Terahertz Emitters, Receivers, and Applications X

Manijeh Razeghi Alexei N. Baranov Miriam S. Vitiello Editors

11–13 August 2019 San Diego, California, United States

Sponsored and Published by SPIE

Volume 11124

Proceedings of SPIE 0277-786X, V. 11124

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 Terahertz Emitters, Receivers, and Applications X, edited by Manijeh Razeghi, Alexei N. Baranov, Miriam S. Vitiello, Proceedings of SPIE Vol. 11124 (SPIE, Bellingham, WA, 2019) Seven-digit Article CID Number.

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

ISBN: 9781510629417 ISBN: 9781510629424 (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

- v Authors
- vii Conference Committee

THZ QUANTUM CASCADE LASERS

- 11124 04 Aperiodic photonic architectures for high-power distributed feedback THz quantum cascade lasers (Invited Paper) [11124-2]
- 11124 06 Graphene-based van der Waals heterostructures towards a new type of terahertz quantum-cascade laser (Invited Paper) [11124-4]

NOVEL CONCEPTS AND MATERIALS FOR THZ TECHNOLOGY I

- 11124 07 Room temperature continuous wave THz frequency comb based on quantum cascade lasers (Keynote Paper) [11124-5]
- 11124 09 Spectral properties of incoherent terahertz torch based on parabolic Ga(As,Bi)/AlGaAs quantum wells [11124-7]

SOURCES OF THZ RADIATION

- 11124 0B Vortex terahertz wave generation in air by femtosecond optical vortex pulses [11124-9]
- 11124 0D Upscaling the output power of a photo-mixing THz source driven by a dual-frequency laser operating on two transverse modes (Invited Paper) [11124-11]

FUNDAMENTALS OF GENERATION, DETECTION, AND PROPAGATION OF THZ WAVES

11124 0G Towards realisation of an efficient continuous wave terahertz source using quantum dot devices [11124-15]

THZ SPECTROSCOPY

- 11124 0N Terahertz frequency metrology (Invited Paper) [11124-22]
- 11124 00 The THz sum-frequency counterparts of stimulated Raman scattering (Invited Paper) [11124-23]

	NOVEL CONCEPTS AND MATERIALS FOR THZ TECHNOLOGY II
11124 OP	Chip-scale terahertz systems (Invited Paper) [11124-24]
11124 OQ	Broadband terahertz gas spectroscopy through multimode self-mixing in a quantum cascade laser (Invited Paper) [11124-25]
11124 OR	Pb _{1-x} Sn _x Se: a new tunable topological platform with terahertz band gap (Invited Paper) [11124-26]
11124 OS	Terahertz waveguide signal processing: passive and active devices (Invited Paper) [11124-27]
	IMAGING
11124 OU	Terahertz-wave radars based on resonant-tunneling-diode oscillators (Invited Paper) [11124-30]
11124 OW	Terahertz spatial light modulator with more than 1 THz working range (Invited Paper) [11124-32]
	THZ DETECTORS
11124 OX	Fibonacci subterahertz imaging: features and applications [11124-33]
11124 10	Terahertz detectors based on all-dielectric photoconductive metasurfaces (Invited Paper) [11124-36]
	POSTER SESSION
11124 11	Fourier imaging with CW terahertz waves [11124-29]
11124 12	External electric field control of terahertz radiation from laser-induced air plasma [11124-37]
11124 15	Large field-of-view continuous-wave terahertz reflective off-axis digital holography [11124-41]
11124 16	A two-phase flow meter targeting high GVF [11124-42]