PROCEEDINGS OF SPIE

Unconventional Optical Imaging

Corinne Fournier
Marc P. Georges
Gabriel Popescu
Editors

22–26 April 2018
Strasbourg, France

Sponsored by
SPIE

Cosponsored by
Strasbourg the Europtimist (France)
CNRS (France)
Investissements d'Avenvir (France)
iCube (France)
Université de Strasbourg (France)

Cooperating Organisations
Photonics 21 (Germany)
EOS—European Optical Society (Germany)
Photonics Public Private Partnership (Belgium)
Comité National d'Optique et de Photonique (France)

Published by
SPIE

Volume 10677

Proceedings of SPIE 0277-786X, V. 10677

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

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 *Unconventional Optical Imaging*, edited by Corinne Fournier, Marc P. Georges, Gabriel Popescu, Proceedings of SPIE Vol. 10677 (SPIE, Bellingham, WA, 2018) Seven-digit Article CID Number.

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

ISBN: 9781510618800
ISBN: 9781510618817 (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 by Curran Associates, Inc., under license from SPIE.

Publication of record for individual papers is online in the 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

xi *Authors*
xv *Conference Committee*

MODELLING, COMPUTATION AND DESIGN I: CO-DESIGN FOR UNCONVENTIONAL IMAGING

10677 03 **Increasing image resolution in near-infrared to visible upconversion detection for long-range active imaging** [10677-2]

10677 04 **Color correction matrix for sparse RGB-W image sensor without IR cutoff filter** [10677-3]

10677 05 **Embedded video rate super-resolution in the infrared with a low-cost multi-aperture camera** [10677-4]

10677 06 **Simple and cheap hyperspectral imaging for astronomy (and more)** [10677-5]

10677 07 **Experimental demonstration of diffraction-limited plenoptic imaging** [10677-6]

MODELLING, COMPUTATION AND DESIGN II: CO-DESIGN FOR UNCONVENTIONAL IMAGING

10677 09 **Chromatic add-on to improve depth from defocus with a conventional camera** [10677-8]

10677 0A **SNR-optimized image fusion for transparent object inspection** [10677-9]

10677 0B **Pansharpening of images acquired with color filter arrays** [10677-10]

10677 0D **Time-resolved diffuse optical tomography system based on adaptive structured light illumination and compressive sensing detection** [10677-13]

10677 0E **Imaging VLS grating spectrographs** [10677-14]

10677 0F **Calibration of a stereoscopic video endoscope for precise three-dimensional geometrical measurements in arbitrary spectral bands** [10677-15]

APPLICATIONS I: BIOIMAGING

10677 0H **Quantitative phase microscopy of dynamic cells using off-axis holographic compression by spatial multiplexing** [10677-17]

10677 0I **Color holographic microscope for monitoring lipids in microalgae** [10677-18]

10677 0J **Tomographic diffractive microscopy: principles and applications (Keynote Paper)** [10677-136]

APPLICATIONS II: BIOIMAGING

10677 0K **Advances in optical coherence tomography for dermatology (Invited Paper)** [10677-19]

10677 0M **Quantitative phase retrieval reconstruction from in-line hologram using a new proximal operator: application to microscopy of bacteria and tracking of droplets** [10677-21]

10677 0O **Bioimaging with controlled depth using upconversion nanoparticles** [10677-23]

10677 0P **Label-free imaging of lipid droplets in cells by stimulated Raman microscopy** [10677-24]

APPLICATIONS III: MICRO- NANOSCOPIC IMAGING

10677 0R **Through-focus scanning optical microscopy applications (Invited Paper)** [10677-26]

10677 0V **Laser sources in multiphoton microscopy: overview and optimization** [10677-30]

MODELLING, COMPUTATION AND DESIGN III

10677 0W **Partially coherent imaging in phase space (Invited Paper)** [10677-31]

10677 0X **Development of a realistic wave propagation-based chromatic confocal microscopy model** [10677-32]

10677 0Y **A dimension reduction method for fast diffuse optical tomography** [10677-33]

10677 10 **Super-resolution for noisy images via deep convolutional neural network** [10677-35]

ADVANCED METHODS I: LIGHT SCATTERING

10677 15 **Vision through turbid media by Fourier filtering and single-pixel detection (Best Student Paper Award)** [10677-40]

10677 17 **Scatter-plate microscope: improved image acquisition** [10677-42]

10677 18 **Mueller microscopy of anisotropic scattering media: theory and experiments** [10677-43]

ADVANCED METHODS II: QUANTITATIVE PHASE IMAGING

10677 19 **Off-axis digital holography for flow analysis (Invited Paper)** [10677-44]

10677 1A **Improving color lensless microscopy reconstructions by self-calibration** [10677-45]

10677 1B **Multiwavelength surface contouring from phase-coded diffraction patterns** [10677-46]

10677 1C **Quantitative phase imaging in turbid media by coherence controlled holographic microscopy** [10677-47]

10677 1E **Ptychography: quantitative phase imaging with incoherent imaging properties** [10677-50]

10677 1F **Simplified approach for tomographic diffractive microscopy of axisymmetric samples** [10677-48]

OPTICS IN SURGERY I: JOINT SESSION BETWEEN CONFERENCES 10677 AND 10685

10677 1G **Phantom and methodology for fluorescence molecular imaging systems benchmarking** [10677-52]

OPTICS IN SURGERY II: JOINT SESSION BETWEEN CONFERENCES 10677 AND 10685

10677 1J **Optics in surgery: the surgeon perspective (Invited Paper)** [10677-54]

10677 1K **Near-infrared fluorescence imaging methods to evaluate blood flow state in the skin lesions** [10677-55]

ADVANCED METHODS III: QUANTITATIVE PHASE IMAGING

10677 1Q **In-line and off-axis hybrid digital holography** [10677-62]

10677 1R **Quantitative phase imaging by using a position sensitive detector** [10677-61]

APPLICATIONS V: WAVEFRONT SHAPING AND RESTORATION

10677 1S **Phase diversity: math, methods and prospects, including sequential diversity imaging (Invited Paper)** [10677-63]

10677 1W **Interest of polarimetric refocused images calibrated in depth for control by vision** [10677-68]

ADVANCED METHODS IV: TERAHERTZ IMAGING

10677 1X **Continuous-wave terahertz phase-contrast imaging (Invited Paper)** [10677-69]

10677 1Y **A potential of terahertz solid immersion microscopy for visualizing sub-wavelength-scale tissue spheroids** [10677-70]

10677 1Z **Terahertz pulsed imaging reveals the stratigraphy of a seventeenth-century oil painting** [10677-71]

10677 20 **Resolution limits of terahertz ptychography (Best Student Paper Award)** [10677-72]

10677 21 **Reconstruction enhancement of noisy data in terahertz pulse time-domain holography by iterative procedure** [10677-73]

ADVANCED METHODS V: HARSH ENVIRONMENTS

10677 22 **Digital holography for erosion monitoring inside the ITER Tokamak (Invited Paper)** [10677-74]

10677 24 **Digital holographic microscopy for remote life detection** [10677-76]

10677 25 **Marine particles investigation by underwater digital holography** [10677-77]

10677 26 **MEMS-based serial LiDAR detection and imaging architecture for automated surveillance of undersea marine life** [10677-78]

MODELLING, COMPUTATION AND DESIGN IV

10677 28 **Supervised machine learning for 3D microscopy without manual annotation: application to spheroids** [10677-80]

10677 29 **L1-norm minimization-based accurate diffraction field calculation method emitted by three-dimensional objects** [10677-85]

10677 2A **An alternative method to correct translation positions in ptychography** [10677-81]

10677 2B **Single-frame fringe pattern analysis using modified variational image decomposition aided by the Hilbert transform for fast full-field quantitative phase imaging** [10677-82]

10677 2D **Shape measurement by inverse raytracing** [10677-84]

POSTER SESSION

10677 2E **Recognition of blastic cells in human peripheral blood by diffraction phase microscopy** [10677-87]

10677 2G **The multichannel pyrometer of the spectral ratio for on-line monitoring in the powder bed additive technologies** [10677-89]

10677 2H **Multiscale photoacoustic microscopy imaging with image improvement and quantification technique** [10677-90]

10677 2I **LED misalignment determination in LED illumination optics using hole grid pattern distribution** [10677-91]

10677 2J **Optimizing phase object reconstruction using an in-line digital holographic microscope and a reconstruction based on a Lorenz-Mie model** [10677-92]

10677 2K **Methods and challenges in laser-induced damage threshold evaluation of volumetric photopolymerized micro-structures** [10677-93]

10677 2L **Broadband Sb/B_4C multilayer mirrors for XUV spectroscopy applications** [10677-94]

10677 2M **Design and calibration for a Full-Stokes imaging polarimeter.** [10677-96]

10677 2N **Unconventional imaging with radial Walsh filters** [10677-97]

10677 2O **Dynamic microparticle manipulation through light structures generated by a self-calibrated Liquid Crystal on Silicon display** [10677-98]

10677 2P **Image quality enhancement based on real-time deconvolution and super resolution** [10677-99]

10677 2R **MWIR infrared gating imaging with uncooled PbSe FPAs for surveillance applications** [10677-101]

10677 2S **Diffraction model of a plenoptic camera for in-situ space exploration** [10677-102]

10677 2T **Aberrations analysis of a Focused Plenoptic Camera** [10677-103]

10677 2U **Comparison of reconstruction approaches for plenoptic imaging systems** [10677-104]

10677 2V **On the use of image quality measures of multi-views in light sheet fluorescence 3D microscopy** [10677-105]

10677 2W **Image reconstruction in multiphoton imaging through multivariate Gaussian fitting** [10677-106]

10677 2X **Application of stacked sparse autoencoder in automated detection of glaucoma in fundus images** [10677-107]

10677 2Y **Automated detection of glaucoma in fundus images using variational mode decomposition and textural features** [10677-108]

10677 34 **Multispectral imaging technique for skin grafts' functional state assessment** [10677-116]

10677 36 **Low-cost polarimetric imaging for surveillance** [10677-118]

10677 37 **Applications of polarimetric imaging in the oil film detection** [10677-119]

10677 38 **Database of polarimetric and multispectral images in the visible and NIR regions** [10677-120]

10677 39 **Description of near-field digital in-line holography using vectorial Rayleigh-Sommerfeld integral** [10677-121]

10677 3A **Combined digital-DOE holographic interferometer for force identification in vibroacoustics** [10677-122]

10677 3B **Data acquisition from digital holograms of particles** [10677-123]

10677 3C **Quantitative phase imaging of low-cost digital in-line holography in comparison with off-axis digital holographic microscopy** [10677-124]

10677 3E **Investigation of the effect of the spectral and angular selectivities of three-dimensional color security holographic stereograms on the process of the reconstruction of 3D images** [10677-126]

10677 3F **Position measurement of in-line microbid holograms using an autoregressive method** [10677-127]

10677 3G **Photon-counted integral holography using orthographic projection images** [10677-128]

10677 3H **Optimization of the complex coherence function Γ for diffraction-based wavefront transformations** [10677-129]

10677 3I **Terahertz hyper-spectral imaging of lab-prepared versus commercial paracetamol tablets and potential applications** [10677-130]

10677 3J **Solution for reconstruction enhancement of pulsed broadband THz holograms recorded with small area detectors** [10677-131]

10677 3L **Imaging of supersonically expanded and pulsed molecular beams by nonlinear photoionization processes** [10677-112]

10677 3N **Multimodal fluorescence imaging navigation for surgical guidance of malignant tumors in photosensitized tissues of neural system and other organs** [10677-86]

10677 3Q **Investigation of a compressive line sensing hyperspectral imaging sensor** [10677-11]

10677 3R **Methods of image correction formed on horizontal long paths** [10677-65]