

REVIEW

by Prof. Dr. Milen Georgiev Bogdanov,

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member of the scientific jury in the competition for the academic position of professor in the professional field 4.2. Chemical Sciences (Physical Chemistry - Formulation of Dispersions for Cosmetics and Household Chemicals) at the Faculty of Chemistry and Pharmacy of Sofia University "St. Kliment Ohridski" (FCP of Sofia University), announced in the State Gazette No. 55 of June 28, 2024.

The only candidate in the competition for the academic position of "professor" in the professional field 4.2. Chemical Sciences (Physical Chemistry - Formulation of Dispersions for Cosmetics and Household Chemicals) is Assoc. Prof. Dr. Krastanka Georgieva Marinova.

1. Overview of the materials

The materials submitted by Assoc. Prof. Marinova complies with the Law on the Development of the Academic Staff in the Republic of Bulgaria, the regulations for its implementation, and the guidelines for acquiring scientific degrees and academic positions at Sofia University "St. Kliment Ohridski." This includes the recommended criteria for scientific degrees and academic positions within the professional field of 4.2 "Chemical Sciences."

Assoc. Prof. Marinova has provided 46 scientific works, including 44 publications and 2 patents. For the current competition, she has submitted 22 works, including 20 full-text scientific publications, 1 registered international patent, and 1 application for an international patent. All submitted works have not been used in previous competitions, fall within the scope of the current competition, and are therefore eligible for review. Additionally, she has included documents that verify citations of her scientific works, participation in scientific conferences, involvement in and leadership of research projects, awards received, and supervision of graduate and doctoral students. These factors will also be considered when determining the final evaluation.

2. Short representation of candidate

In the submitted documents for the competition, the candidate has provided a comprehensive and current reference for her professional development and qualifications, as well as her teaching and research activities. Krastanka Marinova graduated in 1992 with a Master's degree in "Engineering Physics" from the Faculty of Physics at Sofia University. In 1994, she completed a postgraduate qualification in "Separation Processes in Industry and Environmental Protection" at the Faculty of Chemistry at Sofia University, where she defended her doctoral thesis in 1999. Her thesis, focused on the scientific specialty 01.05.05 Physical Chemistry, was titled "Mechanisms of Action and Exhaustion of Fast Defoamers."

Dr. Marinova's career began in 1993 as a physicist at the Faculty of Chemistry at Sofia University, a position she held until 2006. After 2003, she advanced to several roles, including Senior Assistant Professor (2003-2006), Chief Assistant Professor (2006-2010), and Associate Professor (2010 to present). From 2012 to 2019, she served as the Deputy Dean for Academic Affairs for the Bachelor's Degree and the Specialized Continuing Education Program at the Faculty of Chemistry and Pharmacy at Sofia University. Assoc. Prof. Marinova has completed two significant specializations: one at the University of Patras in Greece (1993, 5 months) and another at the Research Center of Rhodia Silicones in Lyon, France (1998, 6 months). She actively participates in European educational networks as a guest lecturer, having taught at the University of Novi Sad (2018) and the University of Lodz (2022). She has also contributed to various projects under the COST program related to the topic of the competition, including COST ACTION MP1106 (2012-2016), COST ACTION D43 (2006-2011), and COST ACTION P21 (2006-2010). Assoc. Prof. Marinova is an active member of scientific and industry organizations. Since 2017, she has been the chairperson of the Association of Bulgarian Cosmetologists and has served on the Control Council (2019-2023) and the Management Board (since 2023) of the Bulgarian National Association of Essential Oils, Perfumery, and Cosmetics. She has a significant teaching role, overseeing five mandatory and three elective courses in both Bachelor's and Master's programs across various specialties at the Faculty of Chemistry and Pharmacy at Sofia University. Since 2017, she has been the head of the Master's program in Cosmetics and Household Chemistry at the same faculty. Throughout her career, Assoc. Prof. Marinova has supervised 3 successfully defended doctoral students and 25 diploma students. Since becoming an Associate Professor, Dr. Krastanka Marinova has led and participated in numerous projects funded by EU programs, the Bulgarian National Science Foundation, and various foreign and Bulgarian companies. Additionally, she has presented reports and posters at over 40 scientific conferences.

3. Assessment of the candidate's contributions and their scientific and practical activities.

According to the documents submitted by Assoc. Prof. Dr. Krastanka Marinova, she holds a certificate confirming her fulfillment of the minimum national requirements for the academic position of "professor" in the scientific field 4.2. Chemical Sciences. It is evident that the candidate not only meets but exceeds these requirements as outlined in Article 2b of the Law on the State Academic Staff of the Republic of Bulgaria, as well as the Recommended Criteria for Acquiring Scientific Degrees and Holding Academic Positions at Sofia University for the professional field 4.2. "Chemical Sciences."

Assoc. Prof. Marinova has provided a list and copies of 22 scientific papers, along with an extended certificate highlighting her scientific contributions. Out of these, 14 articles have been published in journals indexed by Web of Science and/or SCOPUS, and these articles have significant impact factors or ranks. One article was published in a non-indexed journal but has

been cited five times in indexed journals. Additionally, she has five full-text communications published in conference proceedings. She is the first author on four of these articles and the corresponding author (lead author) on seven. The articles published in indexed journals can be categorized as follows: 8 articles in specialized journals that fall within the first quartile (Q1), 5 in the second quartile (Q2), and 1 book chapter. Assoc. Prof. Marinova's works have gained notable recognition in the international literature, with over 1,900 citations recorded in journals indexed in ISI Web of Knowledge and/or SCOPUS. Specifically, the citations for the publications considered in this competition amount to 506 (according to SCOPUS), covering the period from 2011 to the present, which is after she assumed the role of "associate professor." At the time of preparing this review, SCOPUS indicates that Assoc. Prof. Marinova has a Hirsch index of 20 for her entire research career, with five articles contributing to this index being the subject of the current competition. Furthermore, the documents show that some of her research has been widely disseminated through the scientific community, evidenced by her participation in 40 international and national scientific forums. Assoc. Prof. Marinova also has extensive experience in conducting research, leading research projects funded by international and national organizations, and supervising graduate and doctoral students.

Overall, the information presented clearly shows that Assoc. Prof. Marinova is a highly productive scientist. She effectively secures funding for her research, leads research teams, and generates significant scientific output that aligns with recognized high international standards.

The candidate's research activities align closely with the focus of the announced competition. The scientific contributions are in the field of Physical Chemistry and outline three main research directions:

I. Development and Validation of New Experimental Methods for Determining Interfacial Tension and the Rheology of Fluid and Solidifying Boundaries between Fluid Phases.

This research direction emphasizes interfacial tension and surface rheology, which are critical physicochemical parameters that describe the stability of foams and emulsions. These dispersed systems are widely utilized in various industries, including food production, cosmetics, household chemicals, pharmaceuticals, paper manufacturing, and oil extraction and processing. The presented research includes the development of a new apparatus and a procedure for the synchronized measurement of pressure and the profile of axially symmetric drops and bubbles. This allows for the determination of the transition moment from fluid to elastic surface layers and the local tensor components of surface tension.

The main contributions can be summarized as follows:

- A new method for measuring the rheological parameters of surface expansion between liquids of low and high viscosity has been developed, incorporating viscous contributions to the capillary pressure.

- A quantitative criterion for the phase transition from fluid to elastic surface layers has been introduced based on changes in the error during the processing of drop and bubble profiles.
- For the first time, a procedure for determining the two primary components of the surface tension tensor for elastic surface layers has been applied.
- The experimental method has been adapted to measure the tension tensor and adhesion force for fluid and elastic capillary surfaces formed by the interaction of bubbles or drops with a solid, flat surface.

II. Experimental study and physicochemical description of the surface properties of systems with unique characteristics, such as very high surface elasticity and/or viscosity, and composition that depends on the order of component addition and temperature.

This research focuses on the unique properties of disperse systems, particularly the irregular shapes and/or rough surfaces of drops and bubbles, which are often observed during stabilization with proteins or particles. The results highlight the surface properties of various bio-surfactants and their mixtures, including saponins, proteins, and fatty alcohols. Emphasizing the significance of understanding the surface properties of bio-surfactants aids in optimizing the functionality of various products and expanding their potential applications.

The main contributions can be summarized as follows:

- Quillaja saponins: The molecular area and configuration of the molecules at the surface have been determined. The measured surface elasticity aligns with results obtained from various methods.
- Mixtures of HFBII and SDS: The effects of concentration and the order of adsorption are demonstrated, along with the elastic behavior of HFBII layers. A new data processing procedure has been developed to accurately determine surface elasticity.
- HFBII at the water-oil interface: It has been established that the adsorption layer of the hydrophobin protein HFBII hardens below a specific threshold of interfacial tension. This adsorption is irreversible and results in the formation of very stable emulsions.
- Effect of fatty alcohol: The addition of fatty alcohol to alkaline aqueous solutions of low-molecular surfactant mixtures reduces surface tension and increases both the surface elastic and viscous moduli.

III. Physicochemical characterization of multicomponent systems with applications in cosmetics and household chemicals, including the development of formulations for various applications [3, 5, 8, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 22].

Since most cosmetic products are multicomponent disperse systems, their properties depend significantly on stabilizing and structuring substances. This focus area highlights the necessity for thoroughly examining physicochemical parameters, such as interfacial tension, adsorption, interaction energy, the shape and size of aggregates, and factors influencing foaming, foam destruction, emulsification, and wetting. Understanding these key factors is essential for developing more effective and environmentally friendly cosmetics and household chemical products.

4. Evaluation of the candidate's teaching activities

Associate Professor Dr. Krastanka Marinova demonstrates a substantial commitment to teaching, project development, and professional expertise. Her report for the academic years 2021/2022 and 2022/2023 illustrates that she significantly exceeds the minimum required classroom hours at Sofia University, as evidenced by a certified report indicating over 500 academic hours during this period.

Dr. Marinova serves as the primary lecturer and developer of six academic disciplines:

- 1. ****Separation Processes in Dispersed Systems**** - a mandatory course for the Ecochemistry Bachelor's degree program.*
- 2. ****Programming of Computational Problems in Chemistry**** - a mandatory course for the Chemistry and Informatics Bachelor's degree program.*
- 3. ****Dispersions in Cosmetics and Household Chemicals**** - a mandatory course for the Master's degree program in Disperse Systems in Chemical Technologies.*
- 4. ****Basic Mathematics**** - an optional course available to all Bachelor's and Master's in Pharmacy.*
- 5. ****Preparation and Characterization of Hygiene and Cosmetic Products**** - an elective course offered to Bachelor's and Master's in Pharmacy.*
- 6. ****Cosmetic Products as Disperse Systems**** - an elective course intended for Master's in Pharmacy.*
- 7. ****Formulation of Dispersions for Cosmetics and Household Chemistry**** - a mandatory course for Master's in Cosmetics and Household Chemistry.*
- 8. ****Basic Mathematics for Chemists**** - a mandatory course for Master's in Cosmetics and Household Chemistry.*

Furthermore, Dr. Marinova has successfully supervised three doctoral students and twenty-five diploma students. She is recognized as a knowledgeable lecturer who has a positive relationship with her students.

5. General notes and recommendations. Personal impressions

The candidate in the competition has submitted a significant number of scientific works published after her PhD degree and the acquisition of the academic position of "associate professor." Assoc. Prof. Marinova's scientific and expert qualifications are indisputable. Her research includes original scientific and practical contributions, which have been published in renowned international journals and gained global recognition. I strongly recommend that Assoc. Prof. Marinova continues her efforts to develop cosmetics and household chemicals within the country.

Assoc. Prof. Marinova's high level of expertise is also acknowledged in business circles, as evidenced by her election as Chairman of the Association of Bulgarian Cosmetologists and as a Member of the Board of Directors of the Bulgarian National Association of Essential Oils, Perfumery, and Cosmetics. Her work significantly contributes to forming and strengthening relationships between academia and industry.

I personally know Assoc. Prof. Marinova and I have observed her professional qualities as the head of the Master's program in Cosmetics and Household Chemistry and as the Deputy Dean of the Faculty of Chemistry at Sofia University. I greatly appreciate her humanity and dedication in tackling assigned tasks and addressing any arising challenges.

Conclusions:

After a thorough examination of the materials provided by Assoc. Prof. Dr. Krastanka Georgieva Marinova, I have determined that she not only meets but indeed surpasses the national minimum requirements for the academic position of "professor."

Her distinguished merits and significant contributions, combined with my evaluations, lead me to offer my unequivocal support for her candidacy. Accordingly, I recommend that the esteemed Scientific Council of the Faculty of Chemistry and Pharmacy at Sofia University "St. Kliment Ohridski" confer upon Assoc. Prof. Dr. Krastanka Georgieva Marinova the scientific title of "professor" in the area of 4.2. Chemical Sciences (Physical Chemistry—Formulation of Dispersions for Cosmetics and Household Chemicals).

04.11.2024

Sofia

Sign:

/Prof. Dr. Milen Bogdanov/