PROCEEDINGS OF SPIE

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

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

22–24 April 2024 National Harbor, Maryland, United States

Sponsored and Published by SPIE

Volume 13030

Proceedings of SPIE 0277-786X, V. 13030

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

Image Sensing Technologies: Materials, Devices, Systems, and Applications XI, edited by Nibir K. Dhar, Achyut K. Dutta, Sachidananda R. Babu, Proc. of SPIE Vol. 13030, 1303001 · © 2024 SPIE · 0277-786X · doi: 10.1117/12.3037008

Proc. of SPIE Vol. 13030 1303001-1

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 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 XI, edited by Nibir K. Dhar, Achyut K. Dutta, Sachidananda R. Babu, Proc. of SPIE 13030, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

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

ISBN: 9781510673786 ISBN: 9781510673793 (electronic)

Published by **SPIE** P.O. Box 10, Bellingham, Washington 98227-0010 USA Telephone +1 360 676 3290 (Pacific Time) SPIE.org Copyright © 2024 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

v Conference Committee

ADVANCED PHOTODETECTORS AND IMAGE SENSORS I

- 13030 02 Accelerating discovery of tunable optical materials (ATOM) (Keynote Paper) [13030-1]
- 13030 03 Applications of T2SL barrier infrared detectors in Earth observational instruments (Invited Paper) [13030-2]

ADVANCED PHOTODETECTORS AND IMAGE SENSORS II

13030 04 Visible to SWIR eAPD performance (Invited Paper) [13030-7]

ADVANCED INTEGRATION AND IMAGING TECHNOLOGIES II

- 13030 05 Micro-compound parabolic concentrator arrays as alternatives to microlens arrays [13030-11]
- 13030 06 **Recent progress in quantum imaging at INRIM (Invited Paper)** [13030-12]

METASURFACE AND METASTRUCTURE FOR IMAGING II

13030 07 Metalens-enabled wide field-of-view imaging and sensing (Invited Paper) [13030-14]

METASURFACE AND METASTRUCTURE FOR IMAGING III

- 13030 08 In-scene material detection for real-time autonomous hyperspectral reflectance correction [13030-21]
- 13030 09 Characterizing metasurfaces for polarization demultiplexing: an imaging reconstruction using Stokes parameters [13030-22]

DARPA OPTIM PROGRAM

- 13030 0AParametric frequency comb generator based AIScN MEMS IR detector for low-power and
high-performance applications (Invited Paper) [13030-27]
- 13030 0B Sensitive infrared detection via optomechanical spring sensing (Invited Paper) [13030-30]

POSTER SESSION

13030 OC	Modeling optimized reduced spectra of diffuse reflectance for NIR-SWIR absorbing-dye formulations [13030-32]
13030 OD	CubeSat constellation study for Earth observation mission over Sharjah city, United Arab Emirates [13030-33]
13030 OE	A hyperspectral thermal imager based on a low order scanning Fabry-Pérot interferometer [13030-34]
13030 OF	VTR: an optimized vision transformer for SAR ATR acceleration on FPGA [13030-37]
13030 0G	First-principles study of the electronic properties of strained $Hg_{1-x}Cd_xTe$ alloys [13030-39]
13030 OH	Comparison of nano holes and nano pillars moth eye structures for mid-wave infrared [13030-40]
13030 01	Object detection through obscurants using partially coherent fields generated by perfect optical vortex beams [13030-41]
13030 OJ	Performance enhancement of a triple band SWIR-MWIR-LWIR photodetector [13030-43]
13030 OK	A systematic approach to develop high-performance colloidal quantum dot infrared photodetectors [13030-52]
13030 OL	Utilizing Sharjah-Sat-1 optical camera payload for remote sensing applications [13030-42]

Conference Committee

Symposium Chairs

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

Symposium Co-chairs

Ann Marie Raynal, Sandia National Laboratories (United States) Ravi Ravichandran, BAE Systems (United States)

Program Track Chair

Nibir Dhar, Virginia Commonwealth University (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

Houtong Chen, Los Alamos National Laboratory (United States) Arvind I. D'Souza, Leonardo DRS (United States) Samiran Ganauly, Virainia Commonwealth University (United States) Michael D. Gerhold, U.S. Army Research Office (United States) Randy Jacobs, U.S. Army CCDC C5ISR Center Night Vision & Electronic Sensors Directorate (United States) Marvin Jaime-Vasquez, U.S. Army CCDC C5ISR Center Night Vision & 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 Labs. (United States) K. Kay Son, HRL Labs., LLC (United States) Ashok K. Sood, Magnolia Optical Technologies, Inc. (United States) Priyalal S. Wijewarnasuriya, Teledyne Imaging Sensors (United States)