



## STATEMENT

on the competition for the academic position "**Professor**"  
in the professional field 4.2. Chemical sciences (Physical chemistry),  
announced in the State Gazette no. 20 / 10.03.2020  
by the Institute of Physical Chemistry - BAS  
for the Laboratory „Electron Microscopy and Microanalysis“  
with applicant **Assoc. Prof. Dr. Bogdan Stavrev Ranguelov**,

**Member of the Scientific Jury: Prof. Dr. Ekaterina Zhecheva** from the Institute of General and Inorganic Chemistry of the Bulgarian Academy of Sciences

**1. General characteristics of the research activity of the applicant.** Assoc. Prof. Bogdan Ranguelov graduated in the year 1994 from the Faculty of Physics of Sofia University “St. Kliment Ohridski” with a master degree in Physics. The scientific career of Mr. Ranguelov took place at the Institute of Physical Chemistry (IPhCh), where he was starting work in 1995. In 2009, he defended a PhD thesis in physical chemistry entitled “Instability of vicinal crystal surfaces – step bunching”. In 2011 he was promoted to an Associate Professor at the same Institute. Since 2010 he is the head of the Laboratory “Electron Microscopy and Microanalysis”. Dr. Ranguelov had specialization grants in Germany and France.

Assoc. Prof. Ranguelov has co-authored a total of 41 articles with 208 independent citations (Scopus, June 2020). His scientific interests are in the field of physical chemistry and in particular phase formation processes in condensed matter.

The applicant participates in the competition for Professor with 23 publications. The publications included in the habilitation work for Professor are 8, of which 2 are published in first quartile journals (Q1) and 4 – in Q2 journals. The publications beyond habilitation work are 15, with 7 in Q1 journals and 3 in Q2 journals. Mr. Ranguelov has published in the high-ranked journals Physical Review Letters (IF<sub>2019</sub>= 8.385), ChemSusChem (IF<sub>2019</sub>=7.962), International Journal of Hydrogen Energy (IF<sub>2019</sub>=4.939), Journal of the European Ceramic Society (IF<sub>2019</sub>=4.495), Journal of Environmental Chemical Engineering (IF<sub>2019</sub>=4.300.).

Assoc. Prof. Ranguelov was co-supervisor of a PhD student who has successfully defended his thesis in 2018. He was team-member of 11 projects with national funding and leader of the Bulgarian team in an international project. The applicant has attached a list with the titles of 10 contributions that were presented by him at scientific forums in Bulgaria and abroad. He is also co-author of more than 40 oral or poster contributions at scientific conferences.

All documents presented by Assoc. Prof. Ranguelov fit the topic of the competition.

A check up is presented for the compliance of the scientific asset of the applicant with the requirements of the Institute of Physical Chemistry specified in his Regulations for the terms and conditions for acquiring academic degrees and occupying academic positions. Scientometric data of Assoc. Prof. Ranguelov exceed significantly the requirements of the Institute for occupying the academic position “Professor” at IPhCh - BAS.

**2. Basic scientific contributions.** The scientific contributions of Assoc. Prof. Ranguelov are related to the topic of phase formation. A specific feature of the candidate is

his competencies both in electron microscopy and computer modeling of phase formation processes, which allows him to gain a deeper insight into the mechanism of nucleation and crystal growth. These studies are closely related to one of the traditional main topics in IPhCh – research on crystal growth processes. Theoretical simulation studies have provided new knowledge on the instability of vicinal crystal surfaces such as step density waves, step bunching and critical terrace width for two-dimensional nucleation. Verification of the reliability of the theoretical conclusions was looked for by the images from the reflection electron microscopy. Monte Carlo simulation studies have been performed on ad-atoms and atomic clusters diffusion and related phenomena on vicinal crystal surfaces, on association of particles with anisotropic interactions and diffusion-controlled growth and on spontaneous breakdown of free-standing metal nanowires. The publications from the habilitation work of the candidate belong to this scientific field.

Beyond the habilitation work, a big part of the publications of Assoc. Prof. Ranguelov relate to the phase formation and characterization of various materials – glass, ceramics, glass-ceramics, thin films, catalysts, etc. These are joint studies in cooperation with various scientific teams from IPhCh and other scientific institutions, and the candidate's contribution is mainly in elucidating the morphological features of the materials through electron microscopy.

All publications of Assoc. Prof. Ranguelov for the competition are collective but his role in the studies is well-outlined.

**3. Impact of publications in the literature.** The applicant participates in the current competition with 113 independent citations. Although half of the scientific publications included in the habilitation work were published after 2017, 20 citations were noticed on the papers from the habilitation work. The most cited papers are on the preparation of glasses and glass-ceramics using waste materials of industrial origin (47 citations for the series of these papers) as well the paper on the characterization of electrocatalysts based on Magneli-phases (20 citations).

**4. Critical notes and recommendations.** I have no general objections to the research work of Assos. Prof. Ranguelov.

### CONCLUSION

I think that Assoc. Prof. Bogdan Ranguelov proved to be a scientist with a clear thematic area. Based on the topical studies, quantity and quality of papers and their impact in the literature, his significant scientific contributions, engagement in research projects and supervision of PhD students as well as my personal impressions, I strongly recommend Assist.Prof. Dr. Bogdan Ranguelov to be appointed at the academic position of Professor in the professional field 4.2. Chemical Sciences (Physical Chemistry) at the Institute of Physical Chemistry - BAS.

Reviewer:

24.08.2020