

OPINION

By Prof. Roumyana Mironova, PhD

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Regarding: Competition for the academic position of Associate Professor at IMB-BAS, announced in State Gazette No. 52/18.06.2024

By Order № 110-OB/28.06.2024 of the Director of IMB-BAS I have been appointed as a member of the scientific jury in a competition for the academic position of Associate Professor in the same Institute in the professional field 4.3 Biological sciences, scientific specialty **Molecular biology**, for the needs of the Department of Gene Activity Regulation. For participation in the announced competition has submitted documents one candidate - Elena Bozhidarova Krachmarova, PhD and Senior Assistant Professor at the same Institute. I have been provided electronically with all the documents required by the Law on the Development of Academic Staff in the Republic of Bulgaria (LDASRB), the Regulations for its implementation (in force since 05/09/2023) and the relevant regulations of BAS and IMB-BAS. The applicant has submitted a service note certifying that she has more than 10 years of total experience in the field of Molecular Biology, which makes her legitimate to participate in the this competition.

Brief CV

Dr. Krachmarova obtained her Master's degree in Biotechnology Engineer in 2010 at the University of Chemical Technology and Metallurgy (Sofia), and her PhD degree in **Molecular Biology** in 2018 at IMB-BAS with the dissertation topic "Expression and properties of human interferon-gamma and its mutant analogues", and scientific supervisors Acad. Ivan Ivanov and Associate Professor (now full Professor) Genoveva Nacheva. At IMB-BAS, Dr. Krachmarova has successively held the academic positions of Assistant Professor from 2011 to 2015 and Senior Assistant Professor from 2018 to the present. During this period the candidate has enriched her competences in the field of Molecular Biology through two long-term specializations in prestigious foreign institutions - at the Institut de Biologie Structurale (IBS) (Grenoble, France) and at one of the leading biotechnology companies in Europe - Proteros bio-structures GmbH (Martinsried, Germany). She has also participated in several short-term practical courses with a molecular biology focus (PCR, cell culturing, protein crystallization and bio-molecular interactions). Dr. Krachmarova has been awarded several prestigious prizes - the Union of Scientists in Bulgaria Award for Scientific Excellence of Young Scientists (2019), the Eureka Prize for Scientific Achievements in 2018, and in 2020 she received the Eureka Prize for Young Inventor, making her the only two-time winner of the Eureka Prize. *These brief biographical data show that in the course of her career development Dr. Krachmarova has acquired sufficient theoretical and practical experience in the **Molecular Biology** specialty of the current competition, and that her scientific and applied achievements have been highly evaluated.*

Scientific metrics, research areas and contributions

Dr. Krachmarova participates in the current competition with a total number of 16 publications, including 14 journal articles and 2 patents (one Bulgarian and one European). The majority of

her scientific articles (11) are refereed in Web of Science (WoS), and 3 of them - only in Scopus. The overall JCR-IF of all articles is high - **47.536**, and by quartiles the articles are distributed as follows: Q1 - 8 pcs, Q2 - 1 pcs, Q3 - 2 pcs and Q4 - 3 pcs, which shows that among the articles dominate those with the highest quartile (57%). The research articles with candidate's coauthorship have been cited a total of 91 times in WoS and Scopus. In 2023, Dr. Krachmarova was an invited speaker at the 47th FEBS Congress. So far, she has participated with oral presentations in more than 10 national and international meetings and with poster presentations in more than 20 conferences.

Thematically, Dr. Krachmarova's publications fully correspond to the **Molecular Biology** specialty of the current competition. The contributions in these publications relate to the following three research areas:

1. Investigation of the molecular mechanisms of action of SARS-CoV-2 virus proteins ORF6 and Nsp13 in infected cells. These are mainly the contributions in the publications reoffered to as habilitation thesis (Group B). A mechanism of interaction between viral ORF6 and RAE1 proteins has been proposed for the first time and the first ORF6 inhibitor, a potential anti-COVID-19 therapeutic, has been reported. Human interferon-gamma (hIFN- γ) is one of the major cytokines involved in the cytokine storm during severe COVID-19 infections. In this regard, the key role of heparan sulfate in IFN- γ signal transduction pathways has been demonstrated by experimental and theoretical studies. Also, a significant contribution of both a scientific and applied nature in the candidate's habilitation work is the theoretically and experimentally proven role of heparin in suppressing the cytokine storm.

2. Investigation of factors affecting the biological activity of hIFN- γ and approaches for its overexpression prevention. The most important contributions of scientific and applied nature in this area are: a) the first published models of glycosylated hIFN γ forms; b) the demonstration that nucleic acids are integral components of inclusion bodies in bacteria; c) the strategy for isolation of hIFN γ from a cytosolic fraction using the protease RTX has been explored for the first time. Dr. Krachmarova's highly applied contributions include the two patents (European and Bulgarian) dedicated to a method for the production of mutant hIFN γ forms with the potential to combat several (mainly autoimmune) diseases linked to interferon overexpression.

3. Thermodynamics of the interaction of ionic liquids with the transport protein serum albumin. The results of these studies could find application in pharmacy, and particularly in the development of new therapeutic formulations, as well as in the improvement of the existing ones.

Compliance with the LDASRB Act and its Implementing Rules

In the table below I have presented the compliance of Dr. Krachmarova's group of indicators A to E with the national minimum requirements, adjusted for BAS on indicators D and E. As can be seen from the table, the applicant's total score significantly exceeds the required minimum. *This is mainly due to the citations of her publications, keeping in mind that citations are one of the most relevant indicators of research significance and applicability.*

| Indicators' Group | Minimum Points' Number | Candidate's points |
|--------------------------|-------------------------------|---------------------------|
| A | 50 | 50 |
| B | 100 | 100 |
| G | 200 (220 for BAS) | 230 |
| D | 50 (60 for BAS) | 182 |
| E | Not required | 171.9 |
| Total | 430 | 733.9 |

Project activity

Dr. Kruchmarova presented a list of participations in 12 national and 2 international projects. She was the PI of a project with budget funding, for which IMB received funds worth BGN 9,400.00. I will only point out that according to the Regulations for the Application of the LDASRB Act, for the academic position of Associate Professor points under indicator E are not required, but for the position of full Professor at least 150 points are required, *i. e.* regarding this indicator the candidate's activities exceed even the required minimum for Professor position. *With this, I want to emphasize that Dr. Kruchmarova's rich experience in the implementation and management of research projects is extremely valuable and represents a solid basis for her successful realization at the new academic position.*

Social and teaching activities

Dr. Krachmarova has good organizational and pedagogical skills. She has participated in the organization of national and international scientific events and has assisted as a consultant in the development and successful defense of three theses - one for a Bachelor's degree and two for a Master's degree. *These characteristics are required for an imminent Associate Professor who will have the opportunity to train PhD students and to pass on his experience to the next generations.*

CONCLUSION

The only applicant in the current competition, Dr. Elena Krachmarova, fully meets and significantly exceeds the requirements of the LDASRB Act, BAS and IMB-BAS for the occupation of the academic position of Associate Professor. The candidate has significant scientific and scientifically-applied contributions, which is evidenced by the publication of her research in prestigious scientific journals, patents (including European) and by the repeated citation of her works. She has a solid methodological background and a clearly defined research profile in the field of Molecular. All this gives me a reason to confidently recommend to the esteemed members of the Scientific Council at IMB-BAS to vote positively for the election of Dr. Elena Bozhidarova Krachmarova to the academic position of Associate Professor.

October 17, 2024

Prof. R. Mironova