

## STATEMENT

in the competition for the academic position  
of "Professor" in the professional field

4.2. Chemical Sciences, specialization "Physical Chemistry" for the needs of the section  
"Phase Formation, Crystalline and Amorphous Materials", announced in the State

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with the sole candidate being Assoc. Prof. Svetlozar Dimitrov Ivanov from the  
Technical University of Ilmenau, Germany

Member of the Scientific jury: Prof. Maria Hristova Petrova, PhD

### 1. General characteristics of the candidate's scientific research and applied scientific activities

Svetlozar Ivanov graduated in 2000 from the Faculty of Chemistry of Sofia University "St. Kliment Ohridski". In the same year he was appointed as a chemist at the Institute of Chemistry "Acad. R. Kaishev" - BAS in the section "Phase Formation, Crystalline and Amorphous Materials", where in 2006 he defended his doctoral dissertation on the topic: "Modification of Conductive Polyaniline Coatings by Current and Currentless Deposition of Metal Particles". In 2019, he obtained his habilitation at the Faculty of Electrical Engineering and Information Technology, Ilmenau University of Technology, Germany

In the competition documents, Assoc. Prof. Svetlozar Ivanov presented a general list including 59 publications, four book chapters and two patents, six of which are included in the doctoral dissertation.

According to the national minimum requirements set out in the ZRASB and the requirements of the Institute of Physical Chemistry "Acad. R. Kaishev" - BAS regarding the scientific activity of candidates for the academic position of "Professor", the candidate's publications are distributed as follows: in group "B" he has 135 points out of 100 required, with three publications in journals with rank Q1 and three - with rank Q2. For indicator "G", the candidate's points are 250 out of 220 required, with six publications with Q1, two with Q2, two book chapters and two patents. In two of the articles, Assoc. Prof. Svetlozar Ivanov is the first author, and in the book chapter he is only the author.

Thematically, all submitted works are in the field of the announced competition.

Proof of the professional interest of Assoc. Prof. Svetlozar Ivanov is his participation in 19 reports at national and international scientific forums. He actively works on research projects tasks: he is the head of the Bulgarian team in one international scientific project, he is a participant in 2 international and 2 national projects. The total number of citations of the publications with which Assoc. Prof. Svetlozar Ivanov is applying for the position of "professor" is 123 (WoS, Scopus). Three doctoral students have successfully defended their dissertations under his supervision.

### 2. Main scientific and applied scientific contributions

The scientific and applied scientific contributions of Assoc. Prof. Svetlozar Ivanov can be summarized as follows:

1. For the first time, a sulfolane-based electrolyte has been used for the electrochemical deposition of silicon. The selected experimental conditions allow the formation of thin Si layers with low roughness and minimal inclusion of organic contaminants. A comparative study was conducted of Si electrodeposition in sulfolane-based and ionic liquid-based electrolytes. Effective electrodeposition is observed on metallic electrodes (copper, nickel) in both electrolytes due to the enhanced reaction kinetics on this type of substrate.

The electrochemical nucleation and growth of silicon on glassy carbon in an ionic liquid has been studied by interpreting potentiostatic current transients. Electrodeposited silicon-containing layers were tested as anodes for sodium-ion batteries. The layers showed a high specific capacity and a long-term electrochemical stability.

Electrochemically formed porous copper was used as a substrate for electrodeposition of silicon in order

To improve the mechanical and electrochemical stability of electrodeposited silicon, a porous copper substrate formed electrochemically was also investigated.

2. Nickel microfibers with a rough nanostructured surface were synthesized through a one-step chemical process at temperatures below 100 °C. When a magnetic field was applied, well-ordered, parallel-oriented nickel microfibers were obtained. The obtained materials were tested as anodes for lithium-ion batteries.

3. The analysis of the electrochemical and morphological properties at the lithium-electrolyte interface plays a central role in the application of metallic Li in safe and efficient electrochemical energy storage.

The Taguchi method (TM) was used to determine the relative influence of the experimental conditions on the intensity of the corrosion process in lithium-ion batteries. Based on the results obtained from the analysis, the properties and structure of the lithium salt have the greatest influence on the corrosion process in lithium-ion batteries.

The corrosion of lithium in contact with a copper substrate, (Cu-Li), was studied using a combined in situ ZRA (Zero-Resistance-Amperometry)-QCM method. This new technique allows measurement of the gravimetric response due to electrochemical deposition or dissolution in parallel with the galvanic current.

4. This contribution is related to the results obtained in three review articles, which are potentially useful for practical applications:

- a comprehensive overview of the different types of charge storage mechanisms present in electrochemical energy storage systems is provided. A methodology was developed for identification and quantitatively distinguishing between Faradaic, pseudocapacitive and capacitive charge storage using conventional electrochemical methods.

- an updated critical review of the main strategies for electrochemical structuring of 3D copper substrates (3D Cu current collectors), methodologies for analysing these structures, and approaches for effective control for their properties is provided

- a review provides a critical assessment of the mechanisms of aluminum corrosion in lithium-ion batteries, methodologies for analyzing this phenomenon, and approaches for its effective inhibition.

### **3. Reflection of the candidate's scientific publications in Bulgarian and foreign literature.**

The works of Assoc. Prof. Svetlozar Ivanov have received positive evaluation and recognition from the scientific community both in our country and abroad, which is confirmed by the citations in the scientific literature.

### **4. Critical comments and recommendations on the candidate's scientific works.**

I have no critical comments and recommendations.

### **CONCLUSION**

Based on all of the above, it can be concluded that the scientific indicators of Assoc. Prof. Svetlozar Ivanov fully meet all the requirements of the Regulations of the Institute of IPC-BAS for the academic position of "Professor". This gives me reason to propose to the Scientific Jury at the Institute of Chemical and Physical Chemistry-BAS to award the candidate the academic position of "Professor" in professional discipline 4.2. Chemical Sciences, specialty "Physical Chemistry" for the needs of the section "Phase Formation, Crystalline and Amorphous Materials" at the IPC-BAS.

Date: 15.05.2025

MEMBER OF THE JURY:

Prof. M. Petrova