

REPORT

written by Dr. Tsvetanka Krumova Babeva - professor at the Institute of Optical Materials and Technologies "Acad. Jordan Malinowski" (IOMT) - BAS

for the materials submitted for participation in the competition for occupying the academic position of **"Professor" at Plovdiv University "Paisii Hilendarski"**

for field of higher education : 4 "Natural sciences, mathematics and informatics"

professional field : 4.1. "Physical Sciences" (Condensed Matter Physics).

In the competition for "professor", announced in the State Gazette, no. 92 of 18.11.2022 and on the website of Plovdiv University "Paisii Hilendarski" for the needs of Department of "Physics" at the Faculty of Physics and Technology, the only applicant is Assoc. Professor Dr. Mariya Georgieva Marudova-Zsivanovits from Plovdiv University "Paisii Hilendarski", Department of "Physics" at the Faculty of Physics and Technology.

1. General presentation of the procedure and the applicant

By order No. RD-21-330 dated 15.02.2023 of the Rector of the Plovdiv University "Paisii Hilendarski" (PU) I have been appointed as a member of the scientific jury of a competition for the academic position of **"professor"** at the PU for the field of higher education 4 "Natural sciences, mathematics and informatics", professional field 4.1. "Physical Sciences" (Condensed Matter Physics) , announced for the needs of "Physics" Department of the Faculty of Physics and Technology.

The only applicant in the competition is Associate Professor Mariya Georgieva Marudova - Zsivanovits, PhD, from Plovdiv University "Paisii Hilendarski", Department of Physics, Faculty of Physics and Technology. The documents submitted by the applicant fully comply with the Regulations for the Development of the Academic Staff (RDAS) of the PU and includes the following documents: application form addressed to the rector of PU for admission to the competition; Curriculum vitae in European format; diplomas for Master and PhD degrees and a certificate from High Attestation Commission for acquiring the academic position "associate professor"; list and copies of publications; sample form of fulfillment of the minimum national requirements; declaration of originality and authenticity of the attached documents; abstracts of the publications of the materials according Art. 76. from RDAS of PU in Bulgarian and English languages; extended habilitation reference and reference for the main contributions in Bulgarian and English; list of citations; certificate of work experience; documents for teaching activities - the developed plans and programs of courses are presented, as well as a list of supervised PhD students and graduates; documents for scientific research activity – participation and management of projects, attendance of scientific forums, lectures at foreign universities; other documents – evidences of the applicant's contribution to the general development and raising of the reputation of the department, faculty and university are presented.

In the competition, the applicant, Associate Professor Mariya Marudova - Zsivanovits, submitted a total of 40 publications, 1 book chapter, 1 patent, 1 textbook, 1 workbook and 7 electronic courses. I accept all materials for review, because all they are related to the topic of the competition and were not used in the acquisition of the PhD degree and in the habilitation procedure of the applicant. Dr. Marudova fully meets the minimum national requirements, and

gained points for individual groups significantly exceed the minimum requirements: group A - 50 points (from at least 50 pts), group V - 214 points (from at least 100 pts), group G – 420 points (from at least 200 pts), group D – 180 points (from at least 100 pts), group E – 227 points (from at least 150 pts).

Dr. Marudova graduated from the Faculty of Physics of the University of Plovdiv with the qualification of physicist - engineer and specialization "Physics of polymers". In 2007, she was awarded a PhD in the scientific specialty "Chemistry of high molecular compounds". Since 1999, she has successively occupied the positions of assistant (1999 - 2002), senior assistant (2002 - 2007) and chief assistant (2007 - 2009) in the "Experimental Physics" department of the Faculty of Physics of the PU, and since 2009 she is an associate professor in the "Physics" department of the Faculty of Physics and Technology of the PU. In the period 2001 – 2015, Dr. Marudova was on several short-term specializations in the field of physics of food in England and Hungary.

2. General characteristics of the applicant's activity

All presented publications (40 papers) are referenced in the scientific databases *Scopus* and/or *Web of Science* and are divided according to the journals quartiles as follows: Q1 – 8 papers, Q2 – 3 papers, Q3 – 4 papers, Q4 – 12 papers, journals without quartile, but with SJR – 13 papers. Although almost one third of the papers were published in non-quartile journals, it is striking that more than 25% of the papers were published in very prestigious and high-impact journals such as *Food Chemistry* (IF = 9.231), *Applied surface science* (IF =7.392), *Polymers* (IF =4.967), *Journal of Thermal Analysis and Calorimetry* (IF=4.755), *IEEE Sensors Journal* (IF=4.325), *Journal of Applied Polymer Science* (IF=3.057) and others. This is an indisputable testimony to the high quality of the research conducted and the results obtained. A list of 90 independent citations is submitted for participation in the competition. The reference in the *Scopus* database from 31.03.2023 shows 69 refereed publications, 358 independent citations and an *h* - index equal to 10. There is a growth of independent citations number in recent years which indicates that the research conducted is in an up-to-date field and the results obtained are visible in the scientific community.

Dr. Marudova's research activity is mainly focused on the deposition and physicochemical characterization of multi-layered nanoscale structures of natural polymers deposited on biodegradable polyester supports and establishing their potential for application as drug delivery systems. Chitosan/xanthan and chitosan/casein were used as alternating nanosized polymers, and polylactic acid (PLA), poly- ϵ -caprolactone (PEC), and their mixtures were used as porous supports. In general, I characterize the contributions as "*enriching existing knowledge by proving with new means substantial new aspects of already existing scientific fields, problems, theories and hypotheses*". I will point out some of them :

✚ The influence of the type of substrate and its polarity on the formation of the polyelectrolyte layers was investigated and it was found that a substrate with a thickness of 40 microns charged in a positive corona charge is the optimal one from the point of view of adhesive, mechanical and electrical properties (B4.4, B4.5 and B4.8);

✚ The influence of the deposition method of the polyelectrolyte layers (dip coating and spincoating) on PLA and PEC substrates pre-treated in a corona discharge was investigated and a faster growth of the thicknesses of the layers obtained by the dip coating method was found (B4.1 and B4.2). The optimal pH values of the starting solutions at which stable layers are obtained (B4.3 and B4.7) have been established;

✚ The loading of the obtained structures with drugs and its subsequent release was studied in detail (B4.11 and B4.13). It was found that the incorporated amount of benzydamine hydrochloride was greater in structures built on negatively charged supports, preferably PEC supports, and the release was slowest from structures built on PLA supports (B4.11 and B4.13). Additional chemical modification with *N-Ethyl-N'-(3-dimethylaminopropyl) carbodiimide hydrochloride* (EDAC) results in an increase in the amount of incorporated drug and a slower release. The latter correlates with the swelling profile of the multilayer structures (B4.6 and B4.12);

✚ An original methodology, including optical, impedance and calorimetric methods, has been proposed to establish the authenticity of olive oil [G7.3 and G7.8], proving the origin of honey [G7.13] and monitoring the properties of apples during their aging [G7.04];

✚ A relationship was established between the melting points of oils from chia seeds [G7.9], safflower seeds, coriander seeds [G7.20] and black cumin seeds [G7.22] and their fatty acid composition.

According to the applicant's personal contribution, I do not know Dr. Marudova and have not worked with her, but after reviewing in detail her entire research and teaching career, I have no doubt that her personal contribution to the results obtained is substantial. In support of this statement, I would like to note that in 40% of the papers, Dr. Marudova is the first or corresponding author. She is also the first author of the published book chapter.

Dr. Marudova participated in the implementation of 2 international projects financed under the 7th Framework Program of the EU and the “Erasmus+” program. She was project leader of 3 scientific projects funded by the Bulgarian Science Fund and 3 projects funded by the PU. She participated in 1 scientific project funded by the Bulgarian Science Fund, 4 projects funded by operational programs and 4 projects funded by Plovdiv University.

According to Dr. Marudova's teaching activity, I could say only that it is impressive. The classroom occupancy report shows an average of 470 hours per year for the last 11 academic years, and in the last academic year, the implementation of hours was twice the plan. 19 curricula have been developed for Bachelor's and Master's programs in the fields of mechanics, molecular physics, polymers and nanomaterials, as well as 8 curricula for 2 doctoral programs, 4 master's programs, and 2 bachelor's programs. Dr. Marudova is a supervisor of 2 PhD students (1 finished and ready for viva and 1 still studying) and co-supervisor of another 2 PhD students (1 awarded with PhD degree and 1 currently studying). For the last 13 years, she has supervised 16 graduates who have successfully defended their bachelor's degrees (13) and master's degrees (3). Dr. Marudova is the author of 1 textbook and 1 workbook and co-author of a manual for laboratory exercises in physics. In the period from 2011 to 2019, every academic year, Dr. Marudova delivered lectures at Corvinus University, Budapest, Hungary and at the University of Technology, Athens, Greece under the “Erasmus+” program. Dr. Marudova participated in the organizing committees of several international and national conferences in the field of food physics, and in 2014 she was the chairperson of the organizing committee of the 11th international conference "Food Physics and Innovative Technologies", held in Plovdiv.

In addition to the applicant's scientific, teaching and administrative activities described above, I cannot fail to mention the applied scientific activity. Dr. Marudova is a co-author of one patent for production of water-insoluble glucan by means of transferase enzyme reaction, property of PU.

3. Critical remarks and recommendations

I have no critical remarks, neither to the materials presented, nor to the results and contributions obtained.

CONCLUSION

The documents and materials presented by Assoc. Professor Dr. Mariya Marudova-Zsivanovits **meet** all the requirements of the Regulations on the Development of the Academic Staff in the Republic of Bulgaria, the Regulations for its implementation and the relevant Regulations of PU "Paisiy Hilendarski". Dr. Marudova has presented scientific works of considerable quantity and quality, which were not used for the acquisition of PhD degree and the academic position "Associate Professor". The applicant's work contains original scientific and applied scientific contributions that have received a good response and international recognition. The applicant has a very strong teaching activity, and her qualification is undoubted. The results achieved by Assoc. Prof. Dr. Mariya Marudova-Zsivanovits in the research and development fully correspond to the minimum national requirements and significantly exceed them.

After becoming familiar with the materials presented in the competition and the contributions contained in them, I give my **positive** assessment and recommend the Honorable Scientific Jury to prepare a report to the Faculty Council of the Faculty of Physics and Technology of the PU with a **proposal for awarding of Dr. Mariya Georgieva Marudova-Zsivanovits the academic position of "Professor"** at PU "Paisiy Hilendarski" in the field of higher education 4 "Natural sciences, mathematics and informatics", professional field 4.1. "Physical Sciences" (Condensed Matter Physics).

April 4th 2023

Report written and signed by:

Prof. Dr. Tsvetanka Babeva