

OPINION

By Assoc. Prof. Dr. Velin Nikolov,

member of the scientific jury in the competition
for an academic position "associate professor" in a professional field 4.2 Chemistry
(inorganic chemistry) for the needs of the Laboratory "High temperature oxide systems" at
IGIC-BAS
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The only candidate for the competition is Assistant Professor Albena Bachvarova Nedelcheva.

In 2000 year Nedelcheva graduated from a Master's program in Materials and Material Science- Chemical and Metallurgy University- Sofia. In 2005, she finished PhD program on glass and phase formation in selenite systems. Since 2005 until 2010 Nedelcheva is a chemist at the IGIC- BAS. Since 2010 until now she is Assistant Professor

Scientific metrics

According to the submitted documents Nedelcheva has 61 scientific papers, 41 of which are published in journals with impact factor. Its papers have 307 citations (an average of 5 citations). There are also several papers with over 15 citations. The Nedelcheva "H" index on Scopus is 9. In addition the candidate was a member of research teams of 1 international and 9 national projects and participated in 58 national and international scientific forums. These data are impressive taking into account the 14-year study period (no so long) and the nature of its research. The investigation of multi-component systems, particularly containing components with a very different chemical and physical properties, is too labor-intensive and time-consuming process.

According to the document, Nedelcheva covers all minimum requirements of the BAS and the supplementary requirements of the IGIC for the position of "associate professor", exceeding twice these requirements (in the citations section - 7 times).

Contributions reflected in habilitation works

Nedelcheva represents 10 articles as habilitation works in 8 of which she is the first author and in the other 2 she is the second one. This is a clear proof that the candidate is the main investigator in relation to conception, realization and the interpretation of the results of this research activity. The publications refer to selenite glasses of 4 three-component systems, distinguishable by the type of modifier- Cu or Ag, and with respect to the network formers, traditional - B₂O₃ or non-traditional - MoO₃. Above all, it impresses the approach of systematic research of the systems.

As a result, there are undoubted contributions mainly to:

- identifying the areas of glass formation in each of the systems
- research and detailed analysis of the glass structure studied with appropriate methods,
- comparison of the different systems and the implications of the impact of modifiers, network formers, and their interaction.

Various methodical approaches to glass synthesis enhance the interpretation of results. I highly appreciate the research activity in this field and I assume that in the future Nedelcheva, using the obtained results, will expand the research not only towards the optical properties of the glass but also towards their thermal and physical properties in view of their potential applications.

Contributions reflected in non-habilitation work

The applicant has submitted 18 scientific papers out of the habilitation. All of them refer to a second clearly defined research field, in terms of the subject of research and its potential applications. These are modified TiO₂ nanoparticle powders with antibacterial action or with photo catalytic properties.

I want to point out immediately that the numbers of these publications, the scientific journals in which they are published and the citations they have found, are sufficient Nedelcheva to present them successfully as habilitations work also. She, for her own reasons and right, presented the selenite glasses.

Three different sol-gel techniques (hydrolytic, non-hydrolytic, and incineration in solution), as well as a separate technique of mechano-physical activation of solid phase synthesis are used to synthesize the powders. At the same time, TiO₂ powders with different modifier as B₂O₃, ZnO, TiO₂, TeO₂ and SeO₂ were synthesized. Working with so many different oxides with different properties (SeO₂- sublimation, TeO₂ -decomposition, TiO₂- high melting temperature), the choice of sol-gel synthesis technique is a perfectly correct approach and predetermines successful research.

As a result of the applied techniques and the heterogeneous modifiers used, there are several undoubted contributions:

- the optimal technique and conditions for obtaining a nano- product with desired parameters are established.
- the role of each of the modifiers for obtaining a powder with certain properties is established and discussed
- nanopowders with proven antibacterial properties as well as other with photo-catalytic action have also been obtained in a applied aspect.
- amorphous powders of modified TiO₂ are also obtained, where the amorphous state is kept at 300°C.

Conclusion

Given the scientific metrics of Assistant Professor Albena Bachvarova-Nedelcheva, the scientific contributions reflected in the habilitation works, the contributions reflected in the non-habilitation works and my personal excellent impressions of her as a researcher, **I strongly recommend she to be approved for an academic position "Associate Professor" for the needs of the laboratory" High Temperature Oxide Systems "**.

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