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Physics Scientific Board

Wroclaw University of Science and Technology, Wroclaw, Poland

Subject: My evaluation on the habilitation degree application formed by 10 publications under the common title "Selected properties of highly birefringent microstructured optical fibers." by Mr. Tadeusz Martynkien.

07 May 2024

Dear Sir/Madam,

Thank you for your invitation to evaluate Mr. Tadeusz Martynkien regarding his habilitation degree application. Please find my evaluations in the attachment below.

Best Regards,

Prof. Dr. Alper Kiraz

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**My evaluation on the habilitation degree application formed by 10 publications under the common title "Selected properties of highly birefringent microstructured optical fibers." by Mr. Tadeusz Martynkien:**

1-Dr. Martynkien received his Ph.D. degree in 11/2000. He has been affiliated with Faculty of Fundamental Problems of Technology, Wrocław University of Science and Technology as a research assistant since 10/2000. This habilitation thesis is composed of 10 papers published between the years 2005-2018 on highly birefringent microstructured optical fibers made out of glass and polymer materials. The publications are made in prestigious international scientific journals as Opt Exp, Opt Lett, IEEE PTL, Photonics Research, Appl Opt, Meas Sci and Tech, Appl Phys B, and J of Optics. Dr. Martynkien is the first author in 6 and second author in 4 of these 10 publications. Hence, it is clear to me that the candidate is the main leading author or the second main leading author in all these papers. The overall goal of the research program in these papers can be summarized as the numerical modelling, design, and experimental realizations of Highly Birefringent Microstructured Optical Fibers (HBMOFs) made out of glass and polymer materials for applications such as hydrostatic pressure sensing and solitons generation.

2- Works in papers H1-H3 are about developing a theoretical model to explain the low temperature susceptibility of modal birefringence in HBMOFs [H1], verifying this model with experimental results [H2- H3], and develop fibers with zero polarimetric sensitivity to temperature for a specific wavelength [H3].

3-Works in papers H4-H6 are about the development of fibers with high sensitivity to hydrostatic pressure and low sensitivity to temperature. This way good candidate microstructures fibers are demonstrated as hydrostatic pressure sensors. The final publication of this series of works is H6 which is published in the high impact factor journal Optics Express. In H6 the candidate has also developed a theoretical model for the phase modal birefringence and temperature sensitivity of hybrid fibers consisted of a microstructured cladding and a GeO<sub>2</sub>-doped core, in which Bragg gratings can be written. In a follow up paper, in H7 the candidate used this type of to generate solitons tunable in the 1800–2000 nm range.

4-Works in papers H8-H10 are dedicated to highly birefringent optical fibers made of polymers (poly(methyl methacrylate) (PMMA), polystyrene (PS) and a copolymer (PMMA/PS)). In these papers a numerical model was developed by the candidate showing high pressure susceptibility of birefringence in a fiber made of PMMA. Experimental demonstrations were also made. In H9 a polymer microstructured birefringent fiber with stress zones was demonstrated. H10 is about further optimizing the microstructure design of polymer HBMOFs for hydrostatic pressure sensing. This paper shows a good practical application for these fibers. H8-H10 are also published in prestigious journals of IEEE Phot Tech Lett and Opt Lett.

5-Grants: After completion of his PhD the candidate has been the PI of 1 research grant (G9), and served as the co-investigator of 7 others (G2-G8). He also completed his PhD under a research grant G1. He also has 2 research grants in progress (G10,G11) in which he is a co-investigator. Overall these show a good project supervision performance in my opinion. I think the number of acquired grants could be higher, and especially more European grants could be added to the list of projects for an exceptional project performance. The list only involves the G4 as a European grant as far as I can see. Hence, I find the candidate's grant acquisition performance to be "very good" but not "exceptional".

6-International Collaborations: After obtaining his PhD, the candidate had 5 international visits (Canada, France, Belgium, Portugal, Check Republic). Among these, the visit to Belgium consisted of 2 years of post-doctoral stay. These indicate very good international collaboration experience.

7-Teaching & Supervision: 13 students achieved master's degree and 17 students achieved engineer's degree under the supervision of the candidate. Also, the candidate was an assistant supervisor in the doctoral thesis of Katarzyna Gąsior, PhD 2000, and is currently acting as an assistant supervisor in the doctoral thesis of mgr inż. Piotra Pali. The candidate led 8 different courses in his institution. In my opinion, these point at an "excellent" performance in teaching & supervision.

8-Patents: The candidate has co-authorship in 4 granted patents and 1 patent application. These indicate very good intellectual property performance obtained as an output by the candidate.

9-Finally, apart from the 10 papers that constitute the main body of this habilitation work the candidate has 69 other papers obtained after his PhD degree. So, he is very active in academic research.

In conclusion, from the files it is clear to me that Mr. Tadeusz Martynkien is a very good academician who has demonstrated very good independent researcher skills showing a clear research track on microstructured optical fibers.



I think the graduate student supervision (especially PhD student supervision), and research grants acquisitions aspects of his career could be improved, and the candidate can give special emphasis on improving these aspects in his future career. Overall I find this habilitation thesis to be very good, and to satisfy all necessary criteria for promoting him to a habilitated doctor in physical sciences. I strongly recommend the acceptance of this habilitation thesis by Mr. Tadeusz Martynkien to the faculty. I wish him all the success in his future carrier.

