REPORT

for a competition for occupation of the academic position "Associated Professor" in professional field 4.1. "Physical sciences", scientific specialty "Physics of wave processes", according to the announcement in SG no. 79 of 04.10.2022

Applicant: Dr. Branimir Ivanov, Assistant Professor, Institute of Optical Materials and Technologies "Acad. J. Malinovski" (IOMT) - BAS

Reviewer: Prof. Dr. Tsvetanka Babeva, Institute of Optical Materials and Technologies "Acad. J. Malinovski" (IOMT) - BAS

General description of the presented materials

The sole applicant in the competition is Assistant professor Dr. Branimir Ivanov from the Institute of Optical Materials and Technologies "Acad. J. Malinovski" (IOMT) - BAS. He submitted a total of 24 articles for participation in the competition. Nine of the published papers are thematically merged in the equivalent of a habilitation thesis. Almost half of the articles were published in referred journals with an impact factor classified in quartiles as follows: Q1 – 5 papers, Q2 - 2 papers, Q4 - 4 paper. The other 13 articles were published in SJR proceedings manly in SPIE proceedings (10 papers). The last is a very well-known international proceeding for publishing novelties in optics and photonics. Although most papers are published in Q4 journals and journal without IF some of the papers are published in very prestigious journals in the field of optics such as *Applied Optics, Optics Letter*, *Optics Communications* and *Optics and Lasers in Engineering* . 32 independent citations are presented in the competition, and the total number of citations of the applicant, according to his CV, is 80.

Dr. Ivanov fully meets the minimum national requirements, the requirements in ZRAS-BAS and those of IOMT-BAS, and his indicators for the individual groups are as follows: group A - 50 points (out of at least 50 pts), group V - 104 pts. (out of at least 100 pts), group G – 239 pt. (out of at least 200 pts), group D – 64 pt. (out of at least 60 pts). All publications and citations of the applicant, presented in this competition, were not used for the acquisition of the PhD degree.

The documents submitted by the applicant fully comply to the requirements of the RSARB and the regulations for its implementation.

General characteristics of the applicant's scientific, applied and teaching activities

Dr. Ivanov's research activity is in the field of the physics of wave processes, being mainly concentrated in the field of coherent optical metrology and the visualization of three dimensional objects. Since these methods are based on the phenomena of interference and diffraction of light and use coherent light, they offer very good resolution, a non-destructive control method, rapidity, etc. The number of refereed scientific papers of Dr. Ivanov is 33 according to a reference in *Scopus* inquired on 30th Jan 2023. The results have been presented on more than 20 national and international conferences in the field of wave physics. Dr. Ivanov participated in the working teams of

10 projects, funded both by Bulgarian companies and organizations, and by international foundations and programs. As an example for research projects I can mention three consecutive projects in the last 3 years funded by the Ministry of Science and Information and Communication Technologies of the Republic of South Korea, as well as the 3D TV project funded by the 6th Framework Program. Dr. Branimir Ivanov was a most contributing team member in several industry-funded Research and Development projects for developing methods for holographic imaging of metal and clay artefacts, and to holographic recording of objects at sizes twice higher than their natural size, as well as to develop a methodology and system of recording and copying reflection holograms. In addition, Dr. Ivanov has been the main responsible person for the planning, assembly and installation of over 20 national and international holographic exhibitions.

As for the teaching activity of Dr. Ivanov, he is the co-supervisor of a successfully defended diploma and is a very active participant in the education of the students who attend IOMT and conduct their educational practice at the Institute. I would like also to mention Dr. Ivanov's activity in popularizing scientific achievements in the field of physics through his participation in numerous popular television broadcasts and popular magazines.

Basic and / or applied scientific contributions

In general, I characterize the scientific contributions of the applicant as "*enrichment of existing knowledge and theories and application of scientific achievements in practice*".

The scientific contributions of the equivalent of the habilitation thesis are divided by the applicant in two areas, namely interferometric methods for determining the spectral characteristics of optical sources with noise correction and holographic and interferometric methods for visualizing and controlling samples. As contributions in the first direction, I will mention the development of three channel correlational Fourier spectrometer with simultaneous recording of three interferograms: one for the reference source, second for the working light source and third from the sample under study, as well as the development of a method for precise measurement of the optical characteristics of different light sources. As contributions in the second direction, I will mention the development of a phase-shifting holographic polariscopic system with a coherent light source, applied to the measurement of photo-elastic coating in order to determine mechanical stresses.

The applicant's scientific contributions to the works outside the habilitation work are divided by the applicant in three areas. The first one comprises numerical methods for analyzing data from dynamic speckle measurements. Here I will mention the proposed method for dynamic speckle analysis by coarse quantization of the raw speckle images, as well as the developed method for improving the quality of determining the two-dimensional velocity distribution (activity map) of various processes. Contributions in the second area are related to profilometric methods for remote determination of the shape and visualization of three-dimensional objects, and here I will mention the analysis of the projection of a sinusoidal phase grating. In the third area, results for monitoring and control of drying processes by means of dynamic speckle analysis are combined.

I have known Branimir for many years and I can confidently say that he is a very experienced and precise experimental worker with good theoretical background and solid knowledge in physics. His personal contribution to all the research was the creation of the optical experimental schemes, the selection and fine-tuning of the optical elements, and the participation and conduction of the experiments. A protocol for four papers is presented for the separation of personal contributions of Dr. Ivanov from other co-author that will participate in similar competitions for the acquisition of the academic position "Associated Professor". The contribution of the two co-authors - applicants in the aforementioned competitions, is very clearly distinguished.

I have no critical remarks and recommendations.

CONCLUSION

The sole applicant in the competition, Assistant Professor Dr. Branimir Ivanov has presented sufficient quantity and quality of materials, which fully meets the minimum national requirements and those of the BAS and IOMT-BAS for occupying the academic position "Associated Professor". The applicant's scientific research activity is in an up-to-date field, the results obtained contribute positively to the field. There is no doubt of plagiarism in the materials presented.

On the basis of the above, I give my positive assessment and confidently recommend to the honorable Scientific Jury to support the application and propose to the Scientific Council of IOMT - BAS to award Dr. Branimir Ivanov the academic position "Associated Professor" in professional field 4.1. Physical sciences.

Date: 30th Jan 2023

Written by:

/prof. Dr. Tsvetanka Babeva/