

REPORT

by

Prof. Dr. Pavletta Shestakova

Member of the Academic Jury set to render a decision
on the competition for the academic position of "Associate Professor"

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") for the needs of the scientific direction "Macromolecular Engineering", Institute of Polymers, BAS, announced in the State Gazette, issue 65 of 12.08.2022.

This Report is prepared in response to Order № ПД-09-148 of 11.10.2022 issued by the Director of the Institute of Polymers, Bulgarian Academy of Sciences, following the decision made by the Academic Jury that was held on 26.10.2022.

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 the Rules set by the Institute of Polymers, Bulgarian Academy of Sciences, for applying the Act aforementioned.

Assistant Professor Dr. Radostina Kalinova, from the Institute of Polymers, BAS (IP-BAS), is the only candidate in the competition for the academic position of "Professor", announced in the State Gazette, issue 65 of 12.08.2022.

The set of materials presented by Dr. Radostina Kalinova is in accordance with the Rules for the Development of the Academic Staff of IP-BAS, and meets the criteria of IP-BAS for the academic position of "Professor".

1. Assessment of the scientific and research accomplishments of the candidate

Dr. Radostina Kalinova, has presented 18 scientific papers for participation in the competition, which are not included in her PhD Thesis. All 18 submitted publications are accepted for evaluation, of which 5 are under indicator B and 13 are under indicator D. All publications under indicator B are in journals that are referenced and indexed in the international scientific databases (Web of Science and Scopus), with 4 being in quartile Q1 and 1 being in quartile Q2. These publications contribute a total of 120 points, compared to the minimum requirement of 100 points. The distribution of the journals under indicator D by the respective quartiles is as follows: Q1 – 5, Q2 – 2, Q3 – 2, Q4 – 3, and 1 publication is with SJR without IF. The total number of points for indicator D is 241 points, with a minimum requirement of 220 points. 140 citations were noticed on the publications submitted for participation in the competition, which correspond to 280 points for indicator D, with a minimum requirement of 60 points. The summarized analysis of the scientific indicators of the materials submitted for participation in the competition shows that the total number of points from all indicators is 641 points, with which the candidate significantly exceeds both the national minimum requirements (400 points) and those of the Institute of Polymers, BAS (430 points) for the academic position of Associate professor. Dr. Radostina Kalinova, is first author in 9 and second author in 5 of the publications

submitted for participation in the competition, which is recognition of her personal contribution to the conducted research.

The research investigations of Dr. Radostina Kalinova are directed in the following main directions: 1) Preparation of functional polymeric architectures as carriers of medicinal substances; 2) Design and synthesis of functional copolymers for complexation and transfer of biological macromolecules; 3) Synthesis of new linear (co)polymers and study of their properties in different solvents; 4) Polymers and polymer films with potential technological applications. The main scientific contributions of Dr. Radostina Kalinova can be summarized as follows:

- A new approach has been developed for the synthesis of amphiphilic copolymers with different functionality, which allows fine control over the number of side groups distributed along the length of the biodegradable hydrophobic block.

- For the first time, a triblock copolymer containing a biodegradable hydrophobic block, a positively charged block and a neutral hydrophilic block was synthesized by ring-opening polymerization in combination with two radical atom transfer polymerizations. Copolymers have been shown to form stable micelles in water with a surface charge that can be modified by changing the copolymer composition.

- By using two hydrophilic block copolymers with oppositely charged segments, polyionic complex (PIC) micelles with different surface charges and with a cell targeting ligand on their surface were obtained.

- The properties of the different polymer systems in water were systematically studied and a detailed physicochemical characterization of the obtained colloidal systems was carried out. It has been shown that the polymeric micelles obtained from the various block copolymers can be used as carriers of hydrophobic medicinal substances.

- A new synthetic procedure was developed for the synthesis of a hybrid polymer containing short PEO side chains and a poly(L-lysine) block. The possibility of the hybrid copolymer to form complexes with DNA was investigated, and it was shown that the formed nanosized polyplexes possess exceptional colloidal stability, low toxicity and good transfection efficiency, which determines their potential application as DNA carriers.

- A hybrid block copolymer based on ethylene oxide and L-lysine was obtained, and its ability to complex with insulin was investigated, showing that this type of systems can be used as carriers of proteins and peptides for in vivo applications.

- A series of linear copolymers based on poly(dimethylsiloxane)-block-poly(acrylic acid) were synthesized, varying the amount of the second block. Sulfobetaine copolymers with different main chain structure were obtained. Three different polymers based on 1,3,4-oxadiazole were also synthesized, varying the type of conjugated segments and the length of the spacers connecting them. The influence of different conditions (type of solvent, presence of salt and heating) on the behavior and characteristics of the polymer systems was investigated.

- A series of polymer materials have been synthesized (polyionic liquids based on pyrrolidine derivatives, polydiphenylacetylenes with Schiff bases as terminal groups, polymer-organic photocells on plastic substrates of polyethylene terephthalate with an active layer of a conjugated polymer and a fullerene derivative) with potential technological applications as capacitors, polymer-photovoltaic cells and LEDs.

I would like to point out that the research activities and scientific contributions of Assistant Professor Radostina Kalinova are in important and intensively developing scientific field related to the development of new materials, with potential applications as optimized systems for the delivery of medicinal substances or biological macromolecules, as well as materials with applications in the field of new ecologically oriented technologies.

The research activity of Associate Professor Kalinova is realized within the framework of national and international scientific projects. A list including 13 scientific projects with the participation of Dr. Kalinova is presented, of which 9 projects are funded by the National Institute of Scientific Research and one is funded by the programme for bilateral inter-academic cooperation of the BAS. Dr. Kalinova is a participant in the projects for establishing Center of Excellence "National Center for Mechatronics and Clean Technologies" and a Center of Competence "Sustainable utilization of bio-resources and waste from medicinal and aromatic plants for innovative bioactive products", financed under OP SESG, as well as in NRP "Low-carbon energy for transport and household (EPLUS)".

2. Opinions, recommendations and notes

As an oversight, I would like to note that no materials were presented regarding the participation of Dr. Kalinova in scientific forums. This does not affect my overall positive impression of the work of Dr. Kalinova.

The habilitation report is clearly written and correctly reflects the applicant's scientific work. The materials submitted for participation in the competition demonstrate that Dr. Radostina Kalinova, is a competent and highly experienced researcher who works in an interesting and important research field related to the development of new polymer materials with potential biomedical and technological applications.

3. Conclusion

The scientific activity and research metric indicators of Dr. Radostina Kalinova, reflected in the materials submitted for participation in the competition, cover and exceed the requirements for the academic position of "Professor", in accordance with the Law for the Development of Academic Staff in the Republic of Bulgaria, The Regulations of BAS for the Implementation of this Law and the Regulations of IP-BAS.

According to Art. 26(3) of the DASRB, on the grounds of the documentation presented by the candidate, on her publications reviewed and the above assessment, I recommend the Academic Jury to render a positive decision on Dr. Radostina Kalinova for the position of an Associate Professor at the Institute of Polymers, Bulgarian Academy of Sciences.

Date: 01. 12. 2022 r.

Report prepared by:

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