

# ***Optical Interactions with Tissue and Cells XXVIII***

**E. Duco Jansen  
Hope Thomas Beier**  
*Editors*

**30–31 January 2017  
San Francisco, California, United States**

*Sponsored and Published by*  
SPIE

**Volume 10062**

Proceedings of SPIE, 1605-7422, V. 10062

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

Optical Interactions with Tissue and Cells XXVIII, edited by E. Duco Jansen, Hope Thomas Beier, Proc. of  
SPIE Vol. 10062, 1006201 · © 2017 SPIE · CCC code: 1605-7422/17/\$18 · doi: 10.1117/12.2276121

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](http://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 Interactions with Tissue and Cells XXVIII*, edited by E. Duco Jansen, Hope Thomas Beier, Proceedings of SPIE Vol. 10062 (SPIE, Bellingham, WA, 2017) Seven-digit Article CID Number.

ISSN: 1605-7422  
ISSN: 2410-9045 (electronic)

ISBN: 9781510605657  
ISBN: 9781510605664 (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](http://SPIE.org)

Copyright © 2017, 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](http://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 1605-7422/17/\$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](http://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

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

---

## **SESSION 1    ULTRAFast PULSED LASER INTERACTION**

---

- 10062 03    **Evidence of femtosecond-laser pulse induced cell membrane nanosurgery [10062-2]**
- 10062 04    **In-vitro photo-translocation of antiretroviral drug delivery into TZMbl cells [10062-3]**
- 10062 05    **Targeted femtosecond laser driven drug delivery within HIV-1 infected cells: in-vitro studies [10062-4]**
- 10062 06    **Phototransfection of mouse embryonic stem cells with plasmid DNA using femtosecond laser pulses [10062-5]**

---

## **SESSION 2    SHORT PULSED LASER EFFECTS**

---

- 10062 07    **Investigation of the efficacy of ultrafast laser in large bowel excision [10062-6]**
- 10062 08    **Supra-threshold epidermis injury from near-infrared laser radiation prior to ablation onset [10062-7]**
- 10062 09    **Direct numerical simulation of microcavitation processes in different bio environments [10062-8]**
- 10062 0A    **All-fiber laser at 1.94  $\mu\text{m}$ : effect on soft tissue [10062-9]**

---

## **SESSION 3    PHOTOTHERMAL INTERACTIONS FROM PULSED LASERS**

---

- 10062 0B    **Pressure generation during neural stimulation with infrared radiation (Invited Paper) [10062-10]**
- 10062 0C    **Short pulse laser induced thermo-elastic deformation imaging [10062-11]**
- 10062 0D    **Short infrared laser pulses increase cell membrane fluidity [10062-12]**
- 10062 0F    **Antivascular effect induced by photo-mediated ultrasound [10062-14]**

---

**SESSION 4 PHOTOTHERMAL INTERACTIONS**

---

- 10062 0I **Correlating measured transient temperature rises with damage rate processes in cultured cells** [10062-17]
- 10062 0J **Laser driven short-term thermal angioplasty: enhancement of drug delivery performance by heating with tension** [10062-18]

---

**SESSION 5 PHOTOCHEMICAL AND PHOTO-OXIDATIVE INTERACTIONS**

---

- 10062 0L **Photosensitization reaction induced hemolysis in a cuvette observed with hemoglobin absorption spectrum of various species** [10062-20]
- 10062 0N **Evaluation of electrical propagation delay with cardiomyocytes by photosensitization reaction in vitro** [10062-22]
- 10062 0O **Extracellular talaporfin sodium-induced photosensitization reaction with various albumin animal species on myocardial cells in vitro** [10062-23]

---

**SESSION 6 NOVEL APPLICATIONS OF LASERS AND LIGHT IN BIOMEDICINE**

---

- 10062 0T **Using laser induced breakdown spectroscopy and acoustic radiation force elasticity microscope to measure the spatial distribution of corneal elasticity** [10062-28]

---

**SESSION 7 NUMERICAL APPROACHES SIMULATING LASER-TISSUE INTERACTIONS**

---

- 10062 0W **Analysis of nanoparticles optical propagation influence in biological tissue simulating phantoms** [10062-31]
- 10062 0Y **Simulation analysis of the transparency of cornea and sclera** [10062-33]

---

**SESSION 8 OPTICAL PROPERTIES OF TISSUES**

---

- 10062 10 **Study of the effect of temperature on the optical properties of Latin skins** [10062-35]

---

**POSTER SESSION**

---

- 10062 12 **Multiple scattering of polarized light in uniaxial turbid media with arbitrarily oriented linear birefringence** [10062-37]
- 10062 14 **The underlying structure of skin wrinkles: a hyperspectral approach to crows feet** [10062-39]
- 10062 16 **Monte Carlo mathematical modeling of the interactions between light and skin tissue of newborns** [10062-41]

- 10062 17 **In vivo monitoring laser tissue interaction using high resolution Fourier-domain optical coherence tomography** [10062-42]
- 10062 1A **Pros and cons of characterising an optical translocation setup** [10062-46]
- 10062 1B **The role of numerical aperture in efficient estimation of spatially resolved reflectance by a Monte Carlo light propagation model** [10062-47]
- 10062 1C **Preservation media analysis for ex vivo measurements of endogenous UV fluorescence of liver fibrosis in bulk samples** [10062-48]
- 10062 1F **Increasing the quality and germination gymnosperms by photonics methods** [10062-51]



## 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.

Ahmed, Elharith M., 0I  
Ahn, Jin-Chul, 17  
Aleman-García, Nathalie, 1C  
Arai, Tsunenori, 0J, 0L, 0N, 0O  
Arce-Diego, José L., 0W  
Arévalo-Díaz, Laura, 0W  
Beck, Rainer J., 07  
Beier, Hope T., 0D  
Bürmen, Miran, 1B  
Cantu, Jody C., 0D  
Chung, Phil-Sang, 17  
Das Chowdhury, Sourav, 0A  
DeLisi, Michael P., 08  
Denton, Michael L., 0I  
Doi, Marika, 0N  
Draxinger, Wolfgang, 0C  
Durova, Anastasia, 1F  
Dyer, Phillip H., 0I  
Elezabi, Abdulhakem Y., 03  
Fan, Zhongwei, 0T  
Fanjul-Vélez, Félix, 0W  
Franco, Walfre, 1C  
Gamboa, B. Giovana, 0I  
Godbout, Roseline, 03  
Gonzalez, Cherry C., 0I  
Góra, Wojciech S., 07  
Grishkanich, Aleksandr, 1F  
Gutierrez-Herrera, Enoch, 1C  
Hamada, Risa, 0L  
Hand, Duncan P., 07  
Hernández-Ruiz, Joselín, 1C  
Homma, Rie, 0J  
Hu, Zizhong, 0F  
Huber, Robert, 0C  
Iakovlev, Alexey, 1F  
Ibey, Bennett L., 0D  
Ivančić, Matic, 1B  
Jayne, David, 07  
Jo, Hang Chan, 17  
Juhász, Tibor, 0T  
Kascheev, Sergey, 1F  
Katchinskiy, Nir, 03  
Kim, DaeYu, 17  
Kozyreva, Olga, 16  
Kumru, Semih S., 08  
Kurtz, Ron, 0T  
Li, Xin, 0T  
Likar, Boštjan, 1B  
Lile, Lily A., 08  
Ly, Kevin, 09  
Maaza, Malik, 04, 05, 06, 1A  
Mak, Andrey, 1F  
Malabi, Rudzani, 04, 1A  
Manoto, Sello Lebohang, 04, 05, 06  
Maphanga, Charles, 05, 1A  
Mohan, Syam Mohan P. C., 07  
Morales-Cruzado, Beatriz, 10  
Mordovanakis, Aghapi, 0F  
Mthunzi-Kufa, Patience, 04, 05, 06, 1A  
Naglič, Peter, 1B  
Noojin, Gary D., 08, 0I  
Ogawa, Emiyu, 0J, 0L, 0N, 0O  
Ombinda-Lemboumba, Saturnin, 04, 05, 06, 1A  
Ortega-Martinez, Antonio, 1C  
Otsuki, S., 12  
Pal, Atasi, 0A  
Pal, Debasis, 0A  
Paulus, Yannis M., 0F  
Perez-Garcia, Adolfo, 1C  
Pérez-Gutiérrez, Francisco G., 10  
Pernuš, Franjo, 1B  
Perry, Sarah L., 07  
Peterson, Amanda M., 08  
Pfeiffer, Tom, 0C  
Puccetti, G., 14  
Pushkareva, Alexandra, 16  
Quistián-Vázquez, Brenda, 10  
Richter, C.-P., 0B  
Rickman, John M., 0I  
Rockwell, Benjamin A., 0I  
Rodríguez-Colmenares, Miguel A., 0W  
Ruzankina, Julia, 1F  
Sánchez-Pérez, Celia, 1C  
Sarmiento-Gómez, Erick, 10  
Schmidt, Morgan S., 09  
Sen, Ranjan, 0A  
Shephard, Jonathan D., 07  
Shimazaki, Natsumi, 0J  
Shin, Dong Jun, 17  
Shingledecker, Aurora D., 08  
Shires, Mike, 07  
Stolarski, David J., 08  
Suganuma, Kao, 0J  
Sun, Hui, 0T  
Tan, X., 0B  
Thobakgale, Lebogang, 06  
Thomas, Robert J., 08, 09  
Tijerina, Amanda J., 0I

Tseng, Snow H., 0Y  
van der Steen, Antonius F. W., 0C  
van Soest, Gijs, 0C  
Walsh, Alex J., 0D  
Wang, Tianshi, 0C  
Wang, Xueding, 0F  
Wen, Sy-Bor, 09  
Wieser, Wolfgang, 0C  
Wu, Min, 0C  
Xia, N., 0B  
Xu, Y., 0B  
Yang, Chih-Yao, 0Y  
Yang, Xinmai, 0F  
Zhang, Haonan, 0F  
Zohner, Justin J., 08

# Conference Committee

## *Symposium Chairs*

**James G. Fujimoto**, Massachusetts Institute of Technology  
(United States)

**R. Rox Anderson**, Wellman Center for Photomedicine, Massachusetts  
General Hospital (United States) and Harvard School of Medicine  
(United States)

## *Program Track Chair*

**Steven L. Jacques**, Oregon Health & Science University (United States)

## *Conference Chairs*

**E. Duco Jansen**, Vanderbilt University (United States)

**Hope Thomas Beier**, Air Force Research Laboratory (United States)

## *Conference Program Committee*

**Randolph Glickman**, The University of Texas Health Science Center at  
San Antonio (United States)

**Steven L. Jacques**, Oregon Health & Science University (United States)

**Bennett L. Ibey**, Tri Service Research Laboratory (United States)

**Beop-Min Kim**, Korea University (Korea, Republic of)

**Alexander J. Makowski**, Prozess Technologie (United States)

**Jessica C. Ramella-Roman**, Florida International University  
(United States)

**Marissa Nicole Rylander**, Virginia Polytechnic Institute and State  
University (United States)

**Zachary D. Taylor**, University of California, Los Angeles (United States)

**Robert J. Thomas**, Air Force Research Laboratory (United States)

**Alfred Vogel**, Universität zu Lübeck (Germany)

**Gerald J. Wilmink**, WiseWear Corporation (United States)

## *Session Chairs*

1 Ultrafast Pulsed Laser Interaction  
**Hope Thomas Beier**, Air Force Research Laboratory (United States)

2 Short Pulsed Laser Effects  
**Joel N. Bixler**, Air Force Research Laboratory (United States)

- 3 Photothermal Interactions from Pulsed Lasers  
**Bennett L. Ibey**, Tri Service Research Laboratory (United States)
- 4 Photothermal Interactions  
**Randolph D. Glickman**, The University of Texas Health Science Center  
at San Antonio (United States)
- 5 Photochemical and Photo-oxidative Interactions  
**Morgan S. Schmidt**, Air Force Research Laboratory (United States)
- 6 Novel Applications of Lasers and Light in Biomedicine  
**Alexandra J. Walsh**, Air Force Research Laboratory (United States)
- 7 Numerical Approaches Simulating Laser-Tissue Interactions  
**Benjamin A. Rockwell**, Air Force Research Laboratory (United States)
- 8 Optical Properties of Tissues  
**Michael L. Denton**, Air Force Research Laboratory (United States)