

PROCEEDINGS OF SPIE

# ***Terahertz Emitters, Receivers, and Applications XI***

**Manijeh Razeghi**  
**Alexei N. Baranov**  
*Editors*

**24 August – 4 September 2020**  
**Online Only, United States**

*Sponsored and Published by*  
SPIE

**Volume 11499**

Proceedings of SPIE 0277-786X, V. 11499

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

Terahertz Emitters, Receivers, and Applications XI, edited by Manijeh Razeghi,  
Alexei N. Baranov, Proc. of SPIE Vol. 11499, 1149901 · © 2020 SPIE  
CCC code: 0277-786X/20/\$21 · doi: 10.1117/12.2581661

Proc. of SPIE Vol. 11499 1149901-1

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 *Terahertz Emitters, Receivers, and Applications XI*, edited by Manijeh Razeghi, Alexei N. Baranov, Proceedings of SPIE Vol. 11499 (SPIE, Bellingham, WA, 2020) Seven-digit Article CID Number.

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

ISBN: 9781510638044  
ISBN: 9781510638051 (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 © 2020, 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](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 0277-786X/20/\$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](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

---

## SOURCES OF THZ RADIATION I

---

- 11499 02 **Terahertz-wave beam control by photonics technology (Invited Paper)** [11499-1]
- 11499 04 **Leading-edge terahertz-wave parametric sources and their applications (Invited Paper)** [11499-3]
- 11499 05 **Quantum dot photoconductive antenna-based compact setups for terahertz spectroscopy and imaging (Invited Paper)** [11499-4]

---

## SOURCES OF THZ RADIATION II

---

- 11499 09 **Electrically-pumped THz emitters based on plasma waves excitation in III-nitride structures (Invited Paper)** [11499-8]

---

## THZ OPTICS/NEAR FIELD SPECTROSCOPY

---

- 11499 0A **Near-field probing of strong light-matter coupling in single IR antennae (Invited Paper)** [11499-9]
- 11499 0C **Terahertz diffractive optics: different way of thinking (Invited Paper)** [11499-11]

---

## FUNDAMENTALS OF GENERATION, DETECTION, AND PROPAGATION OF THZ WAVES

---

- 11499 0I **On the features of the interference of a set of broadband uniformly topologically charged beams** [11499-17]

---

## THZ SPECTROSCOPY II

---

- 11499 0O **Investigating hydration dynamics and protein collective motions by high-precision dielectric spectroscopy** [11499-23]

---

## NOVEL CONCEPTS AND MATERIALS FOR THZ TECHNOLOGY

---

- 11499 0U **Upconversion of millimeter waves to visible waves: inexpensive focal plane array MMW imaging and ultra-fast MMW wireless communication** [11499-29]

## THZ DETECTION AND IMAGING

---

11499 0Y    **Assessment of cameras for continuous wave sub-terahertz imaging** [11499-33]

## POSTER SESSION

---

11499 14    **Helicity-sensitive detection of terahertz radiation enhanced by plasmons** [11499-39]

11499 15    **Novel promising terahertz optical material based on nanoporous SiO<sub>2</sub>** [11499-40]