

OPINION

on the competition for the academic position “Professor”
in a higher education branch 4. Natural sciences, mathematics and informatics,
professional field 4.2. Chemical sciences (Physical chemistry – Formulation of dispersions for
cosmetics and household chemistry)
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by Prof. Dr. Penka Vasileva Tsanova
Faculty of Chemistry and Pharmacy, University of Sofia “St. Kl. Ohridski”
internal member of the scientific jury appointed with Order No RD 38-368/08.07.2024
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In the competition for the academic position “Professor” in Physical chemistry –
Formulation of dispersions for cosmetics and household chemistry at the Faculty of
Chemistry and Pharmacy of Sofia University “St. Kl. Ohridski“ (FCP-SU) one candidate is
participating – Associate Professor Dr. Krastanka G. Dr. Krastanka G. Marinova.

Krastanka Marinova has a master's degree in "Engineering Physics", specialization
"Quantum Electronics and Laser Technology" (1992) from the Faculty of Physics at Sofia
University "St. Kl. Ohridski". In 1994, she completed a postgraduate qualification "Separation
processes in industry and environmental protection" at the Faculty of Chemistry of Sofia
University "St. Kl. Ohridski" (FC-SU). She specialized for a short period (5–6 months) at the
Department of Chemical Engineering at the University of Patras, Greece (1993), and at the
Research Center of the company Rhodia Silicones Europe, Lyon, France (1998). In 1999, she
defended her dissertation at FC-SU on the topic "Mechanisms of Action and Depletion of Fast
Antifoams" to obtain the educational and scientific degree of "Doctor of Philosophy" in the
scientific specialty 01.05.05 Physical Chemistry. Since 2001, Dr. Krustanka Marinova has
worked at HF-SU (now FHF-SU) successively as a physicist, senior and chief assistant, and
from november 2009 to the present time she is an Associate Professor at FHF-SU. Since
2012, for two terms, Associate Professor Dr. Krustanka Marinova has been the Vice-Dean for
academic activities - Bachelor's Degree and Postgraduate Qualification.

Associate Professor Dr. Krastanka Marinova has submitted all the necessary materials
for participation in the competition, and they comply with the Law for the Development of the
Academic Staff in the Republic of Bulgaria, its Implementation Regulations, as well as the

Internal Regulations of Sofia University "St. Kliment Ohridski". Additionally, they meet the recommended criteria of the Faculty of Chemistry and Pharmacy. Assoc. Prof. Marinova is a co-author of a total of 44 scientific publications, 1 international patent, and 1 international patent application. Of these scientific publications, 32 are indexed in Scopus (30 in Web of Science). All publications currently have a total of 1924 citations in Scopus (1912 in Web of Science), excluding self-citations of all authors. The Hirsch index of Assoc. Prof. Marinova is $h=20$ in Scopus ($h=18$ in Web of Science). In the competition for professor, she is participating with 20 scientific publications, 14 of which are referenced in international databases (Scopus and Web of Science), 1 registered patent, and 1 patent application (these works do not include the scientific publications used in the defense of dissertation or in the competition for associate professor at FCP-SU). The candidate is a lead author (either first or corresponding author) in 11 publications. The citations of the articles submitted for participation in the competition are 488 (in Scopus, excluding the self-citations of all authors), which testifies both to the relevance of the scientific research and to the significance of the published results.

In terms of quantitative indicators, the candidate exceeds the minimum recommended requirements of FCP-SU for the academic position "Professor": Group of Indicators **B** – 5 scientific publications (3-Q1, 2-Q2), totaling 115 points with a minimum requirement of 100 points; Group of Indicators **Г** – 11 scientific works (5-Q1, 3-Q2, 1 book chapter, 1 application, and 1 registered international patent), totaling 240 points with a minimum requirement of 220 points; Group of Indicators **Д** – 488 citations (Scopus), totaling 976 points with a minimum requirement of 120 points; Group of Indicators **Е** – co-supervisor of 3 PhD students, 9 scientific projects, funds raised-225000 BGN, totaling 260 points with a minimum requirement of 150 points; Group of Indicators **Ж** – h -index of 20, 6 developed courses, 25 graduate students, 7 industrial projects, 6 articles outside those in Group **Г**, totaling 551 points with a minimum requirement of 120 points.

The author's report on the scientific contributions of the works of Assoc. Prof. Dr. K. Marinova provides a clear overview of the research area of the conducted studies and accurately outlines the candidate's scientific contributions, despite the absence of a habilitation thesis in the submitted documents. The scientific research of Assoc. Prof. Dr. Marinova is in the field of the physical chemistry of dispersed systems and is classified into three thematic directions with clearly defined own significant achievements and a leading research role.

Direction 1: Development and validation of new experimental methods for interfacial tension determination and surface rheology characterization.

The developed original apparatus and methodology for synchronized pressure measurement and determination of the profile of axially symmetric drops and bubbles in time is an achievement described and protected by a patent. It provides an innovative approach for studying the transition from fluid to elastic surface layers and enables precise measurements of dilatational rheological parameters of the interface between low- and high- viscosity liquids in the presence of surfactants. This new experimental method has been adapted for highly sensitive measurement of various physicochemical parameters of the systems (components of surface tension, equilibrium contact angles, adhesion forces, etc.), providing critical insights into the behavior of surfactants and offering new knowledge about the behavior of elastic layers under different conditions.

Direction 2: Experimental investigation and physicochemical description of systems with complex surface properties - high elasticity, viscosity, and intricate dependencies of composition on temperature and the order of component addition.

The research in this area covers various methods for measuring and analyzing the surface adsorption and rheological properties of Quillaja saponin extracts, the hydrophobin protein, and its mixtures with anionic surfactant and other proteins. A new data processing procedure is proposed which derives with high accuracy the dependence of surface dilatational elasticity on surface pressure/tension. A methodology has been developed that allows obtaining new knowledge on about the stabilization of emulsions and foams with proteins and with different types of particles. The effect of temperature on surface viscoelasticity has been demonstrated, and this effect has been applied to control the drainage of thin liquid films and Ostwald ripening in foams. The main scientific contributions in this field are in deepening the understanding of physicochemical processes in these systems and offering new approaches for control and optimization of their behavior. This is essential for both fundamental research and various industrial applications, where the control of surface properties plays a key role in product quality and stability.

Direction 3: Characterization of physicochemical properties of multicomponent dispersed systems and surfactants in order to develop formulations for applications in cosmetics and household chemicals.

A key contribution of the detailed study on the adsorption kinetics in systems with block copolymers and sodium caseinate is the finding that block copolymers act as antifoaming agents below their cloud point through different foam destruction mechanisms,

providing valuable insights for controlling foam formation in industrial applications. The systematic investigation of surface tension and dilatational rheology under different co-adsorption conditions of BSA and beta-casein revealed that the stability of the foams correlates well with the dynamic surface tension rather than the surface elasticity. This correlation offers new approaches for formulating stable foams with controlled properties. The study of amphoteric surfactants leads to the determination of molecular parameters necessary for the description of the micellar structure with increasing concentration. This research contributes to a better understanding of the behavior of these substances and their role in solutions, which is crucial for applications in cleaning and washing products. The detailed study of the structure of adsorption layers in the processes of wetting and the adsorption of oil droplets on solid surfaces contributes to the understanding of the effectiveness of cleaning processes and wetting of surfaces. This study has practical significance for the optimization of cleaning formulations in various applications.

Research in this direction demonstrates a high level of experimental and theoretical work in the field of physical chemistry of surfactants and multicomponent systems. New technologies and solutions are proposed for developing stable products with optimized characteristics. Through this research, formulations have been created and improved for applications in cosmetics and household chemicals, which increase the effectiveness and sustainability of the products, satisfying the modern requirements of the industry.

The main results of Assoc. Prof. Dr. K. Marinova's scientific research, with which she is participating in the competition for the position of professor, have been popularized through 12 poster presentations and 30 sectional reports, mainly at international scientific conferences and symposiums.

The project activity of Assoc. Prof. Krastanka Marinova is impressive, demonstrating the relevance and competitiveness of the scientific topics she is working on, as well as her role as a responsible researcher. After her habilitation, she has participated in the research teams of 7 scientific projects and 6 industrial projects with foreign companies; she has also been the leader of 2 scientific projects (1 national and 1 international) and 1 industrial project.


The teaching activity of Assoc. Prof. Dr. K. Marinova characterizes her as an established lecturer at FCP-SU. She is a lecturer in courses in two bachelor's and two master's programs: Separation Processes in Dispersed Systems, Programming Computational Tasks in Chemistry, Dispersions in Cosmetics and Household Chemicals, Basic Mathematics, Production and Characterization of Hygiene and Cosmetic Products, and Formulation of Dispersions for Cosmetics and Household Chemicals. She co-supervises 3 PhD students who

have defended their doctoral dissertations and has supervised/co-supervised 25 thesis projects that have been successfully defended at the Bachelor's and Master's levels at FCP-SU. Assoc. Prof. Dr. K. Marinova is the founder and head of the successfully developing master's program "Cosmetics and Household Chemistry" at FCP-SU, established in 2017.

Assoc. Prof. Dr. Marinova is a member of the following organizations: the European Colloid and Interface Society, the Association of Bulgarian Cosmetologists, of which she has been the leader since 2017, the Bulgarian National Association of Essential Oils, Perfumery, and Cosmetics, as well as European scientific and educational networks: CEEPUS network and COST Actions.

In conclusion, considering the high scientific level of the candidate's work and their recognition in the global scientific community, the undeniable fundamental and applied scientific contributions, project and teaching activities, as well as my personal impressions of the candidate's qualities, I firmly express my opinion that Assoc. Prof. Dr. Krastanka Marinova is a scientist with a high professional level in the field of Physical Chemistry, possessing the qualities to lead a team, conduct original and high-quality scientific research on relevant and promising topics, and has developed into a university educator with notable organizational skills. I confidently state my positive assessment and propose that Assoc. Prof. Dr. Krastanka Marinova be elected as a professor in 4.2. Chemical Sciences (in Physical Chemistry – Formulation of Dispersions for Cosmetics and Household Chemicals) at the Faculty of Chemistry and Pharmacy at Sofia University "St. Kliment Ohridski."

04.11.2024
Sofia

Chair of the Scientific Jury: 
(Prof. Dr. P. Vasileva)