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Introduction

Symposium on "Optical Fibers and Their Application" OFTA is a forum of national science in this branch of Photonics. The Symposium also hosts numerable guests from this geographical region, and especially from neighboring countries and Europe. It is organized every year and a half by two major optical fiber technology and application development centers located in Białystok at Białystok University of Technology, and in Lublin at Maria Curie-Skłodowska University UMCS and the Lublin University of Technology. The conference belongs to a bigger circle of national meetings on optoelectronics, optics, photonics, sensors and laser technology which are under a general patronage of professional community organizations like the Polish Physical Society—Section of Optics, the Polish Ceramic Society, the Photonics Society of Poland, Polish Optoelectronics Committee of the Association of Polish Electrical Engineers, Section of Photonics in the Committee of Electronics and Telecommunications, Polish Academy of Sciences, and Polish Association of Theoretical and Applied Electrical Engineering.

Forty-five years ago, during the year of 1975, fibre optic technology in the country of Poland was born. The Department of Physical Chemistry chaired by Professor Andrzej Waksmundzki at the Department of Chemistry in University of Maria Curie-Skłodowska in Lublin started working on a modification of the glass capillary for optical signal transmission purposes and implemented successfully there a few years later the MCVD technology of high-quality silica optical fibres. The works on fibre-optic technology with soft glasses also begun in other scientific institutions like ITME in Warsaw and technological tests began soon afterwards in Glassworks Bialystok and Bialystok Technical University. Simultaneously the country worked on the active elements for fibre optics, including photodiodes and light-emitting diodes and semiconductor lasers which were actively conducted in ITE in Warsaw. Several persons, including the late university professors were involved in initiating and supporting the OFTA conferences at their early stage: J. Groszkowski, A. Smoliński, A. Waksmundzki, M. Pluta, B. Paszkowski, Z. Szpigler, J. Wójcik, K. Holejko, J. Rayss, S. Sońta. The relatively easy availability in the country of numerous samples of various kinds of optical fibres, manufactured by MCVD and other modified and hybrid multi-staged methods, as well as DC, MC and RIT methods with different silica and multicomponent glasses, practically since the mid and late seventies has played a fundamental role in the development of the fibre optics and photonics research and technical community in Poland. One can say, without any exaggeration, that in the absence in the country of such cheap samples, available virtually for free and on-demand for all other laboratories, today the fields of photonics and fibre optics, but also laser technologies would be different, much more modest. Did the created community manage in some way to repay the developers of technology for such a unique opportunity to develop their own and rich photonics application? In general, yes, because the gifted technologists often helped out in the pioneering application

work. In addition, the application works used to give a strong impetus to the development of new optical fibre structures, and stimulated search for technology developments. The country has created a positive feedback mechanism between technology, metrology, fibre optic photonics theory and research applications, and even some pioneering industries. The three mentioned and described fibre optic technology centres, significantly different from each other by research professors and interest, and involved in quite different types of fibre, were then amplified by the work on high quality glasses and optical and photonics materials carried out at the Institute of Glass and Ceramics, AGH and Silesian University of Technology, as well as other centres.

The First National Symposium on "Optical Fibres and Their Applications", organized in the Polish Academy of Sciences Palace in Jabłonna in February 1976, was a real breakthrough event for the local research communities in optoelectronics, as could be seen today from the perspective of several decades after that meeting. The initiator of the first and several subsequent meetings was Professor Adam Smoliński from Warsaw University of Technology. Since then, Optical Fibre Symposia have accompanied the development of photonics in the country and create their unique scientific documentation. The Symposia have always gathered and are still gathering today a large group of young people. The first fibre optic meeting was attended by 100 people. The Symposium in Jabłonna turned into a constant cycle of scientific meetings which lasts until today. During the First Symposium there were delivered two technological works on attempts to manufacture optical fibers in the centers of Lublin and Warsaw and a review by Professor Bohdan Paszkowski of the manufacturing methods of optical fibers in the leading centers in the world. Other works presented at the First National Symposium concerned several topics like: the outlook of the birth of fiber optic telecommunications by Professor Zenon Szpigler, review of the progress of integrated optics using planar optical waveguides and components, first tests of fiber optic transmission in the country, medical and instrumental applications using fiber optics developed in the country, optoelectronic components for fiber optics - sources and detectors and measurements of optoelectronic components. Some of plenary lectures at the symposium were delivered by foreign experts, representatives of leading European optical fiber laboratories like CNET Lannion, ISPT Rome, TU Braunschweig, Univ. Southampton. A large part of the national work, especially those given by academics, had survey and prognostic character, but several works, given by then young researchers concerned their own technological, instrumentation and transmission experiments. A full book of the Symposium Proceedings was published.

The second general summary meeting for technological, theoretical and application works of the national research fibre optics community took place during the Second National Symposium on "Optical Fibres and Their Applications", which was held on 13-15 February 1979, also in the Palace of Sciences in Jabłonna. The meeting was attended by approximately 150 people. During the symposium there

were published several key works from the optical fibre technology centres in Lublin, Warsaw and Bialystok. Several technological works on the production of optical fibers by double-crucible method, MCVD and PCVD methods were presented, as well as technological works on optoelectronic components and works of fibre metrology. Topical sessions during the symposium were: optical fibre technology and theory; optical radiation sources and detectors; surveying of optoelectronic devices and systems for telecommunications; non-telecom application usage of fibre optics, sensors and integrated optics components. Symposium works were issued in two volumes in Polish and an English volume of extended abstracts.

The Third OFTA Symposium was preceded by two side meetings: Optical Fibre Measurement Techniques, Lublin 1981, and Non-telecommunications Optical Fibres in Białowieża 1982. These high technology topical conferences gathered 100 participants each. The Third Symposium on Optical Fibers and Their Applications was expected to be held in 1982 (16-18 February), but due to some well-known system and organization issues in Poland was postponed to 1983 and was held on 15-17 February 1983 in Jabłonna. The symposium gathered much more participants than in previous years because more than 250 people and 20 foreign guests participated, which far exceeded the capacity of the small but beautiful palace in Jabłonna. In total, approximately 30 plenary papers were delivered, and more than 150 contributed papers were presented, including many directly related to optical fibre manufacturing technology. Again, all three technology centres from Lublin, Warsaw and Białystok were represented. The organization rule of the Third Symposium in Jabłonna was like the previous ones. Plenary papers, in the form of invited lectures - tutorials were delivered by the world's leading representatives of this technique. National presentations were displayed in a few thematic poster sessions, which were preceded by wider introductory presentations in digest style. The topical sessions of the national work were as follows: optical fibre communications; optical fibre technology, theory, measurements; sources and detectors for optical fibres; optical fibre passive components—couplers, connectors, switches and sensors; integrated optoelectronics theory, technology, and laboratory experiments; applications of fiber optics: scientific, industrial, and biomedical. Five volumes of proceedings were published, four in Polish and one in English.

The series of conferences on "Optical Fibers and Their Applications" OFTA continued successfully. Subsequent conferences, the Fourth and Fifth, due to the much larger number of participants, took place in the Palace of Culture and Science in Warsaw, still every three years, in 1986 and 1989. After that there was a change in the rule and the next OFTA conferences were continued with considerable organizational success by technological research centres in Bialystok and Lublin. Initially, however, they were numbered separately and then again together. The conferences started to be organized every year and a half. The dominant theme of the meetings done by Bialystok were, in the initial period, the applications of fibre optics and technology

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of non-telecom optical fibres. The Lublin meetings were concentrated on optical fibre transmission technology. Currently, these two series of meetings are still organized every year and a half in September by Lublin and in January by Białystok, and they are the most important events summarizing periodically the achievements of the national scientific and technical OFT community. Below there is a list of conferences continued within the cycle on Optical Fibers and Their Applications. The cycle is supplemented with additional important events, which were also dedicated to fiber optic technology, as a Congress on Optics and Optoelectronics by SPIE, organized in 2005 in Warsaw and the European Conference-Workshop of Optical Fibre Sensors EWOFS, 2013 Krakow, WILGA annual meetings on Photonics Applications, and Laser Technology Symposium.

1976 – I-OFTA (Optical Fibres and Their Applications) Jabłonna 16-18.02.1976;
1979 – II-OFTA Jabłonna, 13-15.02.1979;
1981 – Optical Fibre Measurement Technology, Nat. Symp., Lublin VI 1981;
1982 – Non-Telecommunications Optical Fibres, Nat. Symp., Białystok-Białowieża 1982;
1983 – III-OFTA, Jabłonna (1982) 15-17.02.1983;
1986 – IV-OFTA – Warszawa, PKiN, 11-13.02.1986, Proc. SPIE 0670;
1989 – V-OFTA – Warszawa, PKiN, 21-23.02.1989, Proc. SPIE 1085;
1996 – Technology and Applications of Lightguides, TAL, Krasnobród 17-19.10.1996, Proc. SPIE 3189,
1998 – VI-OFTA – Białystok-Białowieża 22-24.01.1998, Proc. SPIE 3731;
1999 – Lightguides and their Applications, Krasnobród, 14-16.10.1999, Proc. SPIE 4239;
2002 – VIII-OFTA, Białystok – Białowieża, 23-25.01.2002, Proc. SPIE 5028;
2002 – Photonics Applications, Wilga Symposium, 23-26.05.2002, Proc. SPIE 5125;
2003 – Lightguides and their Applications II, Krasnobród, 9-11.10.2003, Proc. SPIE 5576;
2005 – SPIE Congress on Optics and Optoelectronics (COO) in Warszawa, 28.08-02.09.2005, Proc. SPIE 5948, 5950, 5951;
2006 – (X-OFTA) Lightguides and Their Applications III, Krasnobród, 4-7.10.2006, Proc. SPIE 6608;
2008 – XI-OFTA – Białystok and Białowieża, 30.01-02.02.2008, Proc. SPIE 7120;
2009 – XII–OFTA - Lublin and Krasnobród, 14-17.10.2009;
2011 – XIII–OFTA - Białystok and Białowieża, 26-29.01.2011; Proc. SPIE 8010;
2012 – XIV–OFTA - Lublin and Nałęczów, 10-13.10.2012; Proc. SPIE 8698;
2013 – EWOFS Kraków 05.2013, Proc. SPIE 8794;
2014 – XV–OFTA - Białystok and Lipowy Most, 29.01-01.02.2014; Proc. SPIE 9228;
2015 – XVI–OFTA - Lublin and Nałęczów, 22-25.09.2015; Proc. SPIE 9816;
2017 – XVII-OFTA – Białystok and Supraśl; 23-27.01.2017; Proc. SPIE 10325;
2018 – XVIII-OFTA – Lublin and Nałęczów, 19-23.11.2018; Proc. SPIE 11045;
2020 – XIX-OFTA – Białowieża, 27-31.01.2020, Proc. SPIE 11456
2020 – XLVI-WILGA Photonics Applications, 25-31.05.2020, Proc. SPIE 11581;
2020 – Symposium on Laser Technology, Karpacz near Wrocław, 21-25.09.2020;
2021 – XLVII-WILGA Photonics Applications, 31.05-1.06.2021, Proc. SPIE 12040;

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2022 – XLVIII-WILGA Photonics Applications, 15-16.09.2022, Proc. SPIE 12476;

Nałęczów was hosting the Sixteenth Conference and School on "Optical Fibres and Their Applications" on 22-25 September 2015. The conference was included in the worldwide series of events to celebrate the International Year of Light IYL2015 [www.light2015.org]. The organizers of OFTA 2015 meeting were the Department of Technology of Fiber Optics in the Faculty of Chemistry of Maria Curie-Skłodowska University in Lublin, and the Faculty of Electrical Engineering and Computer Science, Technical University of Lublin. The aim of the conference was traditionally to enable the direct discussion of relevant research and technical groups, which are actively involved in the main areas of optical fibre photonics. An additional element of the Conference was the organization of the fourth workshop on fibre optic technology for students and doctoral students in technological laboratories of Optical Fibre Technology Department of the UMCS in Lublin. This action allows young scientists to better understand what opportunities and limitations of practical laboratory and application work with optical fibre devices and photonic components are. The Fifteenth OFTA2015 Conference was held 40 years after the start of the country's work on fibre optic technology. There was an opportunity to organize the Jubilee Session and remind of some facts, institutions, and above all those people who were associated with the origins of this field of photonics in Poland. The 2015 Nałęczów Conference gathered around 120 participants. Over 80 papers were presented in oral and poster sessions. The biggest groups of papers originated from such university centers active in optoelectronics as: Silesian Univ. of Technology in Gliwice, Białystok, Warsaw and Lublin as well as UMCS in Lublin. The topical coverage of the Symposium was: materials for optoelectronics; materials for optical fiber technology; fabrication of optical fibers; components and sub-assemblies for optoelectronics; metrology of optical fibers; metrology of optoelectronic components and devices; applications of optical fibers; education in optoelectronics and photonics. A few plenary papers were presented, touching very current and hot problems in optoelectronics.

The Seventeenth Conference on "Optical Fibres and Their Applications 2017" was organized in Supraśl on 23-27 January 2017, by the Faculty of Electrical Engineering of Białystok University of Technology in co-operation with the Polish Society of Theoretical and Applied Electrical Engineering. Traditionally the patrons of these serial meetings are the Committee of Electronics and Telecommunications of Polish Academy of Sciences, Polish Optoelectronics Committee of the Association of Polish Electrical Engineers, Photonics Society of Poland, and Polish Ceramics Society. The conference has gathered over 120 participants from leading photonics technology centers in Poland. Approximately 60 plenary papers and 40 posters were presented. The conference's topical sessions were concentrated around: hot topics of optical fibre photonics, materials for optical fibres and photonics including new glass synthesis for IR fibres, nonlinear and active glasses for optical fibres, polymer optical fibres, special optical fibres for functional components and sensors, optical fibre

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sensors solutions, optical fibre communications and networks including PON-WDM, and photonic integrated circuits. The detailed conference subjects embraced:

- technology development and manufacturing of optical fibres: classical, telecom, sensory and microstructural; optical fibre cables; planar optical waveguides and components; integrated optics and micro-optics; optical, optoelectronic, photonic and optical fibre sensors.
- fibre optics components, passive and active, such as couplers, power dividers, connectors, optical insulators, fibre circulators, nonreciprocal devices, optical amplifiers, optical and optoelectronic devices for connecting optical fibres with light sources and receivers, optical fibre and planar multiplexers and demultiplexers, etc.
- fibre applications especially those that require close cooperation with specialists producing optical fibres, optical cables, transmission channels, and elements of fibre optics, optoelectronics and photonics.
- education in the field of photonics in universities and secondary schools, continued training in professional schools.

The proceedings of the Seventeenth OFTA Conference were traditionally published in the worldwide book series on optics and photonics, the Proceedings of SPIE. The 2017 OFTA Conference has summarized in a vivid way the current technological achievements of the three major fibre optic technology centres in Lublin, Bialystok and Warsaw; but also, other technological centres active in research on materials for photonics and optoelectronics: glasses, polymers, semiconductors; as well as numerous academic and industrial centres of photonics fibre optic applications. Technology and application centres of photonics and fiber optics are numerous today and active across the country. One can mention some of them: AGH, Warsaw University of Technology (IMiO, ISE, ITele, at the Faculties of Electronics, Mechatronics, and Physics), WAT, at the Technical Universities in Wroclaw, Poznan, Gdansk, Katowice and Gliwice, and other Institutes like ITE, ITR, ITME, and a growing number of research companies and high-tech industries, like Vigo, Fibrain, InPhoTech and others.

During the days of 19 to 23 November 2018, the Eighteenth Conference on "Optical Fibers and Their Applications" was held. The Conference was opened at the Energetyk Resort in Nałęczów, near Lublin, but the accompanying School/Workshop on Optical Fiber Technology was held in Lublin at UMCS OFT Laboratory on 19 November. The Eighteenth Conference was opened by Professor Waldemar Wójcik at the presence of the Dean of the Faculty of Chemistry of UMCS. The national expertise in optical fibers was gathered during the recent years around several big organizations, some of them with international roots: Section of Optoelectronics, Committee of Electronics and Telecommunications, Polish Academy of Sciences; Polish Committee of Optoelectronics, Association of Polish Electrical Engineers; Polish Chapter of SPIE – The International Society for Optical Engineering. The latter

organization registered in this country as a Society and was transformed in 2008 to the Photonics Society of Poland. These organizations cooperate with SPIE—The International Society for Optics and Photonics, IEEE Poland Section and Photonics Chapter, Section of Optics by Polish Physical Society and Polish Ceramic Society.

During the conference opening ceremony Professor W. Wójcik reminded everybody of the history of the OFTA Nałęczów Conferences. The national experts of guided wave, laser, and semiconductor optoelectronics meeting in Krasnobród, Nałęczów, Białowieża, Lipowy Most, and Świnoujście (Laser Technology Symposium) managed to integrate their activities in the frame of numerous optoelectronics research programs carried out during these years. These were programs: national, central, departmental, priority, university and recently also European realized with a number of international partners. Realization of these projects lead to numerous scientific and technical achievements as well as being the underlying factors for establishing several photonic firms in this country and modernizing the instruction at technical universities. The 2018 Nałęczów Conference gathered around 120 participants. Over 80 papers in oral and poster sessions were presented. The biggest groups of papers originated from such university centers active in optoelectronics as: Silesian University of Technology in Gliwice, Białystok, Warsaw and Lublin as well as UMCS in Lublin. The topical coverage of the Symposium was: materials for optoelectronics: materials for optical fiber technology, fabrication of optical fibers, components and sub-assemblies for optoelectronics, metrology of optical fibers, metrology of optoelectronic components and devices, applications of optical fibers, education in optoelectronics and photonics. There were presented a few plenary papers touching very current and hot problems in optoelectronics. The technological sessions of the symposium presented the works from three main national centers where optical fibers are pulled. These are: Faculty of Chemistry, University of Maria Curie Skłodowska in Lublin, Faculty of Electrical Engineering at Białystok University of Technology, and Institute of Electronic Materials Technology in Warsaw. Numerable papers were presented from the research firms and the industry, including InPhoTech, Fibrain and Polish Centre for Photonics and Optical Fibres. A number of research centers in this country and internationally use these optical fibers for optical fiber sensors and photonic instrumentation devices. A large group of applications concerned microstructural photonic optical fibers filled or impregnated with liquid crystals, which are highly nonlinear optical substances, much more nonlinear than glass. This group of papers originated from the laboratories at Warsaw and Wrocław Universities of Technology. But the fibers were manufactured at UMCS in Lublin and at ITME in Warsaw. There were also numerous application-oriented contributions from photonics innovative firms.

The nineteenth OFTA conference was organized on 27-31 Jaunary 2020 in Białowieża by the optical fibre technology research team from Białystok University of

Technology, Faculty of Electrical Engineering under the chairmanship of Professor Jan Dorosz. The conference gathered nearly 100 participants from all academic and industrial centers active in optical fibre photonics. Ten topical sessions were organized with over 30 plenary speeches. The conference was opened by Professor R. Romaniuk and Professor W. Woliński from Warsaw University of Technology. The Conference organizers have provided very favorable participation conditions for Ph.D. and M.Sc. students, which participated in the meetings and sessions in large numbers. Most of the papers were presented by young researchers, which supports the belief that this branch of technology is vivid and holds promise for future development. Optical and photonics sciences and technologies are developing very intensely both globally and locally. The local developments add very effectively to the global ones. The Nineteenth Symposium on Optical Fibers and Their Applications was again a great success for the local research and technical communities. The conference gathered a lot of OFT leaders from the country and geographical region as well as young researchers, which shows how this vivid research area attracts young, gifted minds. The conference, combined with celebrations of forty-five years of OFT development by the local technical community, has shown that the fields of optics and photonics, and specifically Optical Fibre Technology is in excellent shape in Poland and this region of Europe.

The conference, held in Lublin September 11-14, 2023 was the 20th meeting in the series of National Symposia "Fiber Optics and their Applications" (OFTA). These conferences have so far been held alternately in Krasnobrod/Nałęczów and Białowieża/Lipowy Most every year and a half. This edition was jointly organized by the Department of Optical Fibers Technology of Maria Curie Skłodowska Univesity in Lublin, and the Department of Electronics and Information Technology of Lublin University of Technology. The purpose of the conferences was to provide an opportunity for direct substantive discussion of research teams dealing with: the development of technology and manufacturing of classical and microstructured optical fibers, cables, planar fibers, integrated optics and micro-optics components, and fiber optic and optical sensors; fiber optic technology components such as couplers, connectors, optical amplifiers, optical and optoelectronic devices for connecting optical fibers to light sources and receivers, multiplexers and demultiplexers, etc. ; applications of fiber optics especially those that require close cooperation with specialists producing optical fibers, optical paths and cables, components of fiber optic technology, optoelectronics and photonics, as well as education in photonics in colleges and high schools.
The conference was attended by more than a hundred participants representing academic and industrial centers from Poland and neighboring countries. Nearly 40 plenary speeches were divided into 4 thematic groups: Materials, fiber optics - technology, Fiber optics applications, Planar structures and integrated optics, Fiber optics and industry. There were 6 plenary sessions and two poster sessions.
This year's conference was held in the shadow of the war in neighboring Ukraine, less

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than 100 kilometers from the conference site. The organizers invited scientists from Ukraine to present and publish their achievements in the broad field of photonics applications free of charge.

Ryszard S. Romaniuk
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