## **PROCEEDINGS OF SPIE**

# Millimetre Wave and Terahertz Sensors and Technology XII

Neil A. Salmon Frank Gumbmann Editors

9–10 September 2019 Strasbourg, France

Sponsored by SPIE

Cooperating Organisations European Optical Society Cranfield University (United Kingdom)

Published by SPIE

Volume 11164

Proceedings of SPIE 0277-786X, V. 11164

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 Millimetre Wave and Terahertz Sensors and Technology XII, edited by Neil A. Salmon, Frank Gumbmann, Proceedings of SPIE Vol. 11164 (SPIE, Bellingham, WA, 2019) Seven-digit Article CID Number.

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

ISBN: 9781510630314 ISBN: 9781510630321 (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 © 2019, 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/19/\$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.



**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 Conference Committee
- ix Introduction

#### SESSION 1 MMW & THZ RADIOMETRIC AND RADAR IMAGERS AND SENSORS I

- 11164 02 Variation in the electromagnetic signatures of the human skin with physical activity and hydration level of the skin (Invited Paper) [11164-1]
- 11164 03 Measurement results and error analysis from stand-off sensing of material characteristics by polarimetric MMW radiometry [11164-2]
- 11164 04 Real-time non-invasive detection of hidden objects in parcels and packages with sub-THz systems [11164-3]
- 11164 05 Role of the pulse duration at measurements of spectral signatures of substances in THz range of frequencies [11164-4]
- 11164 06 Applications of various sensors for detecting THz waves in adverse conditions [11164-5]

#### SESSION 2 ENABLING TECHNOLOGY

11164 08	Y-Ba-Cu-O superconducting hot electron heterodyne mixers: simulated THz performance for stand-off target detection [11164-7]
11164 09	Y-Ba-Cu-O semiconducting pyroelectric thermal sensors: design and test of near infrared amorphous thin film detectors and extension to antenna-coupled THz devices [11164-8]
11164 0A	Understanding the effect of THz/mm wave-plasma interaction on the brightness of glow discharge detectors [11164-9]
11164 OB	Prospects of designing gold-nanoparticles-based soft terahertz radiation sources and terahertz-to-infrared converters for concealed object detection technology [11164-10]

#### SESSION 3 MMW & THZ RADIOMETRIC AND RADAR IMAGERS AND SENSORS II

11164 0D Full polarimetric radar for concealed weapons detection: experimental determination and simulation of the Huynen target parameters for the human torso [11164-16]

11164 OE	Multiple objects detection and tracking in passive scanning millimeter-wave imaging systems [11164-12]
11164 0G	Step-index sapphire fiber and its application in a terahertz near-field microscopy [11164-14]
	POSTER SESSION
11164 OH	FDTD-modelling of terahertz solid immersion microscopy (Best Student Paper Award) [11164-15]
11164 Ol	Development of the integration variable selection method in numerical simulation of electromagnetic wave propagation in the time domain mode [11164-17]