R E V I E W

by
Prof. DSc Ivo Grabchev
University of Sofia “St Kliment Ohridski”, Faculty of medicine

Member of the Academic Jury set to render a decision on the competition for filling the academic position of a Associate professor in the Professional Field 4.2. Chemical Sciences according to the Classifier of the Areas of Higher Education and the Professional Fields (Scientific Specialty “Organic photochemistry”)
This Review is prepared in response to Order №РД-38-448 of 15.09.2021, issued by the rector of Sofia University "St. Kliment Ohridski" , following the decision made by the Academic Jury that was held on 11.10.2021. The Review is in compliance with the Development of Academic Staff in the Republic of Bulgaria Act (DASRBA), 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" and with the Rules set at the Faculty of Chemistry and pharmacy, for applying the Act aforementioned

1. Presentation of the candidate

Chief Assistant Professor Dr Stanislav Stanimirov graduated from Sofia University "St. Kliment Ohridski ”, Faculty of chemistry and pharmacy, specialty Chemistry, with a bachelor's degree in 2002. In 2009 he obtained a dissertation for the PhD degree in Organic Chemistry by code 01.05.03 on the topic: “Synthesis and photophysical properties of ternary β-dicarbonyl europium complexes with nitrogen-containing or poly (oxyethylene phosphate) ligands” with supervisor prof. Ivan Petkov. The dissertation has been prepared in the Department of Organic Chemistry at the Faculty of chemistry and pharmacy at Sofia University “St. Kliment Ohridski”.
During the period 2007 - 2008 he was a chemist in the Department of Organic Chemistry at the FCF at Sofia University "St. Kliment Ohridski". In 2008, after winning a competition, he was appointed an assistant, and since 2009 he has been a Chief assistant professor at the same department.

In 2007 and 2008 Dr. Stanimirov specialized in the laboratory of prof. H.-J. Butt in Mainz, Germany under the DAAD program for two and one month, respectively. In 2009 he conducted a one-month specialization in the group of prof. Torsten Fiebig at Boston College, Boston US.
In 2013, 2014 and 2015, he again conducted one-month research on the Beyond EVEREST project in Mainz, Germany. From 2018 to 2019, he was a research assistant in the group of Dr Matthew Davies and prof. James Durrant at Swansea University, Swansea, UK.
Dr. Stanislav Stanimirov is a co-author of 19 scientific papers in journals with impact factor with a total IF = 33.268, which are distributed by quartiles as follows: in Q1 - 6; in Q2 - 5; in Q3 - 6; in Q4 - 1; without quartile - 1. They are cited 142 times (Scopus and WoS database, without auto-citations) and his h-index is: 8 (according to Scopus). He has participated with 10 oral and poster presentations at various international and national scientific forums.

2. Evaluation of research activity

In this concurs Dr. Stanimirov participates with 16 scientific papers, which do not repeat those for obtaining the educational and scientific degree "doctor". All publications presented for review are referenced and indexed in Scopus or Web of Science, 6 of them are in quartile Q1, the remaining 5 in Q2, 4 in Q3 and one is in a magazine without quartile.
The relevance and significance of these works is evidenced by the fact that they have been cited 123 times (excluding self-citations and co-authors) in scientific journals referenced and indexed in Scopus and WoS. According to the Development of Academic Staff in the Republic of Bulgaria Act (DASRBA), and the regulations for acquiring scientific degrees and for holding academic positions in FHF at Sofia University “St. Kliment Ohridski” of the candidates for the academic position “Associate Professor”, the minimum required total number of points from the indicators in groups A-G is 510 points. In the current concourse Dr Stanislav Stanimirov participated with 726 points, which exceeds the required 510 points.
Since 2009 Dr Stanimirov possesses the scientific degree "doctor", which means that he meets the requirement of the mandatory indicator of group A of 50 points. According to the indicators in group B, he has presented 5 scientific publications in journals with high impact factor and quartiles (1 of them with Q1, three with Q2 and one with Q3) with which it covers the required 100 points for this indicator. These

publications refer to important and current scientific areas such as the study of metal complexes using various ligands. In this direction, the contributions of Dr Stanimirov in the study of electron spectroscopy for determining the photophysical and structural properties of europium complexes of β-dicarbonyl compounds deserve high praise.

According to the indicators from group D, 11 publications are presented, in which case the total number of points is 220 out of the required 220 points. The articles were published in journals with a high impact factor - five of them with Q1, two with Q2, three with Q3 and one without quartiles.

The presented reference for the citations under indicator E is made correctly according to the requirements of Scopus and Web of Science and shows that of the scientific papers presented in the competition, twelve of them are cited 123 times, which is equal to 246 points with the required 70 points.

According to indicator G, Dr Stanimirov, has 110 points, with a required 70 points. The points on this indicator are formed by h = 7 and his participation as a member of a research team on eight projects funded by the National Scientific Fund.

From the presented scientific papers for participation in the concourse, it can be seen that Dr Stanislav Stanimirov works in a topical field of organic photochemistry, namely the study of the photophysical characteristics of various metal complexes in order to obtain organic light-emitting devices. The applicant's main scientific contributions can be grouped as follows:

1. *Electron spectroscopy as a method to determine the photophysical and structural properties of europium complexes of β-dicarbonyl compounds.*

The determination of the photophysical properties and structural features of newly synthesized europium complexes, using various techniques and methods of electronic absorption and emission spectroscopy, are the scientific contributions of the articles included in this scientific field. In addition, the synthesis of new ternary europium complexes with poly(oxyethylenephosphate) ligands of different oxyethylene chain lengths between phosphate groups by improved methods and the use of N-ethyldiisopropyl amine and propylene oxide as an agent that reacts with the forming agents can be noted as an achievement. in the course of the reaction tetraammonium chloride. In this way the yield and purity of the final products is increased.

A spectroscopic technique has been developed, using lanthanide complexes, to determine the size of the molecules and the distance between the particles in the

donor-acceptor system, which has an advantage over other FRET techniques due to the reliability of the results obtained. By using this technique, the size of various complexes of inclusion of dyes in cyclodextrins, dendrimers, metal-organic networks, etc. can be determined.

The pH dependence of the emission quantum yield of new water-soluble europium poly(oxyethylene phosphate)-tris-(β-diketonate) complexes and the effect of increasing the luminescence of these compounds in solution and in the solid state in the presence of amines or ammonia have been established. The effect of influencing the interconbination conversion of a ligand by coordinating a donor molecule (NH3) through a metal ion was first described.

The emissivity of such compounds has been shown to be related to their possible use as biomarkers in systems for testing and visualizing biological structures, such as DNA, proteins, or as amine or pH sensors.

The low toxicity of the studied POEPAT polymers makes them suitable as carriers of biologically active substances.

2. *Spectral characterization of electroluminescent organoiridium complexes used as emitters in electroluminescent devices.*

The electroluminescent properties of organometallic compounds of transition metals in connection with the possibility of obtaining phosphorescent organic light-emitting devices have been studied. These complexes contain a five-membered chelate ring with carbon and nitrogen atoms coordinated to the metal. It was found that the electronic transitions responsible for phosphorescence in these complexes are a combination of transitions with charge transfer from metal to the ligand and ligand-centered (π-π^*) transitions. It has been found that with cyclometallic ligands, iridium Ir(III) prefers to form bis-cyclometal complexes. The effect of the type of substituent in the cyclometal benzothiazole residue of the iridium complex was determined using a series of heteroleptic Ir (III) complexes. The π electron donor substituents were found to displace the emission band batochromically. Electron donor substituents such as dimethylamino and methoxy derivatives have been found to have lower quantum yields, with low triplet emission of these complexes being a combination of MLCT and LC states. It was also found that the radiative properties of the complexes depend on the temperature. This conclusion was made after in-depth studies of the photophysical properties of complexes in solutions of different polarity, based on the absorption and emission spectra captured at room temperature

and at 77K in solution, as well as the study of emission anisotropy of complexes in polymer matrices.

3. *Application of electron spectroscopy for determination of thermodynamic and photochemical parameters of systems of organic molecules used as sensors or for optical recording of information.*

The effect of β-cyclodextrin on the system of chemical equilibria of 4,7-dihydroxyflavilium was determined using pH change. The trans chalcone reacts with β-cyclodextrin in a weakly acidic medium, unlike the flavilium cation, which does not form a complex, whereas when the trans chalcone is irradiated in the presence of β-cyclodextrin, the flavilium cation is formed. It has been shown that when irradiated with light, the complex is destroyed leaving the β-cyclodextrin cavity empty. This process is reversible and the trans chalcone again forms a complex with β-cyclodextrin when irradiation is stopped. In this case, the conversion of the flavilium cation to a trans chalcone in the presence of β-cyclodextrin is thermodynamically more favourable.

It has been found that the metastable state of a system of chemical complexes of the flavillium cation can be used for optical recording and storage of information in optical memories, with the possibility of spontaneous erasure or recording being blocked by the metastable state.

4. Teaching activity

The teaching activity of Dr Stanislav Stanimirov, includes the courses in "Organic Photochemistry" - specialty "Chemistry: students from FHF in full-time and part-time education, Organic Chemistry in" Specialty "Agrobiotechnology" from BF, full-time education. He also conducts practical and seminar classes and exercises on "Organic Chemistry Part I and II" for all specialties of FHF and BF, full-time and part-time training and seminars and exercises on "Organic Photochemistry" for all chemical specialties of FHF, regular and distance learning.

5. Opinions, recommendations, and notes

I have no remarks regarding the submitted materials under the competition. They are prepared correctly and clearly distinguish the scientific contributions of the candidate and fully meet the requirements of the law and the regulations of Sofia University "St. Kliment Ohridski ». My personal impressions of Dr Stanimirov are

excellent. He is always positive, responsive, and willing to cooperate with colleagues.

6. Conclusion

According to the requirements DASRBA, on the grounds of the documentation presented by the candidate, on his publications reviewed and the above assessment, I recommend to support the election of **Dr Stanislav Stanimirov** as a successful candidate for filling the academic position of an **Associate Professor** in the professional field 4.2. Chemical Sciences (Organic photochemistry).

Date: 3.11.2021 Reviewer: ……

Prof. Ivo Grabchev