PROCEEDINGS OF SPIE

AOPC 2021: Infrared Device and Infrared Technology

HaiMei Gong
Zelin Shi
Jin Lu
Editors

20–22 June 2021
Beijing, China

Organized by
University of Electronic Science and Technology of China (China)
Science and Technology on Low-light-level Night Vision Laboratory (China)
Science and Technology on Electro-Optical Information Security Control (China)
Nano-Optoelectronics Laboratory, Department of Electronic Engineering, Tsinghua University (China)

Sponsored by
Chinese Society for Optical Engineering (China)

Published by
SPIE

Volume 12061

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 *AOPC 2021: Infrared Device and Infrared Technology*, edited by HaiMei Gong, Zelin Shi, Jin Lu, Proc. of SPIE 12061, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

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

ISBN: 9781510649972
ISBN: 9781510649989 (electronic)

Published by
SPIE
P.O. Box 10, Bellingham, Washington 98227-0010 USA
Telephone +1 360 676 3290 (Pacific Time)
SPIE.org
Copyright © 2021 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.

SPIE. DIGITAL LIBRARY
SPIEDigitalLibrary.org

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

INFRARED DEVICE AND INFRARED TECHNOLOGY

12061 02 **High-quality reconstruction in non-line-of-sight imaging via transient multiplied photon count data** [12061-1]

12061 03 **A low-cost mid-infrared polarizer with double-sided silica anti-reflection films fabricated using nanoimprint** [12061-2]

12061 04 **Reconfigurable high-order radio frequency filters based on a wide-bandwidth optical frequency comb** [12061-3]

12061 05 **InAsSb/AlAsSb nBn HOT focal plane array** [12061-6]

12061 06 **Design of infrared small-target adaptive detection system based on DSP and FPGA** [12061-11]

12061 07 **High-speed fringe projection profilometry based on convolutional neural network** [12061-12]

12061 08 **Research on the ranging method of point target by monocular vision based on constraints on trajectory and line of sight** [12061-13]

12061 09 **Binocular stereo vision technology based on human visual characteristics** [12061-14]

12061 0A **Exploration and application of convolutional neural network to improve the quality of DAS voice print machine recognition and acoustic reduction** [12061-15]

12061 0B **Pose estimation of non-cooperative target based on depth image** [12061-16]

12061 0C **Adjustable electromagnetically induced transparency based on terahertz metamaterial embedded with vanadium dioxide** [12061-17]

12061 0D **Estimation method of infrared detection range for reentry target based on signal-to-clutter ratio** [12061-18]

12061 0E **A real-time local path planning method in complex scenes** [12061-19]

12061 0F **Modelling effects of GaN HEMTs terahertz detectors with spiral antennas** [12061-20]

12061 0G **Research on nonuniformity correction based on deep learning** [12061-21]

12061 0H **VHF coverage analysis for quasi-equatorial Earth satellites** [12061-22]

12061 0I **Design of terahertz IMPATT device** [12061-23]

12061 0J **The THz imager instrument for ice cloud remote sensing** [12061-24]

12061 0K **Method for calibrating heat flow meter for small heat flow** [12061-26]

12061 0L **Ultra-thin terahertz devices based on Pancharatnam-Berry phase** [12061-27]

12061 0M **FOV expanded upconversion imaging based on tight focusing system** [12061-28]

12061 0N **Switchable narrowband THz metasurface filter based on vanadium dioxide** [12061-29]

12061 0O **Research on optical fiber compact terahertz time-domain spectroscopy system and cluster analysis of hyperspectral images** [12061-32]

12061 0P **Mismatches removal in unmanned aerial vehicle image registration using density based method** [12061-33]

12061 0Q **Design of fast Fourier transform spectrometer in THz atmospheric limb sounder (TALIS) system** [12061-35]

12061 0R **3D small-scale object recognition network in cluttered point cloud scenes** [12061-40]

12061 0S **Infrared thermal imaging high-precision temperature measurement technology** [12061-42]

12061 0T **Better depth images create better motion recognition** [12061-43]

12061 0U **3D topological Dirac semimetal $(Zn_xCd_{1-x})_3As_2/Sb_2Se_3$ film heterojunction for high performance visible to near-infrared photo detection** [12061-44]

12061 0V **Prototype for infrared detector front end electronics based on COTS devices under cryogenic temperature** [12061-47]

12061 0W **Real-time infrared small target search and tracking algorithm based on adaptive track correlation** [12061-48]

12061 0X **Design of an infrared target simulator for military testing** [12061-56]

12061 0Y **Infrared unmanned aerial vehicle detection based on generative adversarial network data augmentation** [12061-57]

12061 0Z **A GAN-based visible and infrared image fusion algorithm** [12061-58]

12061 10 **Inversion of input signal energy using FWHM of output waveform** [12061-64]

12061 11 **Focused micro-lens array design and performance testing** [12061-67]

12061 12 **Analysis of the influence of outer plate inclination on infrared and radar detection of ships at sea** [12061-68]

12061 13 **Infrared image detail enhancement based on guided filtering with APHE** [12061-69]

12061 14 **Angle measurement method based on axicon lens** [12061-70]

12061 15 **Non-uniformity correction for infrared cameras with variable integration time based on two-point correction** [12061-71]

12061 16 **Calibration and application of radiometer for low-temperature infrared radiation source** [12061-72]

12061 17 **Design and experimental study for lens working at both room and low temperature** [12061-73]

12061 18 **An adaptive fringe projection method for measuring three-dimensional profile of surface with high reflectivity using sub-pixel coordinate mapping** [12061-74]

12061 19 **A calculation approach for shock layer radiation and transmittance towards hypersonic infrared homing vehicle** [12061-76]

12061 1A **Multi-wavelength QCL laser system for on-line detection of multi-component gases** [12061-77]

12061 1B **Terahertz characteristics of amino acids based on microfluidic technology** [12061-78]

12061 1C **Design of dual-channel projection collimator for dynamic infrared scene projector** [12061-79]

12061 1D **Analysis of the internal stray radiation in infrared imaging system based on ambient temperature** [12061-81]

12061 1E **A dual-polarization mode terahertz modulator based on metamaterial and HEMT structures** [12061-82]

12061 1F **Terahertz spectra of sodium carboxymethyl cellulose and guar gum** [12061-84]

12061 1G **Wavelength modulation spectrometer using interband cascade laser for exhaled breath carbon monoxide measurement** [12061-85]

12061 1H **Banknotes anti-counterfeiting system based on THz-TDS confocal imaging** [12061-89]

12061 1I **Recent progress in dark current suppression and efficiency enhancement methods for antimonide superlattice detectors** [12061-92]

12061 1J **Spectral emissivity measurement based on radiation at multiple temperatures** [12061-93]

12061 1K **Innovative thermo-mechanical design for large format cryogenic infrared focal plane assembly** [12061-94]

12061 1L **Sensitive parameters affecting dark current characteristics of SCD** [12061-95]

12061 1M **Design and research on calibration method of multi-channel self-calibration infrared radiation thermometer** [12061-96]

12061 1N **Space-based infrared staring sensor design method integrating detection and information processing technology** [12061-97]

12061 1O **Convergent trinocular stereo measurement model for non-cooperative target** [12061-99]

12061 1P **High frame frequency dynamic infrared scene projector based on dual-DMD** [12061-101]

12061 1Q **Infrared emission enhancement of a black coating doped with multiwall carbon nanotubes using multi-spraying method** [12061-102]

12061 1R **InGaAs short wavelength infrared detector based on carrier collection effect** [12061-106]

12061 1S **The method for predicting laser interference image in infrared detection system** [12061-107]

12061 1T **Study on closed loop frequency tracking circuit of resonant infrared sensor** [12061-108]

12061 1U **Weak infrared radiation intensity measurement based on extended Duffing oscillator** [12061-110]

12061 1V **A novel velocity measurement method based on contact image sensor** [12061-111]

12061 1W **An analytical method for cold optical lens design based on LightTools** [12061-112]