

PROCEEDINGS OF SPIE

Advanced Optics for Defense Applications: UV through LWIR III

Jay N. Vizgaitis
Bjørn F. Andresen
Peter L. Marasco
Jasbinder S. Sanghera
Miguel P. Snyder
Editors

15–16 April 2018
Orlando, Florida, United States

Sponsored and Published by
SPIE

Volume 10627

Proceedings of SPIE 0277-786X, V. 10627

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 *Advanced Optics for Defense Applications: UV through LWIR III*, edited by Jay N. Vizgaitis, Bjørn F. Andresen, Peter L. Marasco, Jasbinder S. Sanghera, Miguel P. Snyder, Proceedings of SPIE Vol. 10627 (SPIE, Bellingham, WA, 2018) Seven-digit Article CID Number.

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

ISBN: 9781510617650
ISBN: 9781510617667 (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 © 2018, 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 \$18.00 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/18/\$18.00.

Printed in the United States of America

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

v	<i>Authors</i>
vii	<i>Conference Committee</i>

SESSION 1 OPTICAL SYSTEM DESIGN I

10627 02	Refractive optically multiplexed LWIR imaging system (Invited Paper) [10627-1]
10627 03	Design study of a MWIR/LWIR multiple FOV lens [10627-2]
10627 04	The relation between uncooled arrays pixel size and optics in the long-wave infrared [10627-3]
10627 05	Additive manufacturing volume optimization for athermal optics [10627-4]

SESSION 2 OPTICAL SYSTEM DESIGN II

10627 07	Freeform based lateral-shift compact zoom system: theory and computer simulations [10627-6]
10627 08	An optical system design with duo-lateral effect detector and finding position of light sources with operational utilisation of this system [10627-7]
10627 09	Wide bandwidth, achromatic, planar silicon lenses for long-wave infrared imaging [10627-8]

SESSION 3 GRIN

10627 0A	Advances in infrared GRIN: a review of novel materials towards components and devices (Invited Paper) [10627-9]
10627 0B	SWaP advantage of replacing high performance glass achromatic doublet with a polymeric nanolayer GRIN achromatic singlet [10627-10]
10627 0C	Raman and CT scan mapping of chalcogenide glass diffusion generated gradient index profiles [10627-11]

SESSION 4 COATINGS, FILTERS, AND METASURFACES I

10627 0E	Up converting as a tool for laser protecting smart filters [10627-13]
----------	--

- 10627 OF **Characterization of glancing angle deposited (GLAD) optical coatings for UV applications** [10627-14]
- 10627 OG **Silicon oxynitride based scratch resistant anti-reflective coatings** [10627-15]
- 10627 OH **Long-duration CW laser testing of optical windows with random antireflective surface structures on both interfaces: preliminary results** [10627-29]

SESSION 5 COATINGS, FILTERS, AND METASURFACES II

- 10627 OI **Spectral performance and durability of dual-band infrared antireflection coatings on 3rd Gen lens substrates** [10627-16]
- 10627 OJ **Low auto-fluorescence broadband antireflection coatings for human genome sequencing optical platform** [10627-17]
- 10627 OL **Micro-structured optical coatings: periodic-array enhanced functionalities (Invited Paper)** [10627-19]

SESSION 6 MATERIALS AND MANUFACTURING I

- 10627 OM **Development in EFG sapphire at II-VI Optical Systems** [10627-20]
- 10627 OO **Optical and crystal growth studies of ZnO-Bi₂O₃-B₂O₃ glass** [10627-22]
- 10627 OP **Thermal conductivity of chalcogenide glasses measured by Raman spectroscopy** [10627-23]

SESSION 7 MATERIALS AND MANUFACTURING II

- 10627 OR **Chalcogenide molded freeform optics for QCL** [10627-25]
- 10627 OU **Infrared plasmon polaritons in high-mobility graphene** [10627-30]