# Review

by Prof. Nikolai Denkov, DSc, member of the scientific jury
appointed by Rector's order RD38-224/10.05.2019
for the contest for the academic position "Professor"
announced in SG ed. 25 on 26.03.2019
professional field "4.2 Chemical Sciences (Physical chemistry)"

One candidate has applied at the contest for granting the academic position "Professor" in scientific field "4.2 Chemical sciences (Physical chemistry)", announced in SG 25/26.03.2019 for the needs of the Department of Physical Chemistry, Faculty of Chemistry and Pharmacy at Sofia University "Saint Kliment Ohridski" – Associate Professor (Docent) **Dr. Stoyan Ivanov Karakashev**, lecturer in the same department.

Stoyan Karakashev was born in 1970. In 1995 he graduated the Faculty of Chemistry of Sofia University "Saint Kliment Ohridski" (SU) with a degree of MSc in "Chemistry" and major "Theoretical chemistry and physical chemistry". In 1997 he graduated a second Master programme: "Control and purification of waters", funded by the TEMPUS program of the EU. In 2002 he defended a PhD thesis in the area of physical chemistry on the topic "Theoretical adsorption models and their application to ionic, nonionic and mixed surfactants at air-water interface". With this thesis he meets the minimum national requirements of **Group A**.

In 2001 to 2003 Stoyan Karakashev worked as a researcher 2$^{nd}$ degree at the Institute of Biochemistry at BAS. From December 2003 till May 2004 he was a guest researcher at the Department of Chemical Engineering at the Newcastle University, Australia. From January 2007 until December of 2008 he was a scientific associate in the Department of Chemical Engineering at Queensland University, Australia.

From September 2009 till May 2013, Stoyan Karakashev was Chief Assistant at the department of Physical Chemistry at Sofia University. In May of 2013 he won the competition for Associate Professor (Docent) in the department of Physical chemistry at Sofia University.

As a guest-researcher, he specialized at the Institute of Polymers Research in Leibnitz (Germany), the University of Utah (USA), Cambridge University (UK), and University of Illinois (USA).

Based on this information, I can conclude that Doc. Karakashev has rich international experience on three different continents – Europe, Australia and North America.

Doc. Karakashev has been part of many international research project, the most important of them being 2 Marie Curie fellowships, 1 project funded by the German academic exchange program, and 1 project from the National Sciences Fund, among others. The ability to win international projects is impressive and worth mentioning.

For the contest Docent Karakashev has presented 90 scientific publications: 2 of them are chapters in books (2%), 75 are articles in referenced journals (83%), 7 articles are published in conference proceedings (7%). The SCOPUS database contains 68 of these articles (76%) and they have a total of 661 citations. According to the same database, the *h*-index of Docent Karakashev is 15 (all of the above numbers are after excluding autocitations).

After he became a doctor in 2002 and docent in 2013, the candidate has presented 21 publications for the current contest. In the documents of the contest, a Habilitation paper, based of 9 of these publications, is included. Furthermore, the candidate has provided an author's Account for the original contributions of his scientific studies included in the current contest.

The scientific works presented by Doc. Karakashev and his author's Account show that he meets the minimum requirement for the academic position of professor. From the 21 articles presented, 12 are published in journals from the highest Q1 quartile, and 6 are in journals from Q2 quartile. These publications meet the requirements of **Groups C and D**.

These publications have 80 citations in Scopus (again with autocitations excluded), which is sufficient to meet the requirements of **Group E**.

Doc. Karakashev meets the requirements of **Group F** with his participation in the projects mentioned above. However, I have to emphasize that the candidate has not been a supervisor of a single MSc student or PhD student. I will come back to this issue in my conclusions.

The research field of the studies presented in this contest, is the physical chemistry of thin liquid films, which is a traditional research area for the department of Physical chemistry of SU. The Habilitation paper of the candidate is poorly presented: there is no introduction, nor conclusions stemming for the conducted research. The Habilitation paper is composed mechanically of short fractions of the publications, without summarizing the candidate's accomplishments in the area of the research. The text is full of grammatical and terminological errors, which shows carelessness in the preparation of the document. The lack of summarized conclusions is a substantial problem that can be traced also in the author's Account for the scientific achievements, as explained below.

For unclear reasons, the author's Account is presented in third person and lacks the signature of the candidate. A big part of it represents biographical data which can be found in the candidate's CV. I find this way of structuring the author's Account as inadequate – it remains unclear what the main scientific contributions of the candidate are.

In the rest of his author's Account, the candidate has listed 20 contributions. For my further comments I will use the enumeration of the contributions as presented in the author's Account, as well as the enumeration of the scientific publications from that Account.

I accept contributions 4, 10, 11, 15, 17, and 19 (based on publications 5, 11, 12, 16, 18 and 20) without any significant notes, apart from the several misprints, which should be corrected.

Scientific contributions 7, 13, 16, and 18 are based on review articles and they are not formulated well. For a review publication to have a scientific contribution it must include also some non-trivial conclusions - an author's look on the progress in the area reviewed. Original new results are not required in reviews (although could be included if present), but the authors' original outlook on the area is expected. For example, the main conclusions of the review articles could be used to formulate the scientific contributions of the candidate in this contest, but no any conclusions are presented in the Account for these "contributions".

My notes on the other scientific contributions are as follows:

**Contribution 1** claims that a critical value of the gas supply rate is discovered for foaming via gas purging through a porous membrane (Bickerman test) – the rate of foam generation becomes higher than the gas supply rate above this critical value. Such effect has been observed many years ago by Dr. Ceco Dushkin and has been published in the article Dushkin et al. Coll. Polym. Sci. **2003**, 281, 130. Therefore, I would expect this contribution of the candidate to be defined more precisely.

**Contribution 2** is also imprecise. The publication related to this contribution shows a theoretical model, which explains already published experimental data. Therefore, this contribution should focus on the model and not on the experimental results.

**Contribution 3** cannot be accepted in its current presentation either. There are numerous studies in the literature about the lifting force and the friction of bubbles in contact with hydrophilic wall (both experimental and theoretical). The contribution in this topic should be defined clearly, as to show the candidates original input into this area.

**Contribution 5** needs further explanation **–** specifically what is the significance of the experimental results.

**Contribution 6** raises a number of questions. It is based on publication 7 from the author's Account. The theoretical model used to calculate the absorption energy of the hydrophilic heads of the surfactants has been already published by *R. Slavchov et al. Surfactant Science and Technology, CRC Press, Boca Raton, 2014, 53-117.* For example, in the paper by *Slavchov et al.* the authors used data for alkylsulfates with hydrocarbon chain length varied between 8 and 12 carbon atoms, whereas in publication 7 by Doc. Karakashev we see data for alkylsulfates with carbon atoms between 7 and 12. As it is, contribution 6 does not explain what the original results are in publication 7, when compared to the article by Slavchov et al.

**Contibution 8** requires more concrete description of the scientific contributions from the conducted research.

**Contribution 9**, just like contribution 6, is closely connected to the aforementioned paper by Slavchov et al. For example Figure 2 from article 10 is the same as Figure 2 from publication 7 without the proper citation. Table 1A from publication 7 and Table 2 from publication 10 are identical without the needed citation. It remains unclear how contribution 9 differs from contribution 6 and from the conclusions of the preceding article by Slavchov et al., not included in this contest.

**Contribution 12** claims that the used theoretical model explains the difference in the absorption at the air-water and oil-water interfaces. This claim, however, needs a better explanation, as there are numerous articles in the literature, with many of them combining using theoretical models to explain experimental data, which do not correspond to the model used by the candidate. A better explanation is needed – when and for which types of systems the presented model explains the experimental results and explains the differences between the two types of interfaces.

**Contribution 20** cannot be accepted as presented, because other explanations about the negative charge of the bubbles in pure water have been published in other papers. The candidate should outline more clearly what his contribution is here.

Summarizing the previous notes, I believe that the candidate must re-formulate his Habilitation paper and his author's Account for scientific contributions. I recommend the merging of these two documents into one shorter document. A clearer and more coherent explanation of the main scientific contributions of the candidate is required. The total number of the claimed contributions can be reduced significantly and the re-formulated contributions should be closely associated with the candidate's publications, without raising any question whether such/similar contributions can be found in earlier studies by other authors.

Concerning his **educational activities**, Doc. Karakashev has taught lectures and seminars in multiple courses at the Faculty of Chemistry and Pharmacy, as explained in the provided documents.

## Conclusions

The quantitative criteria of Doc. Karakashev meet all minimal national requirements for holding the academic position "Professor" in professional area "Chemical sciences", as defined in the relevant legislation.

The author's Account, which plays the role of a Habilitation work when scientific publications are used instead of a monographic book (as it is the case here) does not present correctly the scientific contributions of the candidate. I recommend the candidate to review and edit his author's Account, based on the notes of the scientific jury. Once I see the new author's Account I would be able to vote on his candidature.

I use this review to suggest to the members of the Faculty Council of the Faculty of Chemistry and Pharmacy at Sofia University to update the requirements for holding the academic position "Professor", adding requirements to the candidates to have supervised at least one PhD student and 3 other students (at Bachelor or Master level). Such provision is included in Article 2 paragraph (5) of the Act for academic career development in Bulgaria. It would also be beneficial if the Faculty promotes certain specific recommendations for the preparation and structure of the Account of the scientific contributions of the candidates. Such recommendations would help significantly both the candidates and the scientific juries in the future contests.

Member of the Scientific Jury:

(Prof. Nikolai Denkov)

31 July 2019