Statement

On a competition for the academic position "Associate Professor",

Classification of professional field 4.2 Chemical Sciences (Physical Chemistry),

Announced in SG No. 51/13.06.2023

Applicant: Plamen Christov Tchoukov, PhD, Assistant Professor in IPC-BAS

Member of the Scientific Committee: Lyubomir Nikolov, Dr., Assoc. Prof. in IPC-BAS

Only one candidate - Dr. Plamen Hristov Chukov, Assistant Professor at the Surfaces and Colloids Section in the Institute of physical chemistry – Bulgarian Academy of Sciences, submitted documents for participation in the announced competition. He has submitted all the documents required by the Law and the Regulations on the Conditions and Procedure for Acquisition of Scientific Degrees and Occupation of Academic Positions.

Dr. Plamen Chukov's research activity is presented in the competition with a list of 36 papers, refereed in the Scopus database, one book chapter and 5 publications in conference proceedings. 18 of the papers have been published in international impact journals in quartile Q1, such as *Energy & Fuels* (9 issues), *Langmuir* (5 issues), *Adv. Coll. Int. Sci., Soft Matter, J. Phys. Chemistry C* and *J. Environ. Chem. Eng.* - one each. 15 of the papers are in the Q2 quartile, 10 of which were published in *Colloids Surfaces A: Physicochem. Eng. Aspects*.

The main contributions to Dr. Plamen Chukov's research have been obtained mainly in the study of the stabilization mechanisms of oil/water emulsions and the analysis of kinetics and interactions in thin liquid films, with emphasis on the adsorption properties of surfactants on different phase boundaries. A new mechanism for the stabilization of water/oil type oil emulsions is proposed and the key role of asphaltenes in the stabilization of these emulsions is demonstrated. Mechanisms for the destabilization of water/crude oil emulsions are also presented, using an originally modified version of the Sheludko-Exerowa cell with a dispensing system, by which a change in the chemical composition of an already formed thin film is accomplished.

Also highly impressive is the unique instrument created to simultaneously study the dynamic force and thickness profile of a thin liquid layer formed between a deformable drop and/or bubble and a solid surface (the so-called Integrated Thin Liquid Film Force Apparatus (ITLFFA)). It has been used to obtain important results on the influence of velocity and boundary conditions as a bubble approaches a solid flat surface on the outflow of the thin liquid film. A new approach to determine the degree of mobility of the water-hydrophobic solid surface interface is also proposed, which exploits the behavior of the thin film thickness with time. Last but not least, it should be noted the significant contribution in the creation (assembly) of original scientific equipment for the study of thin liquid films by the microinterferometric method with the application of alternating

and/or constant electric field. Through specially developed software, the new apparatus allows not only automated control in the film formation process, but also simultaneous registration and analysis of experimental data on light intensity, applied pressure, temperature, etc. The original combination of the measurement of film thickness and size by the microinterferometric method with the electrochemical impedance spectroscopy of the emulsion film provides entirely new possibilities for the study of the structure and stability of oil films in aqueous media.

My overall impression is that the experimental set-up, the data obtained, their analysis and their interpretation are extremely convincing. The role and competence of the candidate in each phase of the research is unquestionable. The high quality of Dr. Chukov's scientific work has been noted by the scientific community in an extremely large number of citations - about 1200. The data presented in the documentation and the relevant references show that the candidate has exceeded the criteria required for the academic post of Associate Professor. I have no critical remarks to make on the competition submissions. Dr. Chukov's style is concise and clear. The activities described show a serious attitude to scientific work. Furthermore, I believe that the candidate's research should be developed and deepened.

I have known Plamen Chukov since the moment of his entry as a PhD student at the Institute of physical chemistry at the Bulgarian Academy of Sciences and I am a direct witness of his development. I have no common research or project involvement with the candidate in this competition. I believe that with his overall scientific creativity and activity, with the accumulated considerable research experience, with the acquired scientific and organizational skills, Dr. Chukov is a very promising researcher who is fully ready for further independent development.

In conclusion, my opinion is that the candidate's research activities fully comply with the requirements of the Act and the Regulations on the conditions and procedure for the acquisition of scientific degrees and academic positions and I confidently recommend the Scientific Council of IPC-BAS to award Assistant Professor Dr. Plamen Hristov Chukov the academic position of Associate Professor in the professional field 4.2. Chemical Sciences (Physical chemistry).

Sofia,

October 13th, 2023

Assoc. P