

STATEMENT

from of Prof. Sevdalina Hristova Turmanova, PhD - associate professor at the Assen Zlatarov University - Burgas, Department of Technology, Materials and Materials Science, member of the scientific jury appointed with administrative act PD-304/28.11.2019

regarding The quality of doctoral thesis in the field of higher education 5. Technical sciences, professional classification 5.10. Chemical technologies, scientific specialty Chemistry of macromolecular compounds

Author: Victoria Trifonova Trifonova

Title: Preparation, characterization and application of polymer complexes

The presented materials of the dissertation thesis by Victoria Trifonova Trifonova in paper and electronic form, well described and carefully arranged, contain all the necessary information for evaluation. The required documents have been structured in accordance with the requirements of the Rules for the Implementation of the Law on the Protection of People with the Law and the Rules for the Acquisition of Scientific Degrees and Positions at the Assen Zlatarov University - Burgas.

The doctoral thesis is 136 pages long and includes the following sections: Introduction, Literature Review, Experimental Section, Results and Discussion, Conclusions and Literature. The illustrative material comprising 7 diagrams, 42 figures and 29 tables is precisely crafted and shaped. 163 references have been cited in the time period 1968-2019, most of them from the last 10 years. This fact testifies to systematic research and multifaceted analysis of the publication activity on the scientific problem. The abstract is structured in accordance with the established rules and reflects the most significant moments of the dissertation. The thesis presented by assistant Trifonova deals with an important problem related to the preparation of catalytically active metal complexes of polymers or biomolecules. Efforts have been focused on characterizing novel metal complexes with polydentate ligands, such as dendrimers and oligopeptides, with a view to their practical application for selective oxidation of alkenes. In parallel, systematic theoretical studies of the geometric and electronic characteristics of the complexes were conducted. Probable mechanisms for the course of the catalytic process under study are assumed. The presented doctoral thesis has a clearly stated purpose and the conclusions are logical and relevant to the completed tasks. The review of literature is broad-

based and is specifically related to the chosen scientific issue. There is precision in analyzing known world practice data on the issues raised. A worldwide review of the activity of the publication shows that detailed structural data are lacking for a large number of metal-containing catalysts, no examples have been found for a theoretical description of the electronic and geometric structure of dendrimer complexes with molybdenyl ions. In parallel, the potential application of amino acid and oligopeptide complexes for catalytic oxidation of alkenes with organic hydroperoxides is a relatively poorly studied area, despite the known catalytic properties of a number of biogenic metal ions and the corresponding metalloproteins and metal-biomolecules. The PhD student has developed her thesis in this skillfully found scientific niche, using an interdisciplinary approach combined with good technical background. It is noteworthy to know a number of instrumental methods for the analysis of materials, including infrared spectroscopy, gas - chromatographic analysis with mass spectral detection, electron paramagnetic resonance, differential-thermal analysis, quantum-chemical methods, applied for solving the set tasks in the thesis. This wide range of applied methods demonstrates good use and knowledge of their capabilities by the PhD student. The Results and Discussion section cleverly analyzes data on the basis of which conclusions are drawn and clear dependencies are defined. I define the doctoral thesis as dissertable, logically constructed and well readable with adequate analysis of the results obtained.

The scientific work is based on a total of 5 publications. Two of the publications are in international impacted journals, Journal of Biomaterials and Nanobiotechnology (IF = 1.78) and Bulgarian Chemical Communications (IF = 0.23). The other two publications are in non-refereed journals with scientific peer review - Annual of Assen Zlatarov University in 2018 and Journal of Mathematics & Natural Sciences in 2013. A job has been submitted for publication in Oxidation Communications. The PhD student reported part of the dissertation at four scientific conferences - one national (Fifth International Conference of the South-West University, Blagoevgrad, 2013), two national with international participation (60 y. International participation, Pomorie) and one international (XXII Congress of SCTM, Societies Chemists and Technologists of Macedonia, Ohrid, 2012). Her participation in three scientific projects is also very impressive: NIH 315 / 2014-2015, NIH 346 / 2015-2016. and NIH 399 / 2017-2018 successfully completed in 2015-2018. Eight citations from international scientists were noted on one of the publications in the Journal of Biomaterials and Nanobiotechnology, which is a sure proof, that the results obtained have been recognized and made available to the world scientific community.

I could summarize the main results, scientific and applied contributions of the presented doctoral thesis as follows:

New Mo (VI) complexes with unmodified dendrimer containing 8 primary amino groups (D8), as well as Mo (VI) and V (IV) complexes with modified dendrimers containing 8 and 32 primary amino groups (D8 and D32) with polyethylene glycol. The catalytic activity of the newly obtained complexes in the reaction of cyclohexene oxidation with *tert*-butyl hydroperoxide under aerobic conditions was first investigated. Complex compounds with transition metal ions with selection of amino acids and oligopeptides have been studied in detail as structural elements of protein biopolymers. Quantum-chemical methods have been used to determine the electronic and spatial structure of the complexes obtained, and their correlation with the experimental data on their catalytic activity is discussed. The results in the dissertation have specific original contributions related to the enrichment of knowledge in the field of production and research of metal complexes with organic ligands and potential application in catalysis and biomedicine.

No future work guidelines have been presented that clearly declare an opportunity to continue research and develop scientific issues.

This doctoral thesis complies with the requirements laid down in the Rules for the Terms and Conditions for Acquisition of Academic Degrees and Occupation of Academic Positions at the Assen Zlatarov University- Burgas, and her subject corresponds to the scientific specialty Chemistry of high molecular weight compounds.

I am convinced that the scientific results reported in the doctoral thesis are the result of many years of continuous effort and work that underpin the establishment of Victoria Trifonova as a scientist and researcher.

CONCLUSION

Taking into account the scientific and applied contributions, the value of the obtained results and the analytical precision approach in their interpretation, I give a positive assessment of the dissertation on the topic "Preparation, characterization and application of polymer complexes". I kindly recommend the scientific jury to grant the PhD degree to assistant professor Victoria Trifonova Trifonova in the scientific specialty Chemistry of high-molecular compounds, according to the Law for the Development of the Academic Staff in the Republic of Bulgaria.

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/ Prof. Sevdalina Turmanova, PhD /