PROCEEDINGS OF SPIE

SPIDigitalLibrary.org/conference-proceedings-of-spie

Front Matter: Volume 10830

, "Front Matter: Volume 10830," Proc. SPIE 10830, 13th Conference on Integrated Optics: Sensors, Sensing Structures, and Methods, 1083001 (14 August 2018); doi: 10.1117/12.2511676

SPIE.

Event: Thirteenth Integrated Optics: Sensors, Sensing Structures and Methods Conference, 2018, Szcyrk, Poland

PROCEEDINGS OF SPIE

13th Conference on Integrated Optics: Sensors, Sensing Structures, and Methods

Przemysław Struk
Tadeusz Pustelny
Editors

26 February–2 March 2018
Szczyrk, Poland

Cosponsored by
Committee of Electronics and Telecommunication, Polish Academy of Sciences (Poland)

Organized by
Photonics Society of Poland (Poland)
Polish Acoustical Society Upper Silesian Division (Poland)

Published by
SPIE

Volume 10830

Proceedings of SPIE 0277-786X, V. 10830

SPIE is an international society advancing an interdisciplinary approach to the science and application of light.

13th Conference on Integrated Optics: Sensors, Sensing Structures, and Methods, edited by
Przemysław Struk, Tadeusz Pustelny, Proc. of SPIE Vol. 10830, 1083001 © 2018 SPIE
CCC code: 0277-786X/18/\$18 · doi: 10.1117/12.2511676

Proc. of SPIE Vol. 10830 1083001-1

The papers in this volume were part of the technical conference cited on the cover and title page. Papers were selected and subject to review by the editors and conference program committee. Some conference presentations may not be available for publication. Additional papers and presentation recordings may be available online in the SPIE Digital Library at SPIEDigitalLibrary.org.

The papers reflect the work and thoughts of the authors and are published herein as submitted. The publisher is not responsible for the validity of the information or for any outcomes resulting from reliance thereon.

Please use the following format to cite material from these proceedings:

Author(s), "Title of Paper," in *13th Conference on Integrated Optics: Sensors, Sensing Structures, and Methods*, edited by Przemyslaw Struk, Tadeusz Pustelny, Proceedings of SPIE Vol. 10830 (SPIE, Bellingham, WA, 2018) Seven-digit Article CID Number.

ISSN: 0277-786X
ISSN: 1996-756X (electronic)

ISBN: 9781510622722
ISBN: 9781510622739 (electronic)

Published by

SPIE

P.O. Box 10, Bellingham, Washington 98227-0010 USA
Telephone +1 360 676 3290 (Pacific Time) · Fax +1 360 647 1445

SPIE.org

Copyright © 2018, Society of Photo-Optical Instrumentation Engineers.

Copying of material in this book for internal or personal use, or for the internal or personal use of specific clients, beyond the fair use provisions granted by the U.S. Copyright Law is authorized by SPIE subject to payment of copying fees. The Transactional Reporting Service base fee for this volume is \$18.00 per article (or portion thereof), which should be paid directly to the Copyright Clearance Center (CCC), 222 Rosewood Drive, Danvers, MA 01923. Payment may also be made electronically through CCC Online at copyright.com. Other copying for republication, resale, advertising or promotion, or any form of systematic or multiple reproduction of any material in this book is prohibited except with permission in writing from the publisher. The CCC fee code is 0277-786X/18/\$18.00.

Printed in the United States of America.

Publication of record for individual papers is online in the SPIE Digital Library.

**SPIE. DIGITAL
LIBRARY**

SPIEDigitalLibrary.org

Paper Numbering: *Proceedings of SPIE* follow an e-First publication model. A unique citation identifier (CID) number is assigned to each article at the time of publication. Utilization of CIDs allows articles to be fully citable as soon as they are published online, and connects the same identifier to all online and print versions of the publication. SPIE uses a seven-digit CID article numbering system structured as follows:

- The first five digits correspond to the SPIE volume number.
- The last two digits indicate publication order within the volume using a Base 36 numbering system employing both numerals and letters. These two-number sets start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B ... 0Z, followed by 10-1Z, 20-2Z, etc. The CID Number appears on each page of the manuscript.

Contents

vii	<i>Authors</i>
ix	<i>Conference Committee</i>
xi	<i>Introduction</i>

13TH CONFERENCE ON INTEGRATED OPTICS: SENSORS, SENSING STRUCTURES, AND METHODS

10830 02	Numerical modelling of pulse formation in Er³⁺-doped Q-switched fluoride glass fiber lasers [10830-1]
10830 03	Signal correlation methods for photodetector noise characterization [10830-2]
10830 04	Numerical analysis of integrated optics structures based on wide band gap semiconductor materials for biosensors application [10830-4]
10830 05	Face re-identification across pose in thermal infrared spectrum based on local texture descriptors [10830-5]
10830 06	Optimizing the light source design for a sensor to measure the stroke volume of the artificial heart [10830-6]
10830 07	Studying the influence of markers arrangement on accuracy of the membrane shape mapping in the new DFD method [10830-7]
10830 08	Vision sensor for a filament positioning in the optical fiber tapering system [10830-8]
10830 09	Thermal and optical study of the new methacrylic copolymers useful in POF technology [10830-10]
10830 0A	Synthesis and characterization of polymeric blends based on polysulfone for special applications [10830-11]
10830 0B	Manipulation of virtual 3D objects with the use of graphic tags and AR technologies [10830-12]
10830 0C	Virtualization of the measurement system for the MIMO THz scanner [10830-13]
10830 0D	Testing the SteamVR trackers operation correctness with the OptiTrack system [10830-14]
10830 0E	Study of physico-chemical properties of the new potential optical polymers based on 2-hydroxyethyl methacrylate [10830-16]

10830 OF	Optical properties of monomer-doped liquid crystalline materials for waveguiding structures [10830-17]
10830 OG	Mobile border verification of travellers based on fingerprints: experimental studies [10830-18]
10830 OH	Microbending losses in optical fibers with different cross-sections [10830-19]
10830 OI	The universe is not electrically neutral [10830-20]
10830 OJ	Investigation of optical fiber current sensor with external conversion in unstable stands [10830-21]
10830 OK	Optical fiber current sensor with external conversion in high voltage environment [10830-22]
10830 OL	Investigation of physical properties of ZnO semiconductor material for biocompatible coating layer applications [10830-23]
10830 OM	Optimizing arrangement of markers on a flaccid membrane surface based on evolution strategy (Invited Paper) [10830-24]
10830 ON	Model-based measurement of the stroke volume of a VAD in close-to-real conditions [10830-26]
10830 OO	Analysis for the sensitivity optimization of integrated optical evanescent wave sensors with grating couplers [10830-27]
10830 OP	Influence of near UV irradiation on ZnO nanomaterials NO₂ gas sensing properties [10830-28]
10830 OQ	Study of the impact of the object's location on the image on the results of distance measurement by the DFD technique [10830-30]
10830 OR	Copolymer grafted phthalocyanine-based fiber optic nitrogen dioxide gas sensing [10830-31]
10830 OS	Structural and optical characterization of the high quality Be-doped InAs epitaxial layer grown on GaAs substrate [10830-32]
10830 OT	InAsSb photoluminescence at low temperatures [10830-33]
10830 OU	Theoretical investigation of properties of InAsSb mid-wave infrared detectors [10830-34]
10830 OV	Selected technological aspects of semiconductor samples preparation for Hall effect measurements [10830-36]
10830 OW	Investigating the possibility of using a neural network to determine the stroke volume of a new pneumatic heart prosthesis model [10830-37]
10830 OX	Luminescence spectroscopy diagnosis system for skin cancer research: k-Nearest Neighbour method classifier [10830-39]

- 10830 0Y **System for visualization of hypodermic blood vessels** [10830-40]
- 10830 0Z **Long term stability study of InAsSb mid-wave infrared HOT detectors passivated through two step passivation technique** [10830-41]
- 10830 10 **Higher operating temperature photoresponse of MWIR T2SLs InAs/InAsSb photodetector** [10830-42]
- 10830 11 **The method of determining the characteristic features of graphene oxides by atomic force microscopy** [10830-44]

Authors

Numbers in the index correspond to the last two digits of the seven-digit citation identifier (CID) article numbering system used in Proceedings of SPIE. The first five digits reflect the volume number. Base 36 numbering is employed for the last two digits and indicates the order of articles within the volume. Numbers start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B...0Z, followed by 10-1Z, 20-2Z, etc.

Achtenberg, K., 03	Murawska, Monika, 06
Arciuch, Artur, 0Q	Murawski, Krzysztof, 06, 0M, 0N, 0W
Barczak, Kamil, 0J, 0K	Murawski, Krzysztof, 0S, 0T
Bartnicki, Andrzej, 0A, 0E	Muzyka, R., 11
Benyahia, Djalal, 0S, 0Z	Nawrocki, Mateusz, 0G
Boguski, Jacek, 0S, 0V, 0Z	Niski, Tomasz, 0G
Borysiewicz, Michał A., 0L	Nowak, J., 0A
Chojnowska, M., 03	Opilski, Zbigniew, 0Y
Chychłowski, Miłosz S., 0F	Pachla, Szymon, 0G
Ciosek, J., 0Z	Paczków, Michał, 0G
Ciurapiński, Wiesław, 0G	Pałka, Norbert, 05, 0G
Czerwińska, Elżbieta, 0G	Pałys, Tomasz, 0Q
Drewniak, S., 11	Piotrowski, Józef, 0S, 0Z
Duda, Dominik, 0K	Piszczyk, Marek, 0B, 0C, 0D, 0G
Fila, K., 09	Podkościelna, Beata, 09, 0A, 0E
Firmanty, Krzysztof, 0G	Pomianek, Mateusz, 0B, 0C, 0D
Gargol, M., 09, 0A	Popławski, Krzysztof, 0G
Gawdzik, Barbara, 09, 0A, 0E	Poturaj, K., 0H
Gil, Małgorzata, 09, 0E	Poźniak, Piotr, 0G
Goliszek, M., 09	Procek, Marcin, 0P
Gomółka, Emilia, 0S, 0U	Pustelny, Tadeusz, 06, 0I, 0N
Gorczyca, Kinga, 0S, 0V	Rogalski, Antoni, 0S, 0Z
Grad, Leszek, 0W	Rutkowska, Katarzyna A., 0F
Grodecki, Kacper, 0S, 0T	Sobczak, Mikołaj, 0G
Grudzień, Artur, 05, 0G	Stolarczyk, Agnieszka, 0P
Gryciuk, Karol, 0G	Struk, Przemysław, 04, 0L
Grzonka, Justyna, 0S	Sujecki, S., 0Z
Hołoweńko, Paweł, 0G	Sulej, Wojciech, 07, 08, 0M, 0N, 0W
Ivaldi, F., 0Z	Szablicki, Mateusz, 0J
Jodłowski, Leon, 0G	Szustakowski, Mieczysław, 0G
Kałużnyński, P., 0X	Tsai, Tsung-Tin, 10
Kębtowski, Artur, 0S, 0Z	Turowski, Bartłomiej, 0F
Kogut, D., 0X	Tyszkiewicz, Cuma, 0O
Kopytko, Małgorzata, 0U	Umana-Membreno, Gilberto A., 0S
Kowalski, Marcin, 05, 0G	Walczakowski, Michał, 0G
Kozak, Angela, 0F	Wójcik, G., 0H
Kraszewski-Cąkała, Michał, 0G	Wróbel, Jarosław, 0S, 0V
Krzeszowski, Hubert, 0G	Wu, Chao-Sin, 10
Kubiszyn, Łukasz, 0S, 0Z	Zagrajek, Przemysław, 0C
Maciak, Erwin, 0R	Życki, Piotr, 0G
Maciejewski, Marcin, 0B, 0C, 0D	Życzkowski, Marek, 0G
Malinowski, Tomasz, 0M	
Martyniuk, Piotr, 0S, 0T, 0U, 0V, 0Z, 10	
Mazniewski, Krzysztof, 0K	
Mergo, Paweł, 09, 0E, 0H	
Michalczewski, Krystian, 0S, 0Z, 10	
Michałowski, Paweł Piotr, 0S	
Mikołajczyk, J., 03	
Młyńczak, Jarosław, 0G	

Conference Committee

Conference Chairs

Tadeusz Pustelny, Silesian University of Technology, Gliwice (Poland)

Honorary Conference Chair

Wiesław L. Woliński, Polish Academy of Sciences, Full Member (Poland)

Scientific Committee

Tadeusz Pustelny, (*Chairman*) Silesian University of Technology, Gliwice (Poland)

Tomasz R. Woliński, (*Vice-Chairman*) Warsaw University of Technology (Poland)

Elżbieta Bereś-Pawlik, Wrocław University of Technology (Poland)

Zbigniew Bielecki, Military University of Technology (Poland)

Marek Błażuk, Silesian University of Technology (Poland)

Dominik Dorosz, AGH University of Science and Technology (Poland)

Jan Jakubczyk, Optiwave Systems Inc. (Canada)

Leszek Jaroszewicz, Military University of Technology (Poland)

Malgorzata Jedrzejewska-Szczerska, Gdansk University of Technology (Poland)

Mirosław Karpierz, Warsaw University of Technology (Poland)

Wiesław Królikowski, University of Canberra (Australia)

Erwin Maciak, Silesian University of Technology (Poland)

Paweł Mergo, Maria Curie-Skłodowska University (Poland)

Krzysztof Murawski, Military University of Technology (Poland)

Andrzej Napieralski, Łódź University of Technology (Poland)

Przemysław Struk, Institut Franche-Comte Electronique Mecanique Thermique et Optique (France)

Mieczysław Szustakowski, Military University of Technology (Poland)

Jacek Wojtas, Military University of Technology (Poland)

Organizing Committee

Tadeusz Pustelny, Silesian University of Technology, Gliwice (Poland)

Przemysław Struk, Silesian University of Technology (Poland)

Aneta Olszewska, Silesian University of Technology, Gliwice (Poland)

Sabina Drewniak, Silesian University of Technology, Gliwice (Poland)

Kamil Barczak, Silesian University of Technology, Gliwice (Poland)

Marcin Procek, Silesian University of Technology, Gliwice (Poland)

Marek Błażuk, Silesian University of Technology, Gliwice (Poland)

Introduction

The Conference on Integrated Optics: Sensors, Sensing Structures, and Methods (IOS) is the international scientific forum of photonics and modern nanotechnology. IOS has been organized every year since 2004 and in 2018 it was held for the thirteenth time.

IOS18 took place from 26 February to 2 March 2018 in Szczyrk, Poland in the META Hotel in the Beskid Mountains in southern Poland, during a real winter scenery.

The conference was attended by 80 scientists, mainly from Poland but also from Germany, Australia, Qatar, and Slovakia.

The main organizer of the 13th IOS was the Photonics Society of Poland. The technical co-organizers of the conference were the Upper Silesian Division of the Polish Acoustical Society, and the Optoelectronic Department at the Silesian University of Technology in Gliwice (Poland).

The honorary patronage of the conference has been taken over by Professor Wiesław L. Woliński, a full Member of the Polish Academy of Sciences.

During the IOS18 conference thirty-eight oral lectures were held in 8 scientific sessions. In addition, twenty-one posters presented during the poster session.

The main aim of the conference was an exchange of knowledge in the scope of practical applications of photonics, integrated optics, and related scientific areas. The objectives of the conference were also presentations of experiences in the field of technology and theoretical analysis of optoelectronic sensors and practical applications of sensing structures and systems, as well as new methods in the field of modern metrology.

The IOS18 conference has contributed to the extension of relations between scientific groups and has enabled the intensification of common cooperation for the development of photonics and integrated optics.

The papers in this volume were part of the international scientific conference cited on the cover and title page.

All conference papers were initially checked by the editors and Conference Program Committee and selected of them were subjected to reviews before their publications.

All published papers obtained the positive reviews and recommendations for publications.

(Some conference presentations did not send by their authors for publication.)

The papers reflect the work and thoughts of the authors and are published herein in form accepted by reviewers.

Tadeusz Pustelny
Przemysław Struk