

To the Chair of the Scientific Jury  
Sofia University “St. Kliment Ohridski“  
Faculty of Chemistry and Pharmacy

### **Statement of opinion**

Regarding a competition for the occupation of the academic position “Associate Professor in Radiochemistry”, professional field 4.2. Chemical sciences (Radiochemistry), announced in the State Gazette, issue 103 from 10.12.2021 for the needs of the Faculty of Chemistry and Pharmacy at Sofia University “St. Kliment Ohridski“

**from Prof. Dr. Aneliya Klisarova, MD, PhD, DSc**

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By Order № RD-38-61 from 24.01.2022 of the Rector of Sofia University “St. Kliment Ohridski“ and by a decision of the Scientific Jury, I have been selected to participate in the above competition jury with a statement of opinion.

The only candidate who has applied for this competition is Senior Assistant Dr. Boyan Rumenov Todorov.

#### **Biographical data:**

Boyan Rumenov Todorov was born on 16.01.1978 in Russe. He completed his secondary education at the Secondary School of Mathematics and Natural Sciences “Acad. Ivan Tsenov” in Vratsa, majoring in chemistry, with an average result Very good (5.27). In the period 1996-2001 he completed his Master’s degree at the Faculty of Chemistry of Sofia University with an average result from his academic studies – Very good. In 2007 Boyan Todorov defended his PhD thesis entitled “Dewfinition and assessment of the distribution of radionuclides ( $^{137}\text{Cs}$ ,  $^{60}\text{Co}$  and  $^{241}\text{Am}$ ) in the environment“, scientific specialty “Analytical chemistry”, code 01.05.04. Boyan Todorov started his working experience at the Institute of Nuclear Research and Nuclear Energy at the Bulgarian Academy of Sciences (2002 – 2004). Since 2007 he has become successively

“assistant”, “senior assistant” and “chief assistant” at the Faculty of Chemistry and Pharmacy, Sofia University “St. Kliment Ohridski“. He has carried out several short-term specialisations in Luxemburg, Max-Planck-Institut für Polymerforschung, Mainz (Germany), the Universities of Helsinki and Barcelona.

The rich professional experience of Senior Assistant Boyan Todorov in the field of chemistry and radiochemistry give me grounds to claim that the candidate meets all the necessary requirements for the acquisition of the academic position “Associate Professor”.

In this competition Senior Assistant Boyan Todorov participates with 23 scientific publications in peer-reviewed and indexed journals in the world data bases for scientific information (Web of Science and Scopus; Publications in journals with impact factor (IF) – 21; total IF = 30.884; publications in Q1 – 3; publications in Q2 – 7; publications in Q3 – 6; publications in Q4 – 5; journals without quartile – 1 and a chapter of a book in English language. The scientific results are presented in a total of 10 oral reports and poster presentations at national and international fora.

Total number of citations – 67- Author ID, (SCOPUS): 55682578600

In the articles submitted for the competition: first author in 7 publications; second author in 8 publications; third author in 3 publications and sixth author in 1 publication.

#### **Assessment of contributions:**

The scientific contribution from the publications submitted for participation in the competition, is in the fields of radioecology, nuclear medicine and publications. The distribution of radionuclides in the environment is subject to profound study together with their application as visualizing agents and theranostic preparations. The investigated radionuclides are of various origin (natural and anthropogenic) and possess different nuclear properties such as half-life (with long life: families of  $^{238}\text{U}$ -  $4.468 \times 10^9$  years and  $^{234}\text{Th}$ -  $1.4 \times 10^{10}$  years,  $^{241}\text{Am}$ - 450 years; average life:  $^{60}\text{Co}$ - 5.3 years and  $^{137}\text{Cs}$ - 30.17 years; short life:  $^{125}\text{I}$ - 60 hours and  $^{18}\text{F}$ - 109.77 min.) and type of ionizing radiation (alpha, beta, gamma and positrone).

The main contribution can be summarized in the following three aspects:

- 1. Development and application of analytical and radiochemical methods for specific analysis of environmental tests (plants and soils) and foodstuffs used in highly effective**

**liquid chromatography (HPLC) and nuclear methods for analysis (ICP-MS, Gamma spectrometry) (1a, 2a, 5a, 1b, 3b, 4b, 6b, 7b, 8b, 11b, 13b) from the proposed list.**

The investigations in this aspect result in the following contribution:

- The most appropriate procedure was established and adapted (NIST) for nuclide fractioning (natural and anthropogenic) in soil types characteristic for the territory of Bulgaria.
- A period of redistribution of Am, Cs and Co is established between the soil phases.
- The impact of the climatic changes is studied through their simulation on the fractioning of Am, Cs, Co, Th and U for the various soil types.

**2. Optimisation of the methods for obtaining potential radiopharmaceutical preparations with application in theranostics (3a, 4a, 5b, 10b, 12b, 14b) from the proposed list.**

I would like to lay a special emphasis on this field, namely “Optimisation of the methods for obtaining potential radiopharmaceutical preparations with application in theranostics”. The development of modern pharmaceutical preparations is a complex process requiring thorough knowledge of the disease (molecular level) ensuring a most effective slowing down or discontinuation of the undesired process. In publication (5 c) the possibilities are used for radionuclide visualization for in vivo study of the polyoligopeptase (POP).

The investigations in this aspect demonstrate the following contribution:

- Radiochemical analysis is performed of new radioionising bifunctional compounds used for the successful marking of polyoligopeptase.
- A specific radiochemical procedure is established for recycling of <sup>18</sup> enriched water with application in production, research and hospital cyclotron complexes.
- A profound investigation has been conducted, aimed at revealing the possibilities of copper isotopes and superparamagnetic nanoparticles of iron oxide as theranostic agents.

- An effective procedure has been developed for isomerization of targeted trans cyclooctane bifunctional derivatives to be used for the creation of a new class of radioionising bifunctional compounds.
- Physicochemical parameters have been selected, which are necessary for adequate assessment of bifunctional compounds behavior as environmental pollutants, based on chemometric methods.

### 3. Archeometric investigations with R $\ddot{o}$ -fluorescent analysis (2b, 9b) from the proposed list

The contribution in the field of archeometric investigations with R $\ddot{o}$ -fluorescent analysis is the following:

- A series of golden standards have been developed for the calibration of a mobile R $\ddot{o}$ -fluorescent analyser.
- The artefacts from the gold excavation in Varna were made of a very well refined alluvial gold originating from various gold carrying rivers in the region.
- The exact element content has been established together with the supposed dating of the artefact (слитък) from cape Kaliakra.

#### **Teaching activities:**

For the past 5 years the teaching workload of Senior Assistant Boyan Todorov has varied between 460 and 530 hours.

Lecture courses:

- Ionising radiation measurement – specialty “Nuclear chemistry” (Faculty of Chemistry and Pharmacy), Bachelor degree, full-time training, compulsory subject
- Radioanalytic chemistry – specialty “Nuclear chemistry” (Faculty of Chemistry and Pharmacy), Bachelor degree, full-time training, compulsory subject
- Production of radioactive isotopes and marked compounds – specialty “Nuclear chemistry” (Faculty of Chemistry and Pharmacy), Bachelor degree, full-time training, compulsory subject

- Radioecology – specialty “Nuclear chemistry” (Faculty of Chemistry and Pharmacy), Bachelor degree, full-time training, compulsory subject

Practical seminars:

- Seminars and practical training in “Ionising radiation measurement” - specialty “Nuclear chemistry” (Faculty of Chemistry and Pharmacy), full-time and part-time training
- Seminars and practical training in “Radioanalytic chemistry” - specialty “Nuclear chemistry” (Faculty of Chemistry and Pharmacy), full-time and part-time training
- Seminars and practical training in “Production of radioactive isotopes and marked compounds” - specialty “Nuclear chemistry” (Faculty of Chemistry and Pharmacy), full-time and part-time training
- Seminars and practical training in “Radioecology” - specialty “Nuclear chemistry” (Faculty of Chemistry and Pharmacy), full-time and part-time training
- Seminars and practical training in the course “Instrumental methods for analysis I” – all specialties at the Faculty of Chemistry and Pharmacy, full-time training

### **Supervisor of 15 PhD students**

#### **Participation in scientific projects:**

Participation in over 10 scientific projects, funded by the Scientific Research Fund at the Ministry of Education and Science, the Scientific Research Fund at Sofia University “St. Kliment Ohridski“ and various Operational programmes.

Project leader of one project at the Scientific Research Fund at Sofia University “St. Kliment Ohridski“

Project leader of one project at the Scientific Research Fund at the Ministry of Education and Science

#### **Conclusion:**

Senior Assistant Boyan Todorov is working in three scientific directions: radioecology, nuclear medicine and archeometrics. He has extensive teaching and scientific research

experience. The presented scientific work have been highly assessed by a number of Bulgarian and international scientists. His work contributes to the development and the promotion of radiochemistry and its enhancement in Bulgaria and abroad.

In view of the above scientific contribution, the scientific and teaching experience as well as the participation in a number of scientific projects, I reckon that the requirements are fulfilled as stipulated by the Act on the development of the academic staff in the Republic of Bulgaria, the Regulations for the implementation of the Act on the development of the academic staff in the Republic of Bulgaria and the Regulations for the functioning of Sofia University “St. Kliment Ohridski“ and I recommend to the distinguished members of the Scientific Jury to confer to Senior Assistant Boyan Todorov, PhD, the academic position “Associate professor”.

Varna

Prof. Dr. Aneliya Klisarova, MD, PhD, DSc

08.03.2022