PROCEEDINGS OF SPIE

SPIDigitalLibrary.org/conference-proceedings-of-spie

Front Matter: Volume 10801

, "Front Matter: Volume 10801," Proc. SPIE 10801, Optical Materials and Biomaterials in Security and Defence Systems Technology XV, 1080101 (7 November 2018); doi: 10.1117/12.2518549

SPIE.

Event: SPIE Security + Defence, 2018, Berlin, Germany

PROCEEDINGS OF SPIE

Optical Materials and Biomaterials in Security and Defence Systems Technology XV

**Roberto Zamboni
François Kajzar
Attila A. Szep
Katarzyna Matczyszyn**
Editors

**10 September 2018
Berlin, Germany**

Sponsored by
SPIE

Cooperating Organisations
European Optical Society
Cranfield University (United Kingdom)

Published by
SPIE

Volume 10801

Proceedings of SPIE 0277-786X, V. 10801

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

Optical Materials and Biomaterials in Security and Defence Systems Technology XV, edited by Roberto Zamboni,
François Kajzar, Attila A. Szep, Katarzyna Matczyszyn, Proc. of SPIE Vol. 10801, 1080101
© 2018 SPIE · CCC code: 0277-786X/18/\$18 · doi: 10.1117/12.2518549

Proc. of SPIE Vol. 10801 1080101-1

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 SPIDigitalLibrary.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 *Optical Materials and Biomaterials in Security and Defence Systems Technology XV*, edited by Roberto Zamboni, François Kajzar, Attila A. Szep, Katarzyna Matczyszyn, Proceedings of SPIE Vol. 10801 (SPIE, Bellingham, WA, 2018) Seven-digit Article CID Number.

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

ISBN: 9781510621855
ISBN: 9781510621862 (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**

SPIDigitalLibrary.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

v	<i>Authors</i>
vii	<i>Conference Committee</i>

PHENOMENA I

10801 05	Exploring a direct printing technique for polymeric optical interconnects and modulators [10801-15]
----------	---

NONLINEAR OPTICS AND APPLICATIONS

10801 06	Light amplification and photo-isomerization characteristics of laser dyes and azo molecules incorporated into DNA-complex systems (Invited Paper) [10801-4]
10801 07	Nonlinear optical behaviour of C₆₀ and MWCNT suspensions far beyond the nonlinear threshold (Invited Paper) [10801-5]

POSTER SESSION

10801 0C	Fiber-optic sensors encapsulated into biocompatible polymer material for monitoring the heart rate of the human body [10801-9]
10801 0E	Photoluminescence study of Yb³⁺/Er³⁺ co-doped Sb₂O₃-WO₃-Li₂O (SWL) ceramic phosphor for fingerprint detection in forensic science and security writing [10801-12]
10801 0F	Analysis the effect of thermal load on the insertion loss of the optical couplers [10801-13]
10801 0G	A comparison of probes based on Bragg grating sensor and microphones for heart sounds measurement [10801-14]

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.

Aga, R. S., 05
Bartsch, C. M., 05
Brablik, J., 0G
Dengler, S., 07
Eberle, B., 07
Fajkus, Marcel, 0C, 0F, 0G
Heckman, E. M., 05
Jaros, Rene, 0C, 0F
Kahankova, R., 0G
Kawabe, Yutaka, 06
Kolarik, J., 0G
Kreit, E. B., 05
Kumar, Kaushal, 0E
Martinek, Radek, 0C, 0F, 0G
Nedoma, Jan, 0C, 0F, 0G
Novak, Martin, 0C, 0F
Okoshi, Kento, 06
Ouchen, F., 05
Soustek, L., 0G
Sukul, Prasenjit Prasad, 0E
Zabka, Stanislav, 0C, 0F

Conference Committee

Symposium Chair

Ric Schleijpen, TNO Defence, Security and Safety (Netherlands)

Symposium Co-chair

Karin Stein, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany)

Conference Chairs

Roberto Zamboni, Istituto per la Sintesi Organica e la Fotoreattività (Italy)

François Kajzar, University Politehnica of Bucharest (Romania)

Attila A. Szep, Air Force Research Laboratory (United States)

Katarzyna Matczyszyn, Wroclaw University of Technology (Poland)

Conference Programme Committee

Chantal Andraud, Ecole Normale Supérieure de Lyon (France)

André-Jean Attias, Université Pierre et Marie Curie (France)

Carrie M. Bartsch, Air Force Research Laboratory (United States)

Werner J. Blau, Trinity College Dublin (Ireland)

Fabrice Charra, Commissariat à l'Énergie Atomique (France)

Larry R. Dalton, University of Washington (United States)

Beata J. Derkowska, Torun University (Poland)

Manfred Eich, Technische Universität Hamburg-Harburg (Germany)

Patrick Feneyrou, Thales Research & Technology (France)

Barrett Flake, European Office of Aerospace Research and Development (United Kingdom)

James G. Grote, Air Force Research Laboratory (United States)

Emily M. Heckman, Air Force Research Laboratory (United States)

Charles Y. C. Lee, Air Force Office of Scientific Research (United States)

Antoni C. Mitus, Wroclaw University of Technology (Poland)

Jaroslav Mysliwiec, Wroclaw University of Technology (Poland)

Jacek Niziol, AGH University of Science and Technology (Poland)

Robert L. Nelson, Air Force Research Laboratory (United States)

Yoshiko Okada-Shudo, The University of Electro-Communications (Japan)

Fahima Ouchen, Air Force Research Laboratory (United States)

Agnieszka Pawlicka, Instituto de Química de São Carlos (Brazil)

Luana Persano, Istituto Nanoscienze (Italy)

Ulrich Pietsch, Universität Siegen (Germany)
Ileana Rau, University Politehnica of Bucharest (Romania)
Ifor D. W. Samuel, University of St. Andrews (United Kingdom)
Marina Saphiannikova Grenzer, Leibniz-Institut für Polymerforschung
Dresdene e.V. (Germany)
Niyazi Serdar Sariciftci, Johannes Kepler Universität Linz (Austria)
Renato Seeber, Università degli Studi di Modena e Reggio Emilia
(Italy)
Kenneth D. Singer, Case Western Reserve University (United States)

Session Chairs

- 1 Phenomena I
Roberto Zamboni, Istituto per la Sintesi Organica e la Fotoreattività
(Italy)
- 2 Nonlinear Optics and Applications
François Kajzar, University Politehnica of Bucharest (Romania)
- 3 Phenomena II
Attila A. Szep, Air Force Research Laboratory (United States)