REVIEW

by Assoc. Prof. Dimitar Borisov Iliev, PhD, Institute of Molecular Biology; Section "Regulation of Gene Activity", Institute of Molecular Biology "Acad. Roumen Tsanev" – Bulgarian Academy of Sciences
regarding the competition for the academic position of "Associate Professor"
in professional field 4.3. Biological Sciences, scientific specialty *Molecular Biology*,
for the needs of the Institute of Molecular Biology "Acad. Roumen Tsanev", BAS

By Order No. 169-OB/01.10.2025 of the Director of the Institute of Molecular Biology "Acad. Roumen Tsanev" at BAS (IMB–BAS), I was appointed as a member of the scientific jury in connection with the competition for the academic position of "Associate Professor" in professional field 4.3. Biological Sciences, scientific specialty Molecular Biology.
At the subsequent meeting of the scientific jury on 16.10.2025, I was assigned to prepare a review for the procedure.

The competition was announced in the State Gazette, issue 66 of 12.08.2025, and has a single candidate: Senior Assistant Rositsa Georgieva Tsekovska, PhD.

The documents submitted by the candidate comply with the requirements of the Law on the Development of Academic Staff in the Republic of Bulgaria and the Rules for the Development of Academic Staff of BAS, and meet the criteria of IMB–BAS for acquiring the academic position "Associate Professor."
According to the reference presented in Table 1, Senior Assistant Dr. Rositsa Georgieva Tsekovska fully meets the minimum required points for the position of Associate Professor in groups A, B, and C, and significantly exceeds those in groups D and E, accumulating 838 out of the required 430 points according to the specific criteria of BAS and IMB–BAS.

Table 1. Minimum required points by groups of indicators for the academic position "Associate Professor":

Indicator	National criteria (points)	BAS and IMB–BAS criteria (points)	Submitted by the candidate
А	**50**	**50**	**50**
В	**100**	**100**	**107**
Г	**200**	**220**	**225**
Д	**50**	**60**	**336**
Е	**-**	**-**	**120**
Общо	**400**	**430**	**838**

1. General information about the candidate

Senior Assistant Rositsa Georgieva Tsekovska, PhD, is an established researcher at the Institute of Molecular Biology "Acad. Roumen Tsanev" – BAS, where she has worked since 1999, successively as a chemical specialist, doctoral student, Research Associate II degree, and since 2011 – Senior Assistant in the Section "Regulation of Gene Activity."
She obtained the educational and scientific degree "Doctor" in 2005 with a dissertation titled: *"Non-enzymatic glycosylation of proteins in Escherichia coli."*
The candidate has more than twenty years of continuous research activity in the field of molecular biology and protein biochemistry, which defines her as a highly qualified specialist with long-standing scientific and institutional affiliation with BAS.

2. Publication activity

Senior Assistant Tsekovska has submitted a total of **22 scientific works** published after obtaining the PhD degree, including:
• 16 articles in journals indexed in globally recognized scientific databases (Web of Science and Scopus)
• 3 book chapters
• 3 publications in other scientific outlets

It should be noted that the majority of these scientific works are published in international peer-reviewed journals, including those with high impact factors. The candidate's total JCR IF after obtaining her PhD is **53.138**.
Particularly notable is her co-authorship in an article published in *Nature Protocols* with a JCR IF of 16.0. The provided contribution statement confirms her substantial role in this publication.
The high quality of Dr. Tsekovska's publication activity attests to the strong scientific value of her work; as of the date of submission, her publications have been cited **168 times**.

Participation in scientific projects

Chief Assistant Prof. Tsekovska participates actively in national and international projects, including as **principal investigator of two projects** funded by the Bulgarian National Science Fund, which demonstrates her organizational and leadership competence.

Supervision of students

Senior Assistant Tsekovska has participated as consultant in supervising one thesis student.

3. Research activity and contributions

Dr. Tsekovska's main research focus is related to **glycation processes**, also known as non-enzymatic glycosylation or the Maillard reaction—a fundamental area in modern biology with direct relevance to biotechnology and medicine.
Her habilitation report systematically presents results that demonstrate conceptual consistency and originality of scientific research.

Her most significant achievements include:

• **Demonstrating glycation processes in prokaryotic cells (E. coli)** and determining their effect on the structure and function of recombinant human proteins.
She has conclusively shown that proteolysis and covalent dimerization of rhIFN-γ are closely linked to the glycation of the protein in bacterial cells. Reduced antiviral activity of rhIFN-γ due to proteolysis was observed, while covalent dimerization completely abolished it.
This research uncovered a previously unknown source of heterogeneity and immunogenicity in recombinant biotherapeutics produced in E. coli—highly relevant for their clinical application.
The results undeniably have priority and importance for biopharmaceutical production.

• **Experimentally establishing mechanisms for suppressing glycation** through various chemical agents and vitamins (acetylsalicylic acid (aspirin), aminoguanidine, arginine, vitamin B1 (thiamine), and the B6 vitamers—pyridoxine, pyridoxal-5'-phosphate, pyridoxamine).
She substantiated the protective role of arginine on the stability of rhIFN-γ.
The results show that all seven substances increase the biological activity of rhIFN-γ compared with interferon produced by untreated cells. Arginine was also shown to inhibit accumulation of one of the main advanced glycation end-products (N-carboxymethyl(lysine)) (CML) in rhIFN-γ, accompanied by structural stabilization of the protein.

• **Demonstrating the link between glycation and bacterial aging**, as well as the biomarker role of AGEs in chronic diseases such as diabetes and kidney dysfunction.
Progressive accumulation of AGEs in essential bacterial macromolecules (proteins and DNA) with time was demonstrated.
Analysis of CML levels in sera of patients with type 2 diabetes, chronic kidney disease (CKD), and combined CKD+T2D showed that **patients with CKD alone have significantly higher serum CML levels**, suggesting that kidney impairment—not diabetes—is the main contributor to serum CML accumulation.

• **Discovering a new function of the enzyme phosphoglucose isomerase (PGI) as a deglycase**, catalyzing degradation of Amadori products.
She proposed a unique model for the deglycating mechanism of E. coli PGI and hypothesized that due to its high evolutionary conservation, PGI most likely acts as a deglycase in all living organisms (Archaea, Bacteria, Eukarya).
This is undoubtedly a contribution of high scientific value with potential for new research directions.

• **Developing innovative approaches in nanotechnology and nanosafety** through participation in the international project NanoReg II (EU Horizon 2020), incorporating "Safe by Design" principles and FAIR data management.

Her research is characterized by a broad interdisciplinary scope—from molecular biology and protein biochemistry to nanotoxicology and regulatory aspects of nanomaterials.
All studies feature precise experimental methodology, well-argued interpretation, and a clear focus on practical applicability. The candidate demonstrates the ability to translate scientific findings into applied contexts—for example, through studies on the stability and immunogenicity of protein biotherapeutics and the development of nanosafety approaches.

Assessment of personal contribution

I firmly believe that all scientific works submitted in the competition for Associate Professor represent the personal work and merit of Senior Assistant Rositsa Georgieva Tsekovska, PhD.

Conclusion

Based on the submitted documents, scientific publications, and convincing contributions of Senior Assistant Rositsa Georgieva Tsekovska, it can be unequivocally concluded that she is a well-established researcher with high scientific culture, original thinking, and consistent productivity. Her scientific works contain significant fundamental and applied results recognized by the scientific community in Bulgaria and abroad.
Dr. Tsekovska possesses all qualities of a modern scientist—professional competence, methodological precision, international activity, and the ability to work in a multidisciplinary environment. Therefore, I consider that Senior Assistant Rositsa Georgieva Tsekovska fully meets the requirements of the Law on the Development of Academic Staff and the Regulations for its application for holding the academic position "Associate Professor" in professional field 4.3. Biological Sciences, specialty Molecular Biology. Her scientific output, original experimental contributions, and active participation in national and international projects convincingly demonstrate her high qualification, maturity, and readiness for independent scientific work.

I **unreservedly recommend** that Senior Assistant Rositsa Georgieva Tsekovska, PhD, be elected to the position of Associate Professor in professional field 4.3. Biological Sciences, specialty Molecular Biology, at the Institute of Molecular Biology "Acad. Roumen Tsanev" – BAS.

Date: 17.10.2025

Prepared by:
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(Assoc. Prof. Dimitar Iliev, PhD)