

OPINION

by Assoc. Prof. Dr. Ruzha Georgieva Harizanova
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concerning the materials submitted for the competition for occupying the
academic position "Professor" at the Institute of Optical Materials and Technologies
"Acad. Jordan Malinovski"-BAS

Professional field	4.1 Physical Sciences
Scientific area	"Electrical, magnetic and optical properties of condensed matter"

In the competition for occupying the academic position "Professor" announced in State Gazette № 35 from 10.05.2022 and at the internet site of the Institute of Optical Materials and Technologies (IOMT), BAS only one applicant, Assoc. Prof. Dr. Lian Lyubenov Nedelchev from IOMT-BAS, has submitted his documents.

1. General characterization of the submitted materials

The materials submitted for the competition by the only candidate, Assoc. Prof. Lian Lyubenov Nedelchev, correspond to the ADASRB and the Regulations of IOMT on the application of ADASRB and contain all required documents to participate in the competition.

The overall publication activity of Assoc. Prof. Nedelchev encompasses 96 scientific works, 71 are published in national and international specialized journals with IF or SJR. In the competition, the candidate applies with 21 scientific publications which differ from those submitted for the competition for the academic position "Assoc. Professor" and for the defense of the educational and scientific degree "Doctor". The submitted for the competition publications are written in co-authorship with other scientists and are published in acknowledged in the established databases journals in the field of condensed matter physics.

Indicator A - 50 points from the required 50 points, according to the Regulations of IOMT-BAS. The scientific works submitted for the competition are divided into two groups. The first group contains 7 publications substituting for the habilitation thesis, i.e. indicator B - 1 is in a Q1 magazine, 2 – are in Q2 journals, 2 – in Q4 magazines and 2 are published in magazines with SJR. These publications correspond to 109 points in total compared to the required 100 points. 14 publications published in referred and indexed by Web of Sci and Scopus journals are presented, according to indicator G – 1 is in a Q1 magazine, 7 are in Q2 journals, 2 – in Q3, 1 – in Q4, and 3 are published in journals with SJR and deliver 237 points. As part of the works submitted for indicator G, also a Utility model is presented registered by a document № 4004/15.03.2021 and thus, the total number of points for indicator G is 262 (required - 220 points). For indicator D, Assoc. Prof. Nedelchev has declared 70 citations from which however 1 citation should be reduced for the publication **Nedelchev, L et al.**, Journal of Photochemistry and Photobiology A: Chemistry, 376, Elsevier, 2019, ISSN:1010-6030, DOI:10.1016/j.jphotochem.2019.02.009, 1-6 and 2 citations of **Nedelchev, L et al.**, Applied Optics, 42, 29, Optical Society of America Publishing, 2003, ISSN:1559-128X, should be reduced because these are indirect self-citations. Thus, the points in total become 134 instead of the declared 140 which is again an impressive citation of candidate's work and exceeds the required, according to the Regulations of IOMT-BAS, 120 points. For indicator E, Assoc. Prof. Nedelchev demonstrates a very high activity – he was a leading scientist in two national projects with the Bulgarian National Science Fund (BNSF) and the Ministry of Education, Youth and Science, as well as he has participated in 6 projects – 4 national with the BNSF and 2 international with South Korea. 5 of the projects have already been

successfully implemented. The total number of points for the indicator E is 124 from which 24 points are added as financial means supplied for IOMT-BAS from projects of the candidate.

According to the materials submitted for the competition, the candidate has a very active pedagogical and expert activity – he has evaluated scientific projects for the BNSF, has a significant number of reviews for specialized journals among which are Optics Letters, Optics Express, Applied Optics, Polymers, Sensors, Crystals, Chemical Physics Letters, Nanomaterials, etc. Between 2009 and 2021 he was an academic, member of the Academic Council and of the Scientific Council of the University of Telecommunications and Posts (UTP) and from 2014 to 2015 – Head of the Scientific and Research Sector, from 2015 to 2019 – Dean of the Faculty for Telecommunications and Management. He has authored 1 textbook in Physics for the UTP students published in 2012. He was an active participant as well as a lecturer in several international student schools within the Erasmus Program – in Leipzig (Germany); Valencia (Spain); Debrecen (Hungary) and Sofia (Bulgaria). He has co-supervised 2 PhD students (together with Prof. Dimana Nazarova) – Georgi Mateev (PhD defense in 2022) and Blaga Blagoeva (charged with the right of defense in 2021). He has supervised and consulted a number of diploma and trainee students as part of the project “Student Practices”. Part of his administrative activities at IOMT-BAS are: Head of the “Holography Laboratory” as an unit within the scientific division “Optical Metrology and Holography”, Secretary of the IOMT Scientific Colloquium (from 2015 till present), Scientific Secretary of IOMT-BAS (from 2022), elected member of the Scientific Council of IOMT-BAS (2014-2015, 2022 till present).

Excellent impression makes the active dissemination of the scientific results from the work of Assoc. Prof. Nedelchev – they have been presented at 62 scientific forums with 110 oral and poster presentations in the period 2012-2022. 24 are the oral presentations (4 invited) and 76 are the poster scientific presentations at national and international specialized forums. Thus, the total numbers of points for indicator E is 209 from 150 required.

The total number of points for the competition is 764 which exceed the required 640 points for the occupation of the academic position “Professor”, according to the Regulations on the application of the ADASRB and the Regulations of IOMT-BAS.

2. Characterization of the scientific and research activity of the candidate.

Considering the materials submitted for the competition, the main scientific interests of the candidate are as follows: 1) Investigation and optimization of the optical properties of photoanisotropic materials, including azopolymers and azopolymer-based composites as well as the development and investigation of the parameters of photoinduced chiral structures in thin azopolymer films. 2) Utilization of polarization holography for the recording of gratings, polarization-selective optical elements and surface-relief structures as well as analysis of their optical characteristics. The significance of Assoc. Prof. Nedelchev's interests is determined by the fact that though the photoanisotropic materials have been known for a long time, they have recently become a subject of enormous scientific interest due to their potential for application in polarization holography. As long as for the highly efficient holographic recording from decisive importance is to achieve a larger birefringence for a given medium, which could be achieved in azopolymers and azopolymer-based nanocomposites, as well as in the azopolymer-induced chiral structures, the main area of scientific interests of Assoc. Prof. Nedelchev is meaningful and will ensure the possibility for future active scientific investigation on this topic.

The main contributions in the scientific works substituting for the habilitation thesis are: 1) Investigation of the perspectives for experimental optimization and modeling of the processes of reversible birefringence in thin azopolymer films; a model is developed for the non-destructive thickness estimation in case of thin films; the birefringence kinetics has been investigated [A1-A4]; 2) The potential for the development of photo-induced chiral structures in azopolymers and

azopolymer-based composites filled with TiO_2 nanoparticles is exploited; the optical parameters of the obtained structures are determined and the influence of chirality on the efficiency of the obtained gratings has been established [A5-A7]. The obtained results determine the investigated materials as media with high potential for the polarization recording of highly efficient diffraction optical elements.

The second group of contributions in the scientific works, which do not substitute for the habilitation thesis, may be summarized as follows: 1) Synthesis and characterization of the optical properties of azopolymer composites containing nanoparticles of gold, copper, nickel, goethite and $(\text{GeTe}_4)_{100-x}\text{Cu}_x$, establishing the potential for the obtaining of birefringent media in dependence of the particle type, shape, size and concentration [B1-B5]; 2) Successful achievement of polarization recording of gratings in azopolymers and azopolymer nanocomposites and the investigation, respectively optimization of their optical parameters by varying the experimental conditions of recording [B6-B9, C1]; 3) Tracing the drying process by applying speckle metrology and mechanical properties analysis of thin films of commercial azopolymers (PAZO) and azopolymers and copolymers synthesized at IOMT aiming the optimization of their parameters and obtaining of efficient birefringent media with application in holographic recording [B10-B14].

The results presented as non-habilitation work may be characterized as an enrichment of already existing knowledge by utilizing new experimental techniques and accumulation of new results - an evidence for which is the high number of citation of the candidate's work by other authors. The obtained and presented in the competition by Assoc. Prof. Nedelchev results are of significant importance for the development of advanced suitable as highly efficient birefringent media for holographic recording hybrid azopolymer-based materials as well as establishment and optimization of their main optical parameters.

CONCLUSION

The overall scientific and research activity of Assoc. Prof. Dr. Lian Nedelchev characterizes him as an experienced and thorough scientist with significant experience and knowledge in the field of the physics of optical phenomena and condensed matter physics. I had the possibility to work together with Assoc. Prof. Nedelchev on a project funded by the BNSF, directly concerning his scientific topic and my personal impressions allow me to characterize him as motivated and thorough researcher whose leading contribution in the preparation of the scientific works submitted for the competition is undisputable.

The review of the documents submitted for the competition and their reverberation in the international scientific community, as well as my personal impressions from the candidate, allow me to express a positive opinion and to recommend with conviction the esteemed members of the Scientific Council of IOMT-BAS to vote "Positive" for Assoc. Prof. Dr. Lian Lyubenov Nedelchev to occupy the academic position "Professor" at IOMT-BAS.

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The opinion is prepared by:

/Assoc. Prof. Dr. Ruzha Harizanova/