

REPORT

by

Assoc. Prof. Dr. Georgy Bogomilov Grancharov

Member of the Academic Jury set to render a decision
on a procedure for the acquisition of Academic Degree
“Doctor of Philosophy” (PhD)”

in the Professional Field **4.2. Chemical Sciences** according to the Classifier of the Areas of Higher Education and the Professional Fields (Scientific Specialty “Polymers and Polymer Materials”)

This Report is prepared in response to Order № ПД-09-54 of 07.04.2026 issued by the Director of the Institute of Polymers, Bulgarian Academy of Sciences (BAS), following the decision made by the Academic Jury that was held on 22.04.2026.

The Report is in compliance with *Development of Academic Staff in the Republic of Bulgaria Act (DASRB)*, the *Rules for the Application of the Development of Academic Staff in the Republic of Bulgaria Act*, the *Rules of BAS* and with the *Rules set at the Institute of Polymers, Bulgarian Academy of Sciences, for applying the Act aforementioned*.

1. Biographical information about the candidate

Erik Dimitrov graduated from the Medical University - Sofia with a Master's degree in Medicine in 2024. Before that, in 2019, he started working at the Institute of Polymers - BAS as a technician, and now is currently an Assistant Professor. He was enrolled as a doctoral student in independent training at the Institute in the field of "Macromolecular Engineering" in 2025. The topic of his dissertation thesis is "Macromolecular design and synthetic strategies for obtaining polymers with applications for the transport and delivery of biologically active substances and oligonucleotides" with scientific supervisors Assoc. Prof. Dr. Natalia Toncheva-Moncheva and Prof. DSc. Stanislav Rangelov. In addition to the work on the dissertation thesis, the candidate has also participated in 15 scientific forums and has received 14 scientific awards for his work.

In the present dissertation work, the results of Assistant Professor Erik Dimitrov are summarized in 5 scientific publications. The articles are published in international journals, referenced and indexed in world-recognized databases of scientific information (Web of Science and Scopus) and fall into the Q1 quartile. An extended abstract was also prepared based on the dissertation work. It is noteworthy that in four of the publications Erik Dimitrov is in first place, which clearly shows his personal contribution to scientific works. The points that this indicator brings for fulfilling the minimum requirements for the scientific degree "doctor" are 125 with 30 points required. Taking into account that the articles submitted by the candidate have already been cited fifteen times in the scientific literature, bringing him 30 points, as well as his participation in

10 scientific projects giving him an additional 120 points, the minimum requirements are met unconditionally and exceed the requirements of the Rules. No unreliability of scientific data and plagiarism were found according to the Additional Provisions of the Rules.

2. Assessment of the candidate to meet the minimal criteria for Academic Degree “Doctor of Philosophy” (DSc)

The scientific works of doctoral student Erik Dimitrov are the result of research dedicated to the preparation of phospholipid analogues and their polymer-lipid conjugates, lipid-functionalized oligonucleotides, polystyrene polymers with grafted oligonucleotide chains, as well as amphiphilic linear and “star-shaped” copolymers of polyglycidol and poly(ϵ -caprolactone) with different compositions for the preparation of micellar and niosomal nanocarriers of biologically active substances and drugs.

In the development of the dissertation work, Erik Dimitrov has successfully learned and applied the most modern methods for the synthesis and design of polymers, as well as the variety of methods for characterizing and proving their structure. The possibilities for the use of the obtained copolymers and their conjugates have been analyzed and interpreted.

The dissertation thesis is written on 173 pages, of which the literature review covers 42 pages, and the description of the results and their discussion - 59 pages. The literature review gives the various polymerization reactions for obtaining the polymers, as well as the variety of architectures and properties that the polymers provide. “Click” chemistry with all its possibilities is specially described, as well as its application in the synthesis and design of polymers. Biocompatible, biodegradable and stimuli-responsive polymers are considered, as well as thermo- and pH-sensitive polymers. Attention is paid to phospholipids and their synthetic analogues. The results of the dissertation are divided into 3 chapters, and finally the main conclusions and contributions of the dissertation work are presented.

The thesis presents the synthesis of the phospholipid analogue 1,3-dihexadecyloxypropan-2-ol (DHP) and the controlled polymerizations of different types of defined polymers, which are subsequently linked to DHP via a copper-catalyzed azide-alkyne “click” reaction. DHP-functionalized oligonucleotides were synthesized and thus a new type of nucleolipids were obtained via a “click” reaction in the absence of a copper catalyst. Grafted polymer-oligonucleotide conjugates of copolymers of 4-(chloromethyl)styrene and styrene were successfully obtained, where a “click” reaction without a copper catalyst was again applied. Defined amphiphilic linear and “star-shaped” block copolymers of poly(ϵ -caprolactone) (PCL)

and polyglycidol were synthesized. The protected synthesized polyglycidol was modified and linked to three- or four-armed PCL stars after applying an azide-alkyne “click” reaction. Various methods for characterizing the obtained products have been learned and applied, such as nuclear magnetic resonance spectroscopy, infrared spectroscopy, gel permeation chromatography, ultraviolet and visible spectroscopy, light scattering, gel electrophoresis, etc.

All this, in combination with Erik Dimitrov's skills in the field of polymer synthesis and design, the use of the latest methods in this field such as “click” chemistry, the application of the most modern techniques for the characterization of polymers, leads to the production of materials with desirable and valuable properties that can be used in medicine and pharmacy.

3. Opinions, notes and recommendations

Assistant Professor Erik Dimitrov appears to be an extremely active, focused and dedicated young researcher in his work. In addition to the five publications presented, falling into the highest quartile of scientific journals, he has also participated in 15 scientific forums with oral and poster presentations, which were reported personally by the doctoral student and he has received 14 scientific awards for his work. As the author of the dissertation, he has tried to present the scientific work in the most understandable and accessible way. I have no major remarks about the dissertation, but I will only note some inaccuracies in it:

- In chapter III.4.2. of "Results and Discussion" there is a discrepancy between the numbering of the figures in the main text and that in the figures of the dissertation itself, which makes it difficult to read. This should be eliminated even before the final submission of the dissertation in order to facilitate the work of the reviewers as much as possible.

4. Conclusion

The main contributions of the presented dissertation work clearly outline the current and perspective topic on which the doctoral student Erik Dimtrov works in depth and systematically. This characterizes him as a researcher who, in the process of work, has acquired new knowledge, experimental skills and the ability to thoroughly interpret the results obtained, as well as skillfully apply modern methods of synthesis and analysis. The research carried out by the author will enrich and supplement scientific experience, will introduce innovations in the field of polymers, polymer synthesis, polymer design, characterization of polymers and the use of the obtained materials in medicine and pharmacy. The most appropriate conditions for conducting the synthesis, choice of reaction and catalyst, methods for proving the structure of the obtained

polymer materials, as well as the possibilities for their application in medicine and pharmacy have been precisely used, which I believe is the personal work of the doctoral student.

The dissertation work presented by Erik Vassilev Dimitrov and the materials to it fully meet the requirements for awarding the educational and scientific degree "Doctor of Philosophy" according to the Act on the Development of the Academic Staff in the Republic of Bulgaria, the Regulations for its Implementation, as well as the Regulations of the Bulgarian Academy of Sciences and the Institute of Polymers (BAS). All this, as well as my personal impressions, give me reason to confidently express my positive opinion and to recommend to the Academic Jury to render a positive decision for the acquisition of the Academic Degree "Doctor of Philosophy" to Erik Vassilev Dimitrov in professional field 4.2. Chemical Sciences: Specialty Polymers and Polymer Materials.

Date: 22/06/2026

Sofia

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**Member of the Academic Jury
Assoc. Prof. Dr. G. Grancharov**