

STATEMENT

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Subject: Dissertation for awarding the educational and scientific degree 'Doctor' in the field of higher education "Natural Sciences, Mathematics and Informatics", professional field 4.2. "Chemical Sciences", Scientific specialty "Organic Chemistry", presented by **Zhanina Stoyanova Petkova** (Scientific Jury according to order № ПД-09-291/28.09.2020 of the Director of IOCCP-BAS).

Topic: "SYNTHETIC APPROACHES TOWARDS CHIRAL AND BIOLOGICALLY ACTIVE COMPOUNDS"

Supervisors:

- Prof. Vladimir Dimitrov, IOCCP-BAS
- Dr. Malinka Stoyanova †, IOCCP-BAS

The dissertation work of Zhanina Petkova is in the field of stereoselective organic synthesis. The aim is to conduct rational synthesis of enantiomeric (diastereoisomeric) pure polyfunctional compounds with applications in asymmetric synthesis, as well as in drug chemistry. An approach for selective synthesis of chiral compounds, which may have versatile applications, is presented.

The synthetic tasks of the dissertation work are aimed at obtaining chiral compounds applicable in asymmetric palladium catalyzed reactions for C-C-bonds formation. The core of the approach consists in the use of chiral amines to obtain arylsulfonamides, which are effectively involved in *ortho*-lithiation reactions due to the *ortho*-directing ability of sulfonamide functionality. Subsequent reactions with electrophiles lead to the preparation of a variety of multifunctional compounds. The interest is focused on the introduction of diphenylphosphine fragment into the *ortho*-position relative to the sulfonamide substituent. Thus, a series of so-called P,O-ligands was synthesized, in which the amide functionality was modified with different chiral groups. The resulting chiral P,O-ligands demonstrate promising catalytic activity in palladium catalyzed allylic substitution (up to 83% ee), while in *Suzuki-Miyaura* reaction the results were negative.

Through the use of chiral camphor-sulfonylchloride, a successful series of selective transformations has been demonstrated – preparation of vinyl-substituted camphor derivative, epoxydation and separation of diastereoisomers and selective aminolysis of chiral epoxides. A series of chiral compounds is synthesized by aminolysis of epoxy-derivatives and application of various amines.

The resulting chiral compounds have been studied for biological activity against the standard laboratory strain *Mycobacterium tuberculosis* H37Rv, as well as against multiresistant strain 43. In carrying out this development, a fruitful interdisciplinary cooperation was carried out.

Assistant Zhanina Petkova demonstrates enviable experimental skills and knowledge of modern physicochemical methods for characterizing organic compounds. The synthesized compounds are isolated and studied with precisely conducted and reproducible experiments.

As scientific supervisor of the dissertation Zhanina Petkova, I would like to stress that she is fully capable of conducting and authorizing independent research tasks, with which the main purpose of the PhD thesis is fulfilled. Outside of the scientific and educational nature of the PhD thesis, I would like also to express my satisfaction that Zhanina Petkova works independently and can develop within her own scientific theme.

I will not comment on technical gaps that can always be found in any dissertation work because they do not essentially change the quality of the current dissertation.

Conclusion

The dissertation work of Zhanina Stoyanova Petkova contains sufficient scientific and applied results that are of original contribution and meet the requirements laid down in the Law on Development of Academic Staff in the Republic Bulgaria, the Regulations for Implementation of the Law and the respective Rules of IOCCP-BAS.

Therefore, I am confidently giving my positive assessment of the results achieved in the dissertation work and propose to the scientific jury to award the educational and scientific degree "Doctor" of Zhanina Stoyanova Petkova in the field of higher education: "Natural Sciences, Mathematics and Informatics", professional direction 4.2. "Chemical Sciences", Scientific Specialty "Organic Chemistry".

15.11.2020

Prof. Dr. Vladimir Dimitrov