

STATEMENT

on the competition for holding an academic position 'Associate Professor' in professional field 4.2. Chemical Sciences, scientific specialty 'Physical Chemistry' for the needs of 'Surfaces and Colloids' section, on the topic 'Electrical Properties and Stability of Colloid-Polymer Suspensions', announced in SG, issue 45, dated 28 May 2021, with a single candidate:

Chief Assistant Kamelia Pavlova Kamburova-Petkova, PhD

Statement from Assoc. Prof. Khristo Ivanov Khristov, PhD, member of the Scientific Jury (Order No 58-ПД-09, dated 15 July 2021 of IPC-BAS Director)

Chief Assistant Kamelia Kamburova, PhD, entered the competition with 21 scientific publications in impact factor journals and 6 scientific publications in non-peer reviewed journals. Instead of a habilitation thesis, Dr. Kamburova has presented five articles in *Colloids and Surfaces A: Physicochemical and Engineering Aspects* (IF 2.354), [Q2]. She worked on eight projects financed under state funds and the Ministry of Education and Science as well as on eight projects financed under European and international programmes and funds. She attended 31 international and 14 national scientific forums, delivering both oral and poster presentations. She presented eight reports at the *Aleksei Scheludko* Colloquium of 'Surfaces and Colloids' section, IPC-BAS. From 2012 to 2017 Dr. Kamburova was a member of the organizing committees of scientific seminars for young researchers and PhD students.

Dr. Kamburova's research is mainly in two scientific areas: 1) electrical properties of colloid particles in polyelectrolyte-added water suspensions and suspension stability, and 2) design, formation and characterization of multi-layer films from polyelectrolytes on colloid particles. Three of her articles in co-authorship were awarded 'The most significant scientific and applied achievement in IPC-BAS' in 2013, 2016 and 2020, respectively. She held 360 hours of lab classes in 'Physics', parts 1 and 2, at the Faculty of Applied Mathematics and Informatics of the Technical University. She was involved in further education of young researchers, students, etc.

Currently, there are 176 citations of Dr. Kamburova's articles. It is worth noting that article No 3 has 37 citations, No 8 - 17 citations, No 9 - 12.

All of the above gives a clear indication that Dr. Kamburova not only meets but exceeds the minimum national requirements and the requirements defined by the IPC-BAS Scientific Council.

Main scientific and applied contributions

There are two conditional strands in Dr. Kamburova's scientific work: predominantly fundamental studies, namely: 'Electrical properties of colloid-polyelectrolyte suspensions' and 'Multi-layer films on colloid particles obtained via layered polymer adsorption' and applied studies, namely: 'Polyelectrolyte encapsulation of medications and corrosion inhibitors'.

The experimental results of Dr. Kamburova were obtained using electro-optic methods: light scattering in electrical field, electric double light refraction, and microelectrophoresis. Electrical properties and stability to water suspension aggregation were investigated by means of model oxide particles depending on the charge of polymers adsorbed and on the disperse

medium parameters (ionic force, pH, presence and type of low-molecular salt) (articles No 2, 5, 7, 9, 10, 11, 12). Studies showed that polymer quantity adsorbed on a counter-charged oxide particles that caused aggregation in the suspension, decreased with polymer charge density increase. They also showed that raising the charge of a weak polyelectrolyte (having a pH-dependent charge), resulted in chain lengthening of the latter. A theoretical model was proposed to explain such an outcome from the perspective of counter-ionic condensation perspective. Formed were multi-layer polyelectrolyte films by way of successive adsorption of counter-charged polymers on model (non-spherical) colloid particles (articles No 3, 4, 6, 8, 14). Film electrical properties and thickness were determined and new information was acquired about the mechanism of weak polyelectrolyte film growth, indicating that these films and their electrical properties can be regulated within a wide range via changing medium pH.

A procedure for encapsulation of nano-particles from the anti-inflammatory drug – indomethacin – was developed which involved a multi-layer film formation from two natural polysaccharides – pectin and chitosan (articles No 13, 18). The purpose of the procedure was to improve drug biocompatibility and to control drug release and organ targeting in order to amplify drug efficiency and reduce adverse effects.

Developed were methods to obtain zinc coatings with embedded polymer nano-containers, impregnated with steel corrosion inhibitors (articles No 17, 19, 23, 26) and zinc coatings with embedded nanoparticles – steel corrosion inhibitors (articles No 20, 21, 24, 25, 27). Model studies conducted indicated that these coatings had a good protective effect against steel corrosion.

Dr. Kamburova's personal scientific contribution is substantial, as confirmed by the 15 papers published in prestigious scientific journals with high impact factor (Q1 and Q2) in the last eight years, with her being the first author in ten and second author in five of them.

There is no doubt in my mind that Dr. Kamburova possesses the theoretical knowledge and experimental skills to address scientific-challenges at hand. In my view she can not only work independently but educate, train and lead young specialists.

CONCLUSION

The documentation presented for the purposes of the said competition makes it clear to me that Chief Assistant Dr. Kamelia Pavlova Kamburova-Petkova is a researcher with considerable and internationally recognized scientific contributions, who meets the requirements for holding the academic position of 'Associate Professor' in professional field 4.2. Chemical Sciences, scientific specialty 'Physical Chemistry' as laid down in the *Law on Development of Academic Staff in Republic of Bulgaria* and IPC-BAS criteria. Her achievements and my excellent personal impression of the candidate give me reason to recommend strongly that the honourable members of the Scientific Jury vote positively on granting Chief Assistant Dr. Kamelia Pavlova Kamburova-Petkova the academic position of 'Associate Professor'.

Sofia

Signature:

14 Sept 2021

(Ass. Prof. Khristo Khristov, PhD)