank Q4. In 4 of these publications, she is the second author. There is also a habilitation paper written on 25 pages. It is surprising that there is no title and no literature cited. The points that this group brings are 112 out of the required 100 points. The criterion is met.

**Indicator group D (D7).**

Regarding this indicator the candidate has submitted 13 publications that are referenced and indexed in Web of Science and Scopus. All works are in the field of the current contest and grouped as follows: 1 publication in quartile Q1: *Beilstein Journal of Organic Chemistry*, IF 2.33; 5 publication in quartile Q2: *Sensors* IF 4.42, *Luminescence*, IF 2.464 (2020), *Open*

*Chemistry*, IF 1,47 (2018), *Beilstein Journal of Organic Chemistry*, IF 2.622 (2019), 5 publications in quartile Q3: *Journal of Molecular Structure*, IF 2.12 and 2 with SJR but no IF that carry 10 points each (*Journal of Chemical Technology and Metallurgy*). The total number of points in group D is 220. And in this case the criterion is met.

#### **Indicator group E. Citations.**

All presented works are up-to-date and at a high scientific level, which is also reflected in their citation by other authors. A total of 147 citations were noted, of which 109 are presented in the current competition, carrying 218 points in indicator D.11. This indicator unequivocally shows the relevance and international significance of the reported research. As can be seen, Dr. Stanislava Yordanova, fulfills the requirements of DASRB.

#### **Indicator group G.**

According to indicator G, Dr. S. Yordanova-Tomova has 100 points, which significantly exceeds the required 70 points. The points on this indicator are formed by her h index ( $h = 7$ ) and by the fact that she was the supervisor of graduate students and the head of a scientific project financed by the Scientific Research Fund (FNI) of SU "St. Kl. Ohridski". She was also a member of the scientific team in another 5 scientific projects, but they were not scored.

She was awarded for "Outstanding Young Scientist in the Field of Organic Chemistry-2017" with the award of Acad. Ivan Yuchnovski. She participated with posters and reports in 10 scientific forums. The candidate, assist. prof. Dr. Stanislava Yordanova-Tomova meets the mandatory requirements for the position of "associate professor". All submitted articles are in the field of the competition.

The candidate's scientific interests and research are focused in the field of organic photochemistry and molecular spectroscopy. The main contributions of the works presented in the competition are in the synthesis of new monomeric and dendrimeric compounds mainly based on 1,8-naphthalimides and their metal complexes.

The photophysical characteristics and sensory ability of the obtained compounds were investigated, and the candidate actively participated in the preparation and recording of the spectra of the various compounds in the presence and absence of metal ions and interpreted the obtained results. All compounds are correctly characterized using modern methods such as FTIR, NMR, fluorescence and EPR spectroscopy.

The main scientific contributions of the candidate can be grouped as follows:

1. *Synthesis of new compounds and study of photophysical characteristics in solvents of different polarity* [1, 3, 4, 6, 8, 9, 14, 15, 17, 18, 19].

Some of the more significant contributions are:

A multifunctional compound was obtained, using for the first time 4-chloro-7-nitrobenzofurazan for the peripheral modification of a second generation poly(propyleneimine)

dendrimer. It has been found that the intensity of the emitted yellow-green fluorescence strongly depends on the polarity of the medium.

For the first time, a new benzofurazan-cyclam conjugate was synthesized by direct arylation of cyclam amino groups with 7-chloro 4-nitro-benzofurazan. Its photophysical properties were investigated in organic solvents of different polarity. It was found that the quantum yields strongly depended on the polarity of the medium and the values obtained in non-polar medium were higher than those recorded in polar solvents. Cu(II) complexes of the benzofurazan-cyclam conjugate and the influence of the copper cation on the fluorescence intensity were obtained and investigated. Copper ions were found to coordinate with the tertiary amino groups of the cyclam ring.

New bis-1,8-naphthalimide derivatives with different substituents at the fourth position in the naphthalene ring have been synthesized. It was found that the fluorescence intensity strongly depends on both the type of substituent and the polarity of the solvents (4)

Two new polypropylene amine dendrimers of the first and third generation, modified at the periphery with 4-amino-1,8-naphthalimide and their metal complexes with Cu (II) and Zn(II) ions, as well as copper complexes of polypropylene imine dendrimers, modified at the periphery with 1,8-naphthalimide, were synthesized. It has been found, that the metal ions coordinate to the nitrogen atom from the core of the dendrimer molecule.

A poly(propyleneimine) dendrimer modified with a pyridinium salt of 4-acylamino-1,8-naphthalimide with blue fluorescence was synthesized. The influence of pH and its potential application as a pH sensor have been investigated.

The functional characteristics of a new eosin dye with a biocidal quaternary ammonium group were investigated in aqueous solution and in organic solvents of different polarity. It was established that the spectral properties depend on the nature and polarity of the respective solvents.

*2. Study of the sensory properties of the newly synthesized compounds to different metal ions [1, 3, 4,5, 6, 10, 14, 19].*

Among the main contributions in the scientific work of Dr. Stanislava Yordanova-Tomova, we can note the research on the sensory properties of the obtained new compounds to various metal ions.

The capabilities of a modified polypropylene imine dendrimer to detect the presence of metal ions were investigated. It was found that the best sensing activity of the dendrimer was towards Fe(III) ions, and it could be used as a selective sensor for their detection.

Two new blue fluorescent polymerizable 1,8-naphthalimides and their copolymers with styrene have been synthesized. Their functional properties and their application as sensors for the detection of Fe(III) cations have been investigated .

*3. Investigation of the influence of the pH of the medium on the absorption and fluorescence intensity - 1, 7, 8*

It was found that the fluorescence intensity of the new 1,8-naphthalimide compounds [7] depends on the pH of the medium, being low in alkaline medium and increasing in acidic medium.

A poly(propyleneimine) dendrimer modified with a pyridinium salt of 4-acylamino-1,8-naphthalimide with blue fluorescence was synthesized. The influence of pH and its potential application as a pH sensor have been investigated.

*4. Investigation of antimicrobial and antibacterial properties of the newly synthesized compounds, as well as their copper and zinc complexes [1, 2, 3, 4, 5, 6, 9, 11, 14,16,17].*

A large part of the synthesized compounds and their metal complexes have been tested in vitro for biological activity with the aim of potential application in medicine, as antibacterial and antifungal agents. All tested compounds showed good antimicrobial and antibacterial activity.

Cotton textiles treated with copper complexes of first and third generation poly(propyleneimine) dendrimers modified with 1,8-naphthalimide were found to show good activity against bacterial biofilm formation.

The main contribution of the candidate here is both in the preparation and characterization of these compounds, and in finding a relationship between structure and biological properties.

**Teaching activity**

As an assistant she leads laboratory exercises and seminars in Organic Chemistry - Part I and II for bachelor's degree students speciality in Chemistry, Ecochemistry and Pharmacy of the Faculty of Chemistry and Pharmacy at SU as well as to students from all specialties in the Faculty of Biology who study Organic Chemistry.

She led practical exercises in Organic Photochemistry to students from all chemical specialties. There is no evidence that she developed and led lecture courses. She was the supervisor of 6 successfully defended diploma theses.

**Critical remarks, recommendations and notes**

I have some critical remarks regarding the presentation of the materials submitted for the competition.

A bad impression is made by the errors and inconsistency in the numbering of the publications and in the data specified in different documents.

The author's reference for the contributions of the scientific papers is written swiftly and do not indicate the essence of the contributions. It is written in bad Bulgarian with many mistakes. It is likely that Google Translate was used without the text being read and corrected.

It is surprising to me that the presented habilitation thesis is not titled and there is no cited literature. I find the description of experimental methods in it superfluous.

I think it is good to have one common folder with copies of the publications and in this one each article should be in a separate PDF file. In the documents provided, the publications are in one file following each other and this makes it extremely difficult to find a specific article.

I strongly recommend to assist. prof. Dr Stanislava Yordanova-Tomova, in her future work, to be more precise and with the necessary attention when preparing written materials.

Careless presentation of contest materials does not reduce the value of the publications.

## CONCLUSION

The documents and materials submitted for the competition by Dr. Stanislava Yordanova-Tomova **meet all the requirements** of the DASRB, the Rules for the Application of the Development of Academic Staff in the Republic of Bulgaria Act, and the Rules set at the Sofia University "St. Kliment Ohridski", for applying the Act aforementioned.

She has presented a **sufficient** number of scientific papers published in international specialized journals. The applicant's works have original scientific and applied contributions. Their high scientific level is proven by the number of citations from other authors. The scientific and pedagogical qualification of Assist. Prof. Dr. Stanislava Yordanova-Tomova is **undoubted**.

The results achieved demonstrate the applicant's competence and research experience. This gives me a reason to give my **positive assessment** and to recommend the Academic Jury to render a positive decision on Dr. Stanislava Yordanova-Tomova filling the position of **Associate Professor** in the professional field 4.2 "Chemical Sciences" (Organic Photochemistry) for the needs of the Department of Organic Chemistry and Pharmacognosy, Faculty of Chemistry and Pharmacy, Sofia University "St. Kliment Ohridski".

Date: 25/03/2024

Reviewer:

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