

OPINION

on the competition for appointment to the academic position of "Professor" in professional field 4.2. Chemical Sciences, specialty "Electrochemistry, including chemical power sources".

Candidate: Assoc. Prof. Dr. Jenia Stefanova Georgieva

Member of the Scientific Jury: Prof. Dr. Antonia Evgenieva Stoyanova, IIES-BAS

1. General Assessment of the Candidate's Research and Applied Research Activities

Assoc. Prof. Jenia Georgieva meets and significantly exceeds the required minimum national requirements, as well as the criteria established by the Bulgarian Academy of Sciences (BAS) and the Scientific Council of the Institute of Physical Chemistry (IPC) for appointment to the academic position of "Professor", as follows:

- Under criterion "A" ("Dissertation thesis for the award of the educational and scientific degree 'Doctor'"), the results presented by the candidate comply with the requirements and account for 50 points.
- Under criterion "B", the candidate has presented 8 scientific publications indexed in internationally recognized databases, of which 6 are in journals ranked Q1 and 2 in journals ranked Q2, with a total of 190 points, compared to the required minimum of 100 points.
- Under criterion "G", the candidate has presented 12 scientific publications outside the habilitation work, indexed in Web of Science and Scopus, with a total of 245 points, compared to the required minimum of 220 points. Of these publications, 7 are in Q1 journals, 1 in Q2, 2 in Q3, and 2 are ranked according to SJR.
- Under criterion "D", 546 citations in Scopus obtained after habilitation are reported, corresponding to 1,092 points, compared to the required minimum of 120 points.
- Under criterion "J", the candidate has obtained 317 points, based on a successfully defended doctoral student, participation in and leadership of research projects, and project funding attracted in the amount of BGN 36,594. This result significantly exceeds the required minimum threshold of 150 points.

The data presented demonstrate that the candidate not only meets but substantially exceeds the established criteria for appointment to the academic position of "Professor".

2. Main Scientific and Applied Scientific Contributions

The candidate's research activity is focused on the investigation of nanostructured electro- and photoelectrocatalytic materials and their behavior in processes relevant to electrochemical and energy systems. The research is characterized by consistency and a gradual deepening of the scientific problems addressed, with the results demonstrating an independent and sustained line of research.

Among the main contributions is the achieved control over the characteristics of the active phase through the combination of chemical and photochemical approaches for the synthesis of nanostructured electrocatalysts. The results demonstrate the possibility of targeted formation of bimetallic and core-shell structures and reduction of the noble-metal content, while maintaining control over the composition, structure, and dispersion of the catalytically active phase.

Another important aspect of the research is the establishment of structure-activity relationships in Pt-based electrocatalysts for methanol electrooxidation, as well as in catalytic systems involving oxygen reactions. The decisive role of metal-metal and metal-support interactions, the nature of the support, and the size and dispersion of nanoparticles in determining the catalytic activity, stability, and CO tolerance of the materials has been demonstrated.

A separate research direction concerns the investigation of oxide semiconductors and metal–oxide composites, extending the application of the developed systems to photoelectrocatalytic processes. The functional role of TiO_2 and WO_3 in regulating electronic properties, charge separation and transport, and the stability of catalytic materials has been established. TiO_2 nanostructures have been developed and modified, and their photoelectrochemical characteristics have been investigated and optimized.

Of particular significance is the elucidation of the mechanisms of interaction between the metallic and oxide phases, including the proposed involvement of Ti(III)/Ti(IV) redox transitions in the formation of Pt(Cu)/TiO_2 . These results contribute to a deeper understanding of the factors determining the activity and stability of metal–oxide catalytic systems.

From an applied scientific perspective, the contributions are related to the development of catalytic materials with potential applications in fuel cells, electrolyzers, and photoelectrochemical systems, with particular emphasis on the more efficient utilization and reduction of the amount of noble metals.

In summary, the candidate's contributions are predominantly fundamental in nature with respect to elucidating structure–activity relationships and the role of metal–metal and metal–oxide interactions, combined with a clearly expressed applied scientific orientation. The results represent a logical development of the candidate's research line and demonstrate consistency and independence in the development and investigation of novel electro- and photoelectrocatalytic materials.

3. Impact of the Candidate's Scientific Publications in the Bulgarian and International Literature

Assoc. Prof. Georgieva's scientific output is well recognized within the academic community, as evidenced by the total number of 1,607 citations according to Scopus and her high h-index of 27, calculated on the basis of her overall scientific activity.

4. Critical Remarks and Recommendations Regarding the Candidate's Scientific Works

No significant shortcomings or weaknesses have been identified in the scientific works presented that would diminish the scientific value and significance of the results obtained.

CONCLUSION

The scientific output of Assoc. Prof. Dr. Jenia Stefanova Georgieva, in terms of volume, quality, and scientometric indicators, meets and significantly exceeds the requirements of the Law for the Development of the Academic Staff in the Republic of Bulgaria, the Regulations for its implementation, as well as the relevant requirements of BAS and the Institute of Physical Chemistry (IPC-BAS) for appointment to the academic position of "Professor". The thematic focus of the scientific works is fully consistent with the subject matter of the competition, while the research presented is characterized by relevance, scientific significance, and applied orientation.

Based on the above, I recommend that the members of the Scientific Jury vote for the appointment of Assoc. Prof. Dr. Jenia Stefanova Georgieva to the academic position of "Professor" in professional field 4.2. Chemical Sciences, specialty "Electrochemistry, including chemical power sources".

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Prepared by:

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