

OPINION

on the competition for the academic position "Associate Professor"
in the scientific direction

4.2. Chemical Sciences, specialization "Electrochemistry" (incl. chemical power sources),
for the needs of section "Electrochemistry and Corrosion",
at the Institute of Physical Chemistry (IPC),
Bulgarian Academy of Sciences (BAS),
announced in SG № 62/27.07.2021

Candidate (s): Neli Dimitrova Boshkova, PhD, Assistant Professor
Chairman of the Scientific Jury: Maria Hristova Petrova, Associate Professor

1. GENERAL CHARACTERISTIC OF THE RESEARCH AND APPLIED RESEARCH ACTIVITIES OF THE CANDIDATE

Assis.Prof. Neli Boshkova graduated in 1997 from the Faculty of Chemistry at Sofia University "Kliment Ohridski". In 2003 she was appointed as a chemist at IPC "Acad. R. Kaishev" – BAS in the section "Electrochemistry and Corrosion".

Between 2015 and 2017 she was a PhD student of self-study and she defended successfully the PhD Thesis on: "Zinc composite coatings with built-in polymer particles – preparation and protective ability".

The publications presented by the candidate are related to one of the main thematic priorities of IPC-BAS, concerning cutting-edge materials and technologies based on electrochemically obtained metal, alloy and modified polymer coatings with protective, decorative and electrocatalytic properties.

In the competition documents, Dr. Boshkova has presented a general list containing 37 publications, four chapters of books, one patent and one monograph (accepted for printing). Of the total number of publications, five are included in the doctoral thesis.

The submitted list of publications after the PhD Thesis contains 8 publications, of which four are in Q2 journals, three in Q3 journals, one publication with SJR without IF, three chapters of books, one patent and one monograph (accepted for printing). In one of the publications, she is the first author.

According to the national minimum requirements set in the Law for the Development of the Academic Staff in Bulgaria and the Regulations for its Implementation, as well as according to the requirements of the Institute of Physical Chemistry "Acad. R. Kaishev" - BAS to the scientific activity of the candidates for the academic position "Associate Professor", the presented papers are distributed as follows: under letter „B“ the candidate has 100 points for 100 required, and under letter „G“ - 235 points for 220 required. Thematically all the presented works are in the field of the announced competition.

Evidence of the professional interest of Dr. Boshkova is her participation in 48 oral and poster presentations in national and international scientific forums. Currently, she works actively in the implementation of tasks on research projects, being the project manager of 1 project with the Research Fund and a participant in 12 projects.

2. MAIN SCIENTIFIC AND APPLIED SCIENTIFIC CONTRIBUTIONS

From the presented publications and author's reference it can be seen that the contributions of Dr. N. Boshkova include scientific and applied research in the following two areas:

- Improvement of the corrosion resistance and protective ability of low carbon steel with the help of electrodeposited galvanic and / or composite (hybrid) coatings; corrosion inhibitors; conversion passive films.
- Preparation and corrosion characterization of protective systems based on sol-gel coatings.

The contributions could be summarized as follows:

- Preparation of zinc, zinc alloy galvanic and composite coatings with embedded polymer nanoparticles and those, containing nanocontainers with hematite or kaolinite core and benzotriazole inhibitor as well as with ZnO core and safranin inhibitor. By investigations using different methods (XRD and XPS), the composition of the corrosion products is established and important information regarding the protective ability of composite coatings is obtained.
- Investigation of composite zinc (hybrid) coatings with embedded different types of inorganic and organic particles: ZnO, CuO, PANI, carbon spheres and carbon nanotubes.
- Along with the zinc hybrid coatings, nickel composite coatings with embedded carbon nanotubes are studied [26]. Two types of nickel nano-composite coatings with embedded carbon nanospheres and TiO₂ particles are also obtained with special equipment [35].
- The protective ability of different types of chromatic passivating films on galvanic and composite zinc coatings is evaluated in a model environment of a freely aerated solution of 5% NaCl. To characterize them, standardized test methods are used: PDP, Rp, EIS, scanning-vibration electrode technique (SVET) and "Salt Mist" Chamber (NSS). Conversion films are also obtained on zinc alloy coatings.

One of the current studies is related to the preparation and corrosion characterization of protective systems based on sol-gel coatings of ZrO₂ and TiO₂. The TiO₂ solution is modified with two different types of polymers, added separately to it. Similar studies are performed with multilayer systems of the same starting components, where the systems consist of different sub-layers of TiO₂ and ZrO₂ [6]. Increased corrosion resistance of low carbon steel is achieved by a newly developed hybrid multilayer coating consisting of a zinc sub-layer (1 micron), a middle layer of chitosan (CS) and a sol-gel coating of ZrO₂ as a finishing layer [1]. The newly obtained hybrid multilayer systems show positive effects on the protective ability in the conditions of external polarization, regardless of the various characteristics such as morphology, grain size, roughness and contact angle.

3. IMPACT OF THE CANDIDATE'S SCIENTIFIC PUBLICATIONS IN THE BULGARIAN AND FOREIGN LITERATURE

The research papers of Dr. Boshkova have received positive evaluation and recognition by the scientific community at home and abroad, which is confirmed by the citations in

the scientific literature (80 citations), as well as by participation in national and international forums (48 oral and poster reports).

4. CRITICAL REMARKS AND RECOMMENDATIONS TO THE SCIENTIFIC PAPERS OF THE CANDIDATE

I have no critical remarks or recommendations to the candidate.

5. CONCLUSION

The review of the materials, used by Assistant Professor Nelly Boshkova to participate in this competition, gives me a reason to propose to the Scientific Jury at IPC-BAS to award the candidate Assistant Professor Nelly Boshkova the Academic position "Associate Professor" in the scientific specialty 05.05.14 "Electrochemistry" (incl. chemical power sources) for the needs of IPC-BAS.

7.12.2021



Assoc.Prof. M.Petrova