PROCEEDINGS OF SPIE

Image Sensing Technologies: Materials, Devices, Systems, and Applications X

Nibir K. Dhar Achyut K. Dutta Sachidananda R. Babu Editors

1–3 May 2023 Orlando, Florida, United States

Sponsored and Published by SPIE

Volume 12514

Proceedings of SPIE 0277-786X, V. 12514

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

Image Sensing Technologies: Materials, Devices, Systems, and Applications X, edited by Nibir K. Dhar, Achyut K. Dutta, Sachidananda R. Babu, Proc. of SPIE Vol. 12514, 1251401 © 2023 SPIE · 0277-786X · doi: 10.1117/12.2690588

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 *Image Sensing Technologies: Materials, Devices, Systems, and Applications X*, edited by Nibir K. Dhar, Achyut K. Dutta, Sachidananda R. Babu, Proc. of SPIE 12514, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

ISSN: 0277-786X

ISSN: 1996-756X (electronic)

ISBN: 9781510661424

ISBN: 9781510661431 (electronic)

Published by

SPIE

P.O. Box 10, Bellingham, Washington 98227-0010 USA Telephone +1 360 676 3290 (Pacific Time)

SPIE.org

Copyright © 2023 Society of Photo-Optical Instrumentation Engineers (SPIE).

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 fees. To obtain permission to use and share articles in this volume, visit Copyright Clearance Center 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.

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: A unique citation identifier (CID) number is assigned to each article in the Proceedings of SPIE 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

Conference Committee METASTRUCTURES AND METASURFACES FOR IMAGING APPLICATIONS I 12514 02 High efficiency metastructure-based emitter and photodetector for imaging (Invited Paper) [12514-2] METASTRUCTURES AND METASURFACES FOR IMAGING APPLICATIONS III 12514 03 Silicon meta-APD integrated with InGaAsP meta-emitter for near-infrared (NIR) for active imaging and LIDAR (Invited Paper) [12514-9] ADVANCED PHOTODETECTORS AND IMAGING DEVICES I 12514 04 Dual and multi-spectral band SLS infrared camera systems (Keynote Paper) [12514-10] 12514 05 Quantum modeling of next generation photon detectors (Invited Paper) [12514-11] ADVANCED PHOTODETECTORS AND IMAGING DEVICES II 12514 06 Optical crosstalk and ancillary measurements of free space coupled: InGaAs quad photoreceivers exposed to protons and alpha particles (Invited Paper) [12514-13] 12514 07 Polarization de-multiplexing metasurface-based polarimetric imaging with time of flight multi-pixel imager [12514-15] **ADVANCED IMAGING DEVICES AND APPLICATIONS** 1251409 Event-based sensing for the detection of modulated signals in degraded visual environments [12514-21] 12514 0A Diamond plasmonic terahertz detectors [12514-22]

POSTER SESSION

12514 OB	Scalability of DFT-calculated IR spectra for estimating dielectric functions [12514-26]
12514 0C	Analytical model of diffuse reflectance for NIR-SWIR absorbing-dye formulations using reduced absorbance functions [12514-27]
12514 OE	Efficient infrared super-resolution [12514-33]
12514 OF	Advanced nanostructured antireflection coatings for high performances IR detector and imaging applications [12514-35]
12514 0G	III-N material based deep UV APDs for emergent defense, space, and commercial imaging and spectroscopy applications [12514-38]
12514 0H	A review of different multispectral indices for monitoring plant health in mid-mountain sites [12514-39]
12514 OJ	3D polarization imaging by use of digital holography and transport of intensity [12514-41]
12514 OK	High-strength, vibration-dampening, silicone adhesive to enable optical and sensor assembly [12514-42]
	DIGITAL POSTER SESSION
12514 OL	Space monitoring to control the dynamics of changes in the resource potential of the tourist business under conditions of increased risk of emergencies [12514-36]

iv

Conference Committee

Symposium Chairs

Tien Pham, The MITRE Corporation (United States) **Douglas R. Droege**, L3Harris Technologies, Inc. (United States)

Symposium Co-chairs

Augustus W. Fountain III, University of South Carolina (United States) **Teresa L. Pace**, L3Harris Technologies, Inc. (United States)

Program Track Chair

Mark Itzler, Argo AI, LLC (United States)

Conference Chairs

Nibir K. Dhar, Virginia Commonwealth University (United States) **Achyut K. Dutta**, Banpil Photonics, Inc. (United States) Sachidananda R. Babu, NASA Earth Science Technology Office (United States)

Conference Program Committee

Homayoon Ansari, Jet Propulsion Laboratory (United States) **Houtong Chen**, Los Alamos National Laboratory (United States)

Kwong-Kit Choi, Banpil Photonics, Inc. (United States)

Arvind I. D'Souza, Leonardo DRS (United States)

Samiran Ganguli, Virginia Commonwealth University (United States)

Michael D. Gerhold, U.S. Army Research Office (United States)

Randy Jacobs, U.S. Army CCDC C5ISR Center Night Vision

and Electronic Sensors Directorate (United States)

Marvin Jaime-Vasquez, U.S. Army CCDC C5ISR Center Night Vision and Electronic Sensors Directorate (United States)

Margaret Kim, The University of Alabama (United States)

Sanjay Krishna, The Ohio State University (United States)

Rihito Kuroda, Tohoku University (Japan)

Hidenori Mimura, Shizuoka University (Japan)

Willie Padilla, Duke University (United States)

Vijay Parameshwaran, U.S. Army Research Laboratory (United States)

Mukti M. Rana, Delaware State University (United States)

Siva Sivananthan, EPIR Technologies, Inc. (United States) and Sivananthan Laboratories (United States)
Ashok K. Sood, Magnolia Optical Technologies, Inc. (United States)
Priyalal S. Wijewarnasuriya, Teledyne Imaging Sensors (United States)
K. Kay Son, HRL Laboratories, LLC (United States)