OPINION

on the competition for the academic position of "Associate Professor" in professional field 4.3. Biological Sciences, scientific specialty "Molecular Biology", announced in State Gazette No. 66 of 12.08. 2025 for the needs of the "Regulation of Gene Activity" department, Institute of Molecular Biology "Academician Rumen Tsanev", Bulgarian Academy of Sciences

Opinion prepared by: **Assoc. Prof. Desislava Nikolaeva Staneva, PhD,** Institute of Molecular Biology "Academician Rumen Tsanev" - BAS, Laboratory of Molecular Genetics, Epigenetics and Longevity, member of the scientific jury pursuant to Order No. 169-OB/01.10.2025 of the Director of the Institute of Molecular Biology - BAS.

General

The only participant in the announced competition for the academic position of "associate professor" is **Assist. Prof. Rositsa Georgieva Tsekovska, PhD**. The documents and materials submitted by the candidate fully meet the requirements specified in the Law on the Development of Academic Staff in the Republic of Bulgaria (LDASRB, amended, State Gazette No. 17 of 26.02.2019) and the regulations for application of LDASRB of the Bulgarian Academy of Sciences and the Institute of Molecular Biology "Acad. Rumen Tsanev" at the Bulgarian Academy of Sciences.

Brief biographical information about the candidate

Rositsa Tsekovska graduated from the University of Chemical Technology and Metallurgy in 1999 with a Master's degree in Chemical Engineering and in the same year joined the Institute of Molecular Biology "Acad. R. Tsanev", BAS, as a specialist chemist. In 2005, she obtained a PhD in Molecular Biology, defending her dissertation on "Non-enzymatic glycosylation of proteins in *Escherichia coli*." PhD Tsekovska continued her scientific career at the Institute of Molecular Biology, Bulgarian Academy of Sciences, in the department "Regulation of Gene Activity ", where she has held the positions of Research Associate II (2005-2011) and Assist. Prof. (since 2011). Assistant Prof. Tsekovska has over 20 years of work experience and professional expertise in the scientific field of "Molecular Biology," which is the field of the announced competition.

Fulfilment of the requirements for the academic position of "Associate Professor"

Dr. Tsekovska participates in the current competition with a total of 22 scientific papers, of which 16 are published in JCR-IF and/or SJR publications, 3 are chapters from books, and 3 are articles in non-refereed and non-indexed publications in Web of Science and Scopus. Among the publications in refereed and indexed journals, several articles with a high impact factor are noteworthy, including *Nature Protocols* (IF_{2024}=16.0); *International Journal of Biological Macromolecules* (IF_{2024}=8.5); *Journal of Biological Chemistry* (IF_{2003}=6.482), *NanoImpact* (IF_{2019}=5.478; IF_{2022}=4.9) and *Nanotoxicology* (IF_{2019}=4.925). The documents presented also show an impressive number of citations of publications co-authored by Dr. Tsekovska – 168 citations, compared to the 30 required for the academic position of "Associate Professor" (Indicator D.11). The candidate's scientometric indicators are: total JCR-IF after obtaining the PhD – 53.138 and Hirsch index (according to Scopus) – 4. All this is an indisputable indicator of the relevance of the topics developed by Assist. Prof. Tsekovska and the high scientific value of the results of her research activity. Moreover, the fact that she is the first author in 9 and the last author in 1 of the articles proves her major contribution to the development and performance of the research work, as well as to the publication and presentation of the results.

In addition, Dr. Tsekovska has participated in 23 scientific forums, 8 international, 3 national conferences with international participation, and 12 national scientific events, at which 10 reports and 13 posters were presented. The candidate is also actively involved in the execution of scientific projects. She participates in 3 projects funded by the National Science Fund of the Ministry of Education and Science. Dr. Tsekovska is the leader of two of these projects, one ongoing and one completed. She is a member of the scientific team of a project under the EU Horizon 2020 program.

Compliance with the minimum national requirements under the Higher Education Act.

A review of the documentation submitted clearly shows that, in terms of scientometric indicators, Dr. Tsekovska's scientific output fully meets and even exceeds the minimum national requirements for the academic position of "Associate Professor," as follows: Indicator 1 from group A - 50 points, the candidate has submitted a diploma for the scientific and educational degree "PhD" (No. 29476/21.01.2005). For Group B, Indicator 4, Habilitation Thesis - 107 points, formed from scientific publications in editions that are referenced and indexed in world-renowned scientific information databases (Web of Science and Scopus): with Q1 - 50 points, Q3 - 30 points, Q4 – 12 points, and one book chapter – 15 points. For indicators 7 and 8 in group D – 225 points from 5 publications in journals with Q1 – 125 points, 2 with Q3 with JCR-IF - 30 points and 4 publications in Q3 without JCR-IF - 40 points. Two book chapters are also listed - 30 points. According to indicator 11 in group D – 336 points for 168 citations of Dr. Tsekovska's works in scientific publications. Although not a mandatory requirement, the candidate has collected 120 points under indicators 15, 16, and 18 in group E as a result of active project work.

According to the above, Assist. Prof. Tsekovska fully meets the minimum national requirements under the LDASRB and the regulations for the ALDASRB of the BAS and the IMB "Acad. R. Tsanev," with a minimum requirement of 430 points; the candidate's total number of points is 838, which is almost twice the number required to obtain the academic degree of Associate Professor.

Evaluation of scientific contributions

The main research focus and the original results obtained in the works of Dr. Tsekovska are related to the role of non-enzymatic glycosylation (glycation) in cellular physiology and pathology (publications 1, 2, 10, 15, 16, 19-22). The contributions of scientific production in this direction can be summarized as follows:

- Glycation in *E. coli* is initiated by agents of endogenous origin, rather than by substances with glycating potential entering the cells from the culture medium. (15 and 22)
- Glycation plays an essential role in the aging process in bacteria - the progressive accumulation of advanced glycation end products (AGEs) in essential bacterial macromolecules (proteins and DNA) has been demonstrated over time. (19)
- Recombinant proteins produced by bacterial cells, in particular human gamma interferon, as well as beta interferon produced in eukaryotic CHO (Chinese hamster ovary) cells, are subject to non-enzymatic glycosylation. (16, 20 and 21). Glycation of biotherapeutics leads to changes in their structure, reduced or absent biological activity and strong immunogenicity, which causes adverse reactions in patients treated with such preparations and may pose a risk to their health.
- Revealing the effect of glycation end products on human physiology and the development of pathological conditions, two biomarkers with potential application in medical diagnostics have been identified. One is fructosamine (Amadori product) with biomarker potential for glycemic control in diabetic patients and in particular in patients with diabetic nephropathy. The other, N^{ε}-carboxymethyl(lysine) (CML) is one of the main glycation end products, the accumulation of which

has been found in the serum of patients with chronic kidney disease (CKD) and is a potential biomarker for CKD.
The discovery of mechanisms and the development of strategies for the suppression (publications 6, 7, 13, 14) and modulation (publication 17, 18) of the non-enzymatic glycosylation process are another essential part of the research conducted by Dr. Tsekovska. In these studies, the inhibitory activity of 16 substances was analyzed and it was found that they exerted effect at different stages of glycation to varying degrees. Among them, acetylsalicylic acid, resveratrol, theophylline, xanthine and L-lysine were identified as agents with the highest anti-glycation activity; caffeine has a neutral effect, while uric acid exhibits pro-glycation activity, and oxidative stress has a modulating effect on glycation. A particularly important and original contribution is the discovery that the glycolytic enzyme phosphoglucose isomerase (Pgi) of *E. coli* catalyzes the deglycation of proteins (publications 3 and 5). The unique library of monoclonal antibodies against advanced glycation end products (publication 18) is of a distinctly scientific-applied nature. Undoubtedly, in addition to their fundamental scientific significance, the results of all these studies also have great potential for application in practice.
An original result of Dr. Tsekovska's collaborative work is related to another non-enzymatic process, namely non-enzymatic DNA degradation. In these studies, the deoxyribonuclease activity of allelic acids was established, followed by analyses to reveal the mechanism leading to DNA molecule damage (Publication 8).
Another modern direction the candidate's research is nanotechnology (publications 4, 9, 11 and 12). The in-depth analysis of the available approaches for grouping the wide variety of existing nanomaterials, their applicability in regulatory frameworks and their integration with the concept of "Safe(r) by Design - SbD" is essential for assessing the risk of each specific nanomaterial, with the aim of its safe and sustainable introduction into various fields of production. Of contribution is the development of the electronic platform "Template Wizard" for standardized data collection from scientific experiments, metadata generation and their management.
In summary, the contributions of Dr. Tsekovska's research activities have both scientific-theoretical significance and scientific-applied value. As interesting and relevant from a scientific point of view are the topics on which Dr. Tsekovska conducts research, equally important and significant are the results obtained, due to their potential for application in various aspects of human practice (medicine, pharmacy, nanotechnology, etc.).

Conclusion

The materials and scientific production presented by Asst. Prof. Tsekovska are distinguished by high quality and good scientometric indicators and convincingly show that she is a well-established scientist with extensive experience and professional expertise in the field of the announced competition. The scientific contributions, the number and quality of the published scientific articles, as well as their high citation rate fully meet and in many of the indicators exceed the requirements for holding the academic position of "Associate Professor" specified in the Regulations for the ALDASRB of the Institute of Molecular Biology "Acad. Rumen Tsanev", BAS. This gives me reason to express my overall positive assessment and to confidently recommend to the esteemed Scientific Jury and the Scientific Council of IMB to award the academic position of "Associate Professor" in the scientific specialty "Molecular Biology" in the professional field 4.3 Biological Sciences to Asst. Prof. Rositsa Tsekovska, PhD.

19 November 2025

Member of the scientific jury:

/Assoc. Prof. Dessislava Staneva, PhD/