

## **Scientific opinion**

**by Prof. Dr. Penka Mladenova Petrova,  
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**Regarding:** Evaluation of a candidate, a participant in a competition for the academic position "Associate Professor" at the Institute of Molecular Biology "Roumen Tsanev" - BAS

### **1. Information about the contest**

The competition is by professional field by professional field 4.3. Biological Sciences, scientific specialty "Molecular Biology" for the needs of the "Regulation of Gene Activity" section announced in the State Gazette No. 52/ 18.06.2024. My participation in the Jury is in accordance with Order No. 110-OB/28.06.2024 of the Director of the Institute of Molecular Biology "Roumen Tsanev, Prof. Dr. A. Gospodinov.

### **2. Information about the candidate**

The only candidate in the competition for the academic position "Associate Professor" is Dr. Elena Bozhidarova Kruchmarova, assistant-prof. at the Institute of Molecular Biology "Academician Roumen Tsanev", BAS. From 2015 to 2018, Elena Kruchmarova was a PhD student at the same institute, and in 2018 she defended her PhD Thesis on the topic: "Expression and properties of human interferon-gamma and its mutant analogues". Her doctoral dissertation received the award of the Union of Scientists in Bulgaria, and later Elena Kruchmarova received two consecutive awards of the "Eureka" Foundation: for high scientific achievements in 2018, and for young inventor in 2020.

### **3. Fulfilment of the requirements for occupying the academic position**

Dr. Elena Kruchmarova participated in the competition with 16 scientific works, of which 14 scientific publications referenced in Scopus and WOS and two patents: one for Bulgaria and one European patent. The total Impact Factor of the articles after acquisition of ONS "Doctor" is 47.536. Scientific works form points according to the indicators of PPZRASRB as follows: Indicator A - 50 points (dissertation for ONS "Doctor", indicator B: 100 points (4 articles with Q1 x 24 points). Indicator Г is formed by articles with quartile and patents: 4 articles with Q1 x 25 points = 100 points, 1 article with Q2 x 20 = 20 points, 2 with Q3 x 15 = 30 points, 3 articles with only SJR x 10 = 30 points and two patents on 25 points = 50 points, or all points total 230 points, with 220 points required. From group of

indicators D (citations, minimum required points: 60), Dr. Kruchmarova presents a list of 91 citations in refereed journals (x 2 points) = 182 points. From participation in multiple projects under indicator E (although points for this indicator are not required for the position of "Assoc= Prof.", the candidate has 171.9 points. Thus, the total number of points for Assistant Professor Kruchmarova is 733.9 points, with a minimum of 430 points according to the Rules of Application of the Law in Bulgarian Academy of Sciences. Although it is optional, it should be noted, that she has a Hirsh index H 7 according to SCOPUS database.

The reference list and the supporting material showed that Elena Kruchmarova meets the minimum requirements of ZRASRB and the Regulations for its application for holding the position of "Associate Professor", as well as the additional requirements of the Bulgarian Academy of Sciences for the position of "Associate Professor".

#### **4. Scientific topics**

The scientific directions in which Elena Kruchmarova has published in recent years are mainly three: (1) study of factors influencing the biological activity of human gamma-interferon (hIFN $\gamma$ ) and its production as a recombinant protein, which direction is a continuation of the dissertation work, (2) study of the molecular mechanisms of action of proteins of the SARS-CoV-2 virus in infected cells and (3) thermodynamics of interaction of ionic liquids with the transport protein serum albumin.

In the studies of the factors affecting the biological activity of human gamma-interferon (hIFN $\gamma$ ) and its production as a recombinant protein, the first model structures of glycosylated homodimers of hIFN $\gamma$  were created and a strategy for the synthesis of soluble gamma-interferon was applied for the first time. are optimal storage conditions for gamma-interferon and its mutant derivatives.

Regarding the SARS-CoV-2 virus, the molecular mechanisms of action of the ORF6 and Nsp13 proteins in infected cells have been investigated, and inhibitors of ORF6 have been proposed for the first time, which is a key step for the development of potential drugs for COVID-19. Through in silico screening, potential inhibitors of the viral protein helicase Nsp13 were investigated. A new antiviral mechanism of action of Ritonavir against SARS-CoV-2 has been discovered.

A third direction in Dr. Kruchmarova's scientific work is the search for opportunities to improve the delivery of drugs in the human body, by studying the thermodynamics of interaction of ionic liquids with the transport protein serum albumin.

8 ionic liquids based on salicylic acid have been synthesized and have shown efficacy in the treatment of chronic skin diseases.

Dr. Elena Kruchmarova's future research will be devoted to the search for new antiviral substances, e.g. peptide aptamers whose potential to inhibit the activity of ORF6 and NSP13 proteins of the SARS-CoV-2 virus will be investigated together with immunological assays of infected cell lines.

### **5. Participation in scientific projects and contracts**

Associate Professor Kruchmarova has a key role as a participant and leader of a large number of scientific projects, among which are funded by the National Science Fund under Competitions for Fundamental Scientific Research, the RILA Program, etc. She is also a participant in international projects, National scientific programs and is the head of a scientific project financed by the Program for supporting young scientists and doctoral students. Her co-authorship in patents is very important, as it implies good communication with the business environment in the future.

Parallel to her scientific activity, Dr. Elena Kruchmarova was a consultant for two diploma theses of master's students at HTMU.

### **6. Conclusion**

In conclusion, Assistant Professor Elena Kruchmarova, PhD, has significant scientific achievements in the field of molecular biology. In addition to having an excellent knowledge of the problems on which she works, she brings enthusiasm and sensitivity to particularly significant research for science and society. Based on the presented materials and analysis of the achievements, I give a completely POSITIVE assessment to the candidate and I strongly recommend to the Scientific Council of the Institute of Molecular Biology "Roumen Tsanev" - BAS to choose Dr. Elena Bozhidarova Kruchmarova to take the academic position "Assoc. Prof.".

20.10.2024

Signature:

(Prof. Penka Petrova, DSci)