

PROCEEDINGS OF SPIE

Terahertz, RF, Millimeter, and Submillimeter-Wave Technology and Applications XIV

**Laurence P. Sadwick
Tianxin Yang**
Editors

**6–11 March 2021
Online Only, United States**

*Sponsored and Published by
SPIE*

Volume 11685

Proceedings of SPIE 0277-786X, V. 11685

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 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 *Terahertz, RF, Millimeter, and Submillimeter-Wave Technology and Applications XIV*, edited by Laurence P. Sadwick, Tianxin Yang, Proceedings of SPIE Vol. 11685 (SPIE, Bellingham, WA, 2021) Seven-digit Article CID Number.

ISSN: 0277-786X

ISSN: 1996-756X (electronic)

ISBN: 9781510642058

ISBN: 9781510642065 (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 © 2021, 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 \$21.00 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/21/\$21.00.

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.

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

THZ IMAGING AND SPECTROSCOPY

- 11685 05 **Stable, compact terahertz ATR time-domain spectroscopy apparatus for quantitative solute measurements and real-time monitoring** [11685-2]
- 11685 06 **Imaging using terahertz time-domain spectroscopy in motion** [11685-3]
- 11685 07 **Reduction of surface morphology influence on THz reflection time domain spectroscopy for material classification by using multiple observation angles** [11685-4]

THZ SOURCES AND DEVICES

- 11685 0C **AlGaIn/GaN heterostructures for plasma wave detection and emission in THz regime** [11685-9]

INFRARED DEVICES, SOURCES, AND SYSTEMS

- 11685 0D **Wavelength selective, polarization sensitive, and uncooled infrared detectors for solar infrared imaging** [11685-10]
- 11685 0G **Compact and robust mid-infrared laser-based gas sensor for portable and real-time measurements** [11685-13]

OPTOELECTRIC DEVICES, SOURCES, AND SYSTEMS

- 11685 0H **Hydrogen-terminated diamond MESFETs: operating principles, static and dynamic performance, and reliability (Invited Paper)** [11685-14]
- 11685 0J **Ultracompact silicon optomechanical cavities as optical upconverters of OFDM wireless signals** [11685-16]
- 11685 0K **Single-pixel UV image sensor based on 4H-SiC CMOS technology with gamma-ray irradiation resistance** [11685-17]
- 11685 0L **Novel computational model for simulating integrated optoelectronic oscillators** [11685-18]

COMBS AND RESONATORS

- 11685 OM Terahertz-wave Nyquist wavelength division multiplexing communication utilizing integrated-optic spectrum synthesizer [11685-19]
- 11685 ON High-resolution spectroscopy of arbitrary light sources using frequency combs [11685-20]
- 11685 OP Photonic microwave and RF channelizers based on Kerr micro-combs [11685-22]

METAMATERIALS AND GRAPHENE

- 11685 OU Design of an optimized graphene plasmonic splitter utilizing higher-order mode propagation [11685-27]

EMERGING AREAS IN TERAHERTZ

- 11685 OX THz spectroscopy of emerging materials for light driven processes and energy harvesting (Invited Paper) [11685-30]

SPECTROSCOPY, IMAGING, AND INTERFEROMETRY

- 11685 11 Fitting of photoluminescence spectra for structural characterisation of high current density resonant tunnelling diodes for THz applications [11685-34]
- 11685 14 Characterization of hollow-core-metal waveguide using broadband THz time domain spectroscopy for high-pressure and temperature sensor [11685-37]
- 11685 15 Discrimination between cosmological and stellar phenomena by intensity interferometry [11685-38]
- 11685 16 Measurement of moisture content in milk powder using terahertz time-domain spectroscopy [11685-39]

TERAHERTZ LASER SYSTEMS

- 11685 1C Stability of CW-THz wave using laser chaos [11685-45]

THz TIME AND FREQUENCY DOMAIN AND EXTRACTION

- 11685 1F Towards THz beam steering with integrated phased photomixer arrays [11685-48]

- 11685 1H **Extraction of optical parameters of composite material for real-world THz application**
[11685-50]
- 11685 1I **Electrically-driven heterodyne detection of a multifrequency THz-wave with a photomixer**
[11685-60]

OPTICAL THZ TECHNIQUES

- 11685 1J **Tunable multi-channel optical true time delay using frequency interval tunable multiwavelength light source** [11685-51]
- 11685 1L **Simultaneous estimation of thickness and refractive index by combining transmission and reflection measurements** [11685-53]
- 11685 1M **A spatio-temporal finite difference time domain simulation technique to estimate terahertz pulse profile of a photo-conductive antennae** [11685-54]

APPLICATIONS AND MODELING OF THZ STRUCTURES

- 11685 1O **A polarization-maintaining THz anti-resonant fiber based on the mode coupling between core and cladding** [11685-56]
- 11685 1Q **Terahertz waves polarization tunability in unaligned single-wall carbon nanotube thin film**
[11685-58]

POSTER SESSION

- 11685 1S **THz-based spectroscopy for accurate material identification** [11685-61]
- 11685 1T **A new FPGA-based terahertz (THz) imaging device for multiphase flow metering** [11685-62]
- 11685 1U **Super-resolution simulation of terahertz coded aperture imaging** [11685-63]