

PROCEEDINGS OF SPIE

***Image Sensing Technologies:
Materials, Devices, Systems, and
Applications VII***

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

**27 April – 8 May 2020
Online Only, United States**

*Sponsored and Published by
SPIE*

Volume 11388

Proceedings of SPIE 0277-786X, V. 11388

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 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 *Image Sensing Technologies: Materials, Devices, Systems, and Applications VII*, edited by Nibir K. Dhar, Achyut K. Dutta, Sachidananda R. Babu, Proceedings of SPIE Vol. 11388 (SPIE, Bellingham, WA, 2020) Seven-digit Article CID Number.

ISSN: 0277-786X

ISSN: 1996-756X (electronic)

ISBN: 9781510635531

ISBN: 9781510635548 (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 © 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. 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

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

ADVANCED PHOTODETECTORS AND FOCAL PLANE ARRAY I

11388 04 ROIC for 3 μm pitch detectors in portable applications [11388-4]

ADVANCED PHOTODETECTORS AND FOCAL PLANE ARRAY III

11388 08 Space flight of 2.2 micron wavelength extended InGaAs optical receivers to the International Space Station [11388-9]

PHOTONICS INTEGRATION IN IMAGING

11388 0H Integrated photonics for hyperspectral sensing (Invited Paper) [11388-19]

COMPUTING IN IMAGING

11388 0L Sensing the insensible using optical schemes: converting the maze problem into a quantum search problem (Invited Paper) [11388-25]

11388 0M Thermal imaging for rapid noninvasive on-site insulation diagnostics [11388-27]

11388 0N Design and testing of cryogenic infrared relay optics [11388-28]

POSTER SESSION

11388 0P Excess noise factor of front and back-illuminated silicon avalanche photodiode [11388-29]

11388 0T Vortex Fourier encoding for small-brain classification of MNIST digits with no hidden layers [11388-33]

11388 0U IR absorption spectra for isolated molecules of nitrosamines using density functional theory [11388-34]

11388 0W Investigation of the Christiansen effect in indium tin oxide bulk materials [11388-36]