

PROCEEDINGS OF SPIE

Laser Technology for Defense and Security XV

Mark Dubinskiy
Timothy C. Newell
Editors

17–18 April 2019
Baltimore, Maryland, United States

Sponsored and Published by
SPIE

Volume 10981

Proceedings of SPIE 0277-786X, V. 10981

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 *Laser Technology for Defense and Security XV*, edited by Mark Dubinskiy, Timothy C. Newell, Proceedings of SPIE Vol. 10981 (SPIE, Bellingham, WA, 2019) Seven-digit Article CID Number.

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

ISBN: 9781510626270
ISBN: 9781510626287 (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 © 2019, 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/19/\$18.00.

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**
SPIEDigitalLibrary.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>

MID-IR LASERS AND COMPONENTS

10981 08	Erbium-doped mid-infrared fiber lasers (Invited Paper) [10981-7]
----------	---

LASER MATERIALS II

10981 0H	Improved polymer cladding for eye safer fiber lasers [10981-16]
----------	--

SEMICONDUCTOR LASERS (PUMPS) AND DETECTORS

10981 0K	High power blue laser system for manufacturing and defense applications [10981-19]
10981 0M	Low noise, near-infrared APDs for laser wavefront monitoring [10981-21]

BEAM CONTROL AND LASER-MATTER INTERACTION

10981 0N	High peak power, short pulse duration Er:YAG lasers and applications [10981-22]
10981 0O	Modeling the effects of high-energy-laser beam quality using scalar Schell-model sources [10981-23]
10981 0S	Implications of 4D weather cubes for improved cloud free line of sight assessments of free space optical communications link performance [10981-27]