PROCEEDINGS OF SPIE

SPIDigitalLibrary.org/conference-proceedings-of-spie

Front Matter: Volume 6627

, "Front Matter: Volume 6627," Proc. SPIE 6627, Optical Coherence Tomography and Coherence Techniques III, 662701 (11 July 2007); doi: 10.1117/12.754388

SPIE.

Event: European Conferences on Biomedical Optics, 2007, Munich, Germany

Optical Coherence Tomography and Coherence Techniques III

Peter E. Andersen
Zhongping Chen
Editors

17–19 June 2007
Munich, Germany

Sponsored and Published by
SPIE
OSA—Optical Society of America

Financial Sponsor

EOARD—European Office of Aerospace Research and Development

We wish to thank the following for their contribution to the success of this conference:
European Office of Aerospace Research and Development
Air Force Office of Scientific Research
United States Air Force Research Laboratory (www.london.af.mil)

Cooperating Organizations
EOS—European Optical Society
WLT—Wissenschaftliche Gesellschaft Lasertechnik e.V. (Germany)
DGLM—Deutsche Gesellschaft für Lasermedizin e.V. (Germany)

Volume 6627

Proceedings of SPIE-OSA Biomedical Optics, 1605-7422, v. 6627

The papers included 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. The papers published in these proceedings 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 this book:

Author(s), "Title of Paper," in *Optical Coherence Tomography and Coherence Techniques III*, edited by Peter E. Andersen, Zhongping Chen, Proceedings of SPIE-OSA Biomedical Optics, Vol. 6627 (SPIE, Bellingham, WA, 2007) Article CID Number.

ISSN 1605-7422
ISBN 9780819467713

Copublished 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

and

OSA—Optical Society of America
2010 Massachusetts Ave., N.W., Washington, D.C., 20036 USA
Telephone 1 202/223-8130 (Eastern Time) · Fax 1 202/223-1096
<http://www.osa.org>

Copyright © 2007, Society of Photo-Optical Instrumentation Engineers and Optical Society of America.

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 the publishers 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 1605-7422/07/\$18.00.

Printed in the United States of America.

Paper Numbering: Proceedings of SPIE-OSA Biomedical Optics follow an e-First publication model, with papers published first online and then in print and on CD-ROM. Papers are published as they are submitted and meet publication criteria. A unique, consistent, permanent citation identifier (CID) number is assigned to each article at the time of the first publication. Utilization of CIDs allows articles to be fully citable as soon they are published online, and connects the same identifier to all online, print, and electronic versions of the publication. In this six-digit CID article numbering system:

- The first four digits correspond to the 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. The complete citation is used on the first page, and an abbreviated version on subsequent pages. Numbers in the index correspond to the last two digits of the six-digit CID number.

Contents

ix Conference Committee

SESSION 1 SOURCE TECHNOLOGY FOR OCT

- 6627 03 **Novel superluminescent diodes and SLD-based light sources for optical coherence tomography** [6627-02]
E. V. Andreeva, P. I. Lapin, V. V. Prokhorov, V. R. Shidlovski, M. V. Shramenko, S. D. Yakubovich, Superlum Diodes Ltd. (Russia)
- 6627 04 **Ultrahigh resolution optical coherence tomography at two infrared wavelength regions using a single light source** [6627-03]
F. Spöler, S. Kray, P. Grychtol, RWTH Aachen Univ. (Germany); B. Hermes, J. Bornemann, Univ. Hospital RWTH Aachen (Germany); M. Först, H. Kurz, RWTH Aachen Univ. (Germany)
- 6627 05 **High speed wavelength-swept laser source with simple configuration for optical coherence tomography** [6627-04]
C. Chong, A. Morosawa, T. Sakai, Santec Corp. (Japan)
- 6627 06 **Wide tuning range wavelength-swept laser with single semiconductor optical amplifier for OCT** [6627-05]
A. Morosawa, C. Chong, T. Sakai, Santec Corp. (Japan)

SESSION 2 CLINICAL AND PRE-CLINICAL APPLICATIONS OF OCT I

- 6627 07 **Three-dimensional Fourier-domain optical coherence tomography of alveolar mechanics in stepwise inflated and deflated isolated and perfused rabbit lungs** [6627-06]
A. Krueger, L. Knels, S. Meissner, M. Wendel, A. R. Heller, T. Lambeck, T. Koch, E. Koch, Technische Univ. Dresden (Germany)
- 6627 08 **Diagnostic potential of optical coherence tomography in non-melanoma skin cancer: a clinical study** [6627-07]
M. Mogensen, Roskilde Hospital, Univ. of Copenhagen (Denmark); L. Thrane, T. M. Jørgensen, Risø National Lab., Technical Univ. of Denmark (Denmark); G. B. E. Jemec, Roskilde Hospital, Univ. of Copenhagen (Denmark)
- 6627 09 **In vivo and 3D visualization of coronary artery development by optical coherence tomography** [6627-08]
L. Thrane, Technical Univ. of Denmark (Denmark); K. Norozi, Hannover Medical School (Germany); J. Männer, Georg-August-Univ. of Göttingen (Germany); F. Pedersen, Technical Univ. of Denmark (Denmark); S. Mottl-Link, German Cancer Research Ctr. (Germany); H. Engelbrecht Larsen, P. E. Andersen, Technical Univ. of Denmark (Denmark); A. Wessel, T. M. Yelbuz, Hannover Medical School (Germany)

SESSION 3 CLINICAL AND PRE-CLINICAL APPLICATIONS OF OCT II

- 6627 0B **Dynamic imaging of penetration and decontamination after chemical eye burn using optical coherence tomography** [6627-10]
F. Spöler, M. Först, H. Kurz, RWTH Aachen Univ. (Germany); M. Frentz, N. F. Schrage, Aachen Ctr. of Technology Transfer in Ophthalmology (Germany)
- 6627 0D **Investigation of murine vasodynamics by Fourier domain optical coherence tomography** [6627-12]
S. Meißner, G. Müller, J. Walther, A. Krüger, M. Cuevas, B. Eichhorn, U. Ravens, H. Morawietz, E. Koch, Univ. of Technology Dresden (Germany)
- 6627 0E **Robust intravascular optical coherence elastography driven by acoustic radiation pressure** [6627-13]
G. van Soest, R. R. Bouchard, F. Mastik, Erasmus Univ. Medical Ctr. (Netherlands); N. de Jong, Erasmus Univ. Medical Ctr. (Netherlands), Univ. of Twente (Netherlands), and Interuniv. Cardiology Institute of The Netherlands (Netherlands); A. F. W. van der Steen, Erasmus Univ. Medical Ctr. (Netherlands) and Interuniv. Cardiology Institute of The Netherlands (Netherlands)
- 6627 0F **Optical coherence tomography (OCT) imaging and computer aided diagnosis of human cervical tissue specimens** [6627-65]
F. Bazant-Hegemark, N. Stone, Cranfield Univ. at Silsoe (United Kingdom) and Gloucestershire Royal Hospital (United Kingdom); M. D. Read, Gloucestershire Royal Hospital (United Kingdom); K. McCarthy, Cheltenham General Hospital (United Kingdom); R. K. Wang, Oregon Health and Science Univ. (USA)

SESSION 4 RETINAL IMAGING

- 6627 0I **Phase retardation measurement of retinal nerve fiber layer using polarization-sensitive spectral domain optical coherence tomography and scanning laser polarimetry** [6627-16]
M. Yamanari, Univ. of Tsukuba (Japan); M. Miura, Tokyo Medical Univ. (Japan), and Univ. of Tsukuba (Japan); S. Makita, T. Yatagai, Y. Yasuno, Univ. of Tsukuba (Japan)
- 6627 0J **Intensity-based quantification of fast retinal blood flow in 3D via high resolution resonant Doppler spectral OCT (Invited Paper)** [6627-17]
R. Michaely, A. H. Bachmann, M. L. Villiger, C. Blatter, T. Lasser, R. A. Leitgeb, École Polytechnique Fédérale de Lausanne (Switzerland)

SESSION 5 OCT MODELING AND SPECKLE REDUCTION

- 6627 0N **Scatterer size-based analysis of optical coherence tomography signals** [6627-20]
A. Kartakoulis, C. Pitris, Univ. of Cyprus (Cyprus)
- 6627 0O **Stereoscopic optical coherence tomography in the frequency domain for refractive index sensitive imaging** [6627-21]
P. H. Tomlins, M. Tedaldi, R. A. Ferguson, National Physical Lab. (United Kingdom); R. K. Wang, Oregon Health and Science Univ. (USA)

- 6627 OP **Speckle reduction in optical coherence tomography images of human skin by a spatial diversity method** [6627-22]
T. M. Jørgensen, L. Thrane, Risø National Lab., Technical Univ. of Denmark (Denmark); M. Mogensen, Roskilde Hospital, Univ. of Copenhagen (Denmark); F. Pedersen, P. E. Andersen, Risø National Lab., Technical Univ. of Denmark (Denmark)
- 6627 OQ **Contribution of various scattering orders to OCT images of skin** [6627-23]
M. Yu. Kirillin, Univ. of Oulu (Finland) and M.V. Lomonosov Moscow State Univ. (Russia); A. V. Priezzhev, M.V. Lomonosov Moscow State Univ. (Russia); R. Myllyla, Univ. of Oulu (Finland)
- 6627 OR **Speckle size in optical coherence tomography** [6627-24]
G. Lamouche, National Research Council Canada (Canada); C.-E. Bisailon, National Research Council Canada (Canada) and Ecole Polytechnique de Montréal (Canada); R. Maciejko, École Polytechnique de Montréal (Canada); M. Dufour, J.-P. Monchalain, National Research Council Canada (Canada)
- 6627 OS **Maximum likelihood estimation of depth reflectance in time-domain optical coherence tomography** [6627-59]
S. Sherif, C. Flueraru, Y. Mao, S. Chang, National Research Council Canada (Canada)
- 6627 OT **The effects of Gaussian beams on optical coherence tomography** [6627-60]
C.-C. Liu, National Chiao Tung Univ. (Taiwan); C.-H. Cheng, C.-W. Chiu, I.-J. Hsu, Chung Yuan Christian Univ. (Taiwan)
- 6627 OU **Absorption effects in optical coherence tomography modeling** [6627-61]
T. H. Chow, Nanyang Technological Univ. (Singapore); J. C. Y. Kah, National Univ. of Singapore (Singapore); K. M. Tan, B. K. Ng, R. S. Gulam, Nanyang Technological Univ. (Singapore); C. J. R. Sheppard, National Univ. of Singapore (Singapore)

SESSION 6 ADVANCES IN OCT SYSTEM TECHNOLOGY I

- 6627 OX **Simultaneous optical coherence and multiphoton microscopy of skin-equivalent tissue models (Invited Paper)** [6627-26]
J. K. Barton, The Univ. of Arizona (USA); S. Tang, R. Lim, B. J. Tromberg, Beckman Laser Institute (USA)
- 6627 OZ **Measurement of axial position of spherical objects using multiple delay element C-scan OCT** [6627-28]
L. Plesea, M. Gomez, A. Gh. Podoleanu, Univ. of Kent (United Kingdom)
- 6627 12 **Single- vs. two-camera-based spectral-domain polarization-sensitive OCT systems** [6627-32]
B. Baumann, E. Götzinger, M. Pircher, C. K. Hitzenberger, Medical Univ. of Vienna (Austria)
- 6627 13 **Optical coherence tomography using a dynamically focusing tunable micro-lens** [6627-55]
K. Aljaseem, A. Werber, D. Mader, S. Reichelt, H. Zappe, Univ. of Freiburg (Germany)

- 6627 14 **Logarithmic transformation technique for exact signal recovery in frequency-domain optical-coherence tomography** [6627-66]
S. Chandra Sekhar, R. A. Leitgeb, A. H. Bachmann, M. Unser, École Polytechnique Fédérale de Lausanne (Switzerland)

SESSION 7 SYSTEM ARCHITECTURE

- 6627 15 **MEMS-based non-rotatory circumferential scanning optical probe for endoscopic optical coherence tomography** [6627-33]
Y. Xu, National Univ. of Singapore (Singapore) and Institute of Microelectronics (Singapore); J. Singh, T. H. Siang, K. Ramakrishna, C. S. Premchandran, C. W. Sheng, Institute of Microelectronics (Singapore); C. T. Kuan, Nanyang Technological Univ. (Singapore), and Institute of Microelectronics (Singapore); N. Chen, National Univ. of Singapore (Singapore); M. C. Olivo, National Cancer Ctr. (Singapore); C. J. R. Sheppard, National Univ. of Singapore (Singapore)
- 6627 16 **Doppler spectral optical coherence tomography with optical frequency shift** [6627-34]
M. Wojtkowski, A. Szkulmowska, M. Szkulmowski, T. Bajraszewski, W. Fojt, A. Kowalczyk, Nicolaus Copernicus Univ. (Poland)
- 6627 17 **Optical coherence tomography controlled femtosecond laser microsurgery system** [6627-35]
O. Massow, Laser Zentrum Hannover e.V. (Germany); F. Will, Rowiak GmbH (Germany); H. Lubatschowski, Laser Zentrum Hannover e.V. (Germany) and Rowiak GmbH (Germany)
- 6627 18 **Coherent amplified optical coherence tomography** [6627-36]
J. Zhang, B. Rao, Z. Chen, Beckman Laser Institute (USA) and Univ. of California, Irvine (USA)
- 6627 19 **Full field frequency domain common path optical coherence tomography with annular aperture** [6627-58]
I. Abdulhalim, R. Friedman, L. Liraz, R. Dadon, Ben Gurion Univ. of the Negev (Israel)
- 6627 1A **Optical projection microtomography of transparent objects** [6627-62]
S. Vertu, M. Ochiai, M. Shuzo, I. Yamada, J.-J. Delaunay, The Univ. of Tokyo (Japan); O. Haeberlé, Univ. of Haute Alsace (France); Y. Okamoto, Chiba Univ. (Japan)

SESSION 8 ADVANCES IN OCT SYSTEM TECHNOLOGY II

- 6627 1E **Design criteria in choosing optimized OCT scanning regimes** [6627-40]
C. C. Rosa, Univ. of Porto (Portugal) and INESC-Porto (Portugal); J. Rogers, J. Pedro, Ophthalmic Technologies Inc. (Canada); R. Rosen, New York Eye Infirmary (USA); A. Podoleanu, Univ. of Kent (United Kingdom)
- 6627 1H **Extended focus Fourier domain optical coherence microscopy assists developmental biology** [6627-44]
M. L. Villiger, École Polytechnique Fédérale de Lausanne (Switzerland); M. Beleut, C. Briskin, Institut Suisse de Recherche Expérimentale sur le Cancer (Switzerland); T. Lasser, École Polytechnique Fédérale de Lausanne (Switzerland); R. A. Leitgeb, École Polytechnique Fédérale de Lausanne (Switzerland) and Medical Univ. of Vienna (Austria)

- 6627 1I **Spectroscopic Fourier domain optical coherence tomography** [6627-67]
C. Kasseck, K. Lehmann, N. C. Gerhardt, M. Hofmann, Ruhr-Univ. Bochum (Germany)
- 6627 1J **Using a piezoelectric fiber stretcher to remove the depth ambiguity in optical Fourier domain imaging** [6627-68]
S. Vergnole, G. Lamouche, M. Dufour, B. Gauthier, National Research Council (Canada)
- 6627 1K **Differential-phase optical coherence reflectometer for surface profile measurement** [6627-69]
H.-J. Huang, National Yang-Ming Univ. (Taiwan); W.-C. Kuo, National Taiwan Normal Univ. (Taiwan); S.-Y. Chang, National Central Univ. (Taiwan); C.-W. Ho, National United Univ. (Taiwan); C. Chou, National Yang-Ming Univ. (Taiwan) and National Central Univ. (Taiwan)

SESSION 9 RETINAL IMAGING II

- 6627 1L **Correcting ocular aberrations with a high stroke deformable mirror** [6627-45]
S. Tuohy, A. Bradu, A. Gh. Podoleanu, Univ. of Kent (United Kingdom); N. Chateau, Imagine Eyes (France)
- 6627 1M **Quantification of the outer retinal layers: correlation to visual acuity in healthy subjects and patients with central serous chorioretinopathy** [6627-46]
B. Sander, U. Christensen, M. Larsen, Glostrup Hospital (Denmark); T. M. Jørgensen, Technical Univ. of Denmark (Denmark)
- 6627 1N **Scattering optical coherence angiography with 1- μ m swept source optical coherence tomography** [6627-47]
Y. Yasuno, Univ. of Tsukuba (Japan); Y. Hong, Univ. of Tsukuba (Japan) and Korea Advanced Institute of Science and Technology (South Korea); S. Makita, Univ. of Tsukuba (Japan); M. Akiba, Yamagata Promotional Organization for Industrial Technology (Japan); M. Miura, Univ. of Tsukuba (Japan) and Tokyo Medical Univ. (Japan); T. Yatagai, Univ. of Tsukuba (Japan)
- 6627 1O **Optical coherence angiography for the retina and choroid** [6627-48]
S. Makita, Univ. of Tsukuba (Japan); Y. Hong, Univ. of Tsukuba (Japan) and KAIST (South Korea); M. Miura, Tokyo Medical Univ. (Japan) and Univ. of Tsukuba (Japan); M. Yamanari, T. Yatagai, Y. Yasuno, Univ. of Tsukuba (Japan)

SESSION 10 POLARISATION SENSITIVE OCT

- 6627 1S **Polarization-sensitive Fourier domain optical coherence tomography for the imaging the anterior segment disorder of the eyes** [6627-52]
M. Miura, Univ. of Tsukuba (Japan) and Tokyo Medical Univ. (Japan); M. Yamanari, Univ. of Tsukuba (Japan); Y. Watabnabe, H. Mori, Univ. of Tsukuba (Japan) and Tokyo Medical Univ. (Japan); T. Iwasaki, Tokyo Medical Univ. (Japan); A. E. Elsner, Indiana Univ. (USA); K. Kawana, T. Oshika, T. Yatagai, Y. Yasuno, Univ. of Tsukuba (Japan)
- 6627 1T **Mueller coherency matrix method for contrast image in tissue polarimetry** [6627-54]
J. L. Arce-Diego, F. Fanjul-Vélez, D. Samperio-García, D. Pereda-Cubián, Univ. of Cantabria (Spain)

6627 1U

Depth-resolved simplified characterization of collagen depletion in dermis with polarization sensitive optical coherence tomography applicable to non-laboratory conditions [6627-53]

V. Tougbaev, T. J. Eom, W. Shin, Y. L. Lee, B.-A. Yu, C.-S. Kee, D.-K. Ko, J. Lee, Gwangju Institute of Science and Technology (South Korea)

Author Index

Conference Committee

General Chairs

David Boas, Massachusetts General Hospital (USA)
Stefan Andersson-Engles, Lunds Tekniska Högskola (Sweden)

Program Chairs

Wolfgang Drexler, Cardiff University (United Kingdom)
Mary-Ann Mycek, University of Michigan (USA)

Conference Chairs

Peter E. Andersen, Technical University of Denmark (Denmark)
Zhongping Chen, University of California, Irvine (USA)

Program Committee

Jennifer K. Barton, The University of Arizona (USA)
Stephen A. Boppart, University of Illinois at Urbana-Champaign (USA)
Wolfgang Drexler, Cardiff University (United Kingdom)
James G. Fujimoto, Massachusetts Institute of Technology (USA)
Christoph K. Hitzenberger, Medizinische Universität Wien (Austria)
Andrzej Kowalczyk, Nicolaus Copernicus University (Poland)
Michael Larsen, Glostrup Hospital, University of Copenhagen (Denmark)
Constantinos Pitris, University of Cyprus (Cyprus)
Adrian Gh. Podoleanu, University of Kent at Canterbury (United Kingdom)
René-Paul Salathé, École Polytechnique Fédérale de Lausanne (Switzerland)
Natalia M. Shakhova, Institute of Applied Physics (Russia)
Ton G. van Leeuwen, Universiteit Twente (Netherlands)
Julia Welzel, General Hospital Augsburg (Germany)
Yoshiaki Yasuno, University of Tsukuba (Japan)

Session Chairs

- 1 Source Technology for OCT
Peter E. Andersen, Technical University of Denmark (Denmark)

- 2 Clinical and Pre-Clinical Applications of OCT I
Julia Welzel, General Hospital Augsburg (Germany)
- 3 Clinical and Pre-Clinical Applications of OCT II
Jennifer K. Barton, The University of Arizona (USA)
- 4 Retinal Imaging
Wolfgang Drexler, Cardiff University (United Kingdom)
- 5 OCT Modeling and Speckle Reduction
Lars Thrane, Risø National Laboratory, Technical University of Denmark (Denmark)
- 6 Advances in OCT System Technology I
James G. Fujimoto, Massachusetts Institute of Technology (USA)
- 7 System Architecture
Adrian Gh. Podoleanu, University of Kent at Canterbury (United Kingdom)
- 8 Advances in OCT System Technology II
Constantinos Pitris, University of Cyprus (Cyprus)
- 9 Retinal Imaging II
Christoph K. Hitzenberger, Medizinische Universität Wien (Austria)
- 10 Polarisation Sensitive OCT
Johannes F. DeBoer, Massachusetts General Hospital (USA)