

# PROCEEDINGS OF SPIE

[SPIDigitalLibrary.org/conference-proceedings-of-spie](https://SPIDigitalLibrary.org/conference-proceedings-of-spie)

## Front Matter: Volume 10085

, "Front Matter: Volume 10085," Proc. SPIE 10085, Components and Packaging for Laser Systems III, 1008501 (20 March 2017); doi: 10.1117/12.2276037

**SPIE.**

Event: SPIE LASE, 2017, San Francisco, California, United States

PROCEEDINGS OF SPIE

# ***Components and Packaging for Laser Systems III***

**Alexei L. Glebov**  
**Paul O. Leisher**  
*Editors*

**31 January–2 February 2017**  
**San Francisco, California, United States**

*Sponsored and Published by*  
SPIE

**Volume 10085**

Proceedings of SPIE 0277-786X, V. 10085

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

Components and Packaging for Laser Systems III, edited by Alexei L. Glebov, Paul O. Leisher, Proc. of SPIE  
Vol. 10085, 1008501 · © 2017 SPIE · CCC code: 0277-786X/17/\$18 · doi: 10.1117/12.2276037

Proc. of SPIE Vol. 10085 1008501-1

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 [SPIDigitalLibrary.org](http://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 *Components and Packaging for Laser Systems III*, edited by Alexei L. Glebov, Paul O. Leisher, Proceedings of SPIE Vol. 10085 (SPIE, Bellingham, WA, 2017) Seven-digit Article CID Number.

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

ISBN: 9781510606111  
ISBN: 9781510606128 (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](http://SPIE.org)

Copyright © 2017, 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](http://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/17/\$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](http://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

vii *Authors*  
ix *Conference Committee*

<b>SESSION 1</b>	<b>LASER DIODE PACKAGING I: JOINT SESSION WITH CONFERENCES 10085 AND 10086</b>
10085 02	<b>Assessment of factors regulating the thermal lens profile and lateral brightness in high power diode lasers (Invited Paper) [10085-1]</b>
10085 04	<b>Complete indium-free CW 200W passively cooled high power diode laser array using double-side cooling technology [10085-3]</b>
<b>SESSION 2</b>	<b>LASER DIODE PACKAGING II</b>
10085 05	<b>Narrow-line diode laser packaging and integration in the NIR and MIR spectral range (Invited Paper) [10085-4]</b>
10085 06	<b>Compact diode laser module at 1116 nm with an integrated optical isolation and a PM-SMF output [10085-5]</b>
10085 08	<b>Artificial neural network assisted laser chip collimator assembly and impact on multi-emitter module beam parameter product [10085-7]</b>
<b>SESSION 3</b>	<b>LASER DIODE PACKAGING III</b>
10085 09	<b>Reliable QCW diode laser arrays for operation with high duty cycles [10085-8]</b>
10085 0A	<b>Thermal characteristics of compact conduction-cooled high power diode laser array packages [10085-9]</b>
10085 0B	<b>Collimation optics for high power blue laser diodes [10085-10]</b>
10085 0C	<b>Optoelectronic packaging of single photon avalanche diodes [10085-2]</b>
10085 0D	<b>The smile effect reduction of diode laser bar by bare bar curve control [10085-12]</b>
<b>SESSION 4</b>	<b>LASER DIODE PACKAGING IV</b>
10085 0F	<b>Narrow linewidth diode laser modules for quantum optical sensor applications in the field and in space (Invited Paper) [10085-14]</b>
10085 0G	<b>Optical components for tailoring beam properties of multi-kW diode lasers [10085-15]</b>
10085 0I	<b>Optimization of microchannel cooler of high power diode laser array package [10085-17]</b>

---

**SESSION 5 COMPONENTS AND PACKAGING FOR HIGH POWER/ENERGY LASERS I**

---

- 10085 OJ **Application specific beam profiles: new surface and thin-film refinement processes using beam shaping technologies (Invited Paper)** [10085-18]
- 10085 OK **Optics for multimode lasers with elongated depth of field** [10085-19]

---

**SESSION 6 COMPONENTS AND PACKAGING FOR HIGH POWER/ENERGY LASERS II**

---

- 10085 OM **1.5kW linear polarized on PM fiber and 2kW on non-PM fiber narrow linewidth CW diffraction-limited fiber amplifier** [10085-40]
- 10085 ON **SRS modeling in high power CW fiber lasers for component optimization** [10085-22]
- 10085 OP **Complex holographic elements in photo-thermo-refractive glass for the visible spectral region** [10085-24]
- 10085 OQ **High power laser source for atom cooling based on reliable telecoms technology with all fibre frequency stabilisation** [10085-25]
- 10085 OR **The SMAT fiber laser for industrial applications** [10085-26]

---

**SESSION 7 COMPONENTS AND PACKAGING FOR PULSED HIGH POWER/ENERGY LASERS**

---

- 10085 OS **Environmentally stable seed source for high power ultrafast laser (Invited Paper)** [10085-27]

---

**SESSION 8 COMPONENTS AND PACKAGING FOR LASER BEAM ENGINEERING**

---

- 10085 OW **Design and evaluation of a diffractive beam splitter for dual-wavelength laser processing** [10085-31]
- 10085 OY **Active alignment of DOE based structured light application in consumer electronics** [10085-33]
- 10085 OZ **Simultaneous position and angle control for outgoing laser beam design using two galvanometer mirrors** [10085-34]
- 10085 10 **Beam shaping with numerically optimized photonic crystals** [10085-35]

---

**POSTER SESSION**

---

- 10085 12 **The implementation of the combined high-speed laser scanning for SRS-lidar** [10085-37]
- 10085 13 **Simple, compact, and low cost CO<sub>2</sub> laser driven by fast high voltage solid state switch for industrial application** [10085-38]
- 10085 14 **Cladding pump light stripper study for high power fiber laser applications** [10085-39]

# Authors

Numbers in the index correspond to the last two digits of the seven-digit citation identifier (CID) article numbering system used in Proceedings of SPIE. The first five digits reflect the volume number. Base 36 numbering is employed for the last two digits and indicates the order of articles within the volume. Numbers start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B...0Z, followed by 10-1Z, 20-2Z, etc.

Amako, J., 0W  
Ashok, Nandam, 14  
Assmann, Christian, 05  
Bawamia, A., 0F  
Bayer, Andreas, 0G  
Biesenbach, Jens, 09, 0G  
Bodem, Christian, 0G  
Bordenyuk, Andrey, 0S  
Braglia, Andrea, 08  
Brecher, C., 0Y  
Brochu, G., 0N  
Cheng, Jian, 0D  
Crump, P., 02  
De La Cruz, Joel, 0M  
Demmer, D., 0C  
Ding, Jianwu, 0R  
Dionne, R., 0N  
Divliansky, Ivan, 0P  
Dürsch, Sascha, 0G  
Elizarov, Valentin, 12  
Farries, Mark, 0Q  
Faßbender, Wilhelm, 09, 0G  
Faucher, M., 0N  
Forrer, H., 0B  
Forrer, M., 0B  
Gadonas, Roldas, 10  
Gailevičius, Darius, 10  
Gapontsev, Valentin, 0M, 0S  
Giudice, A., 0C  
Glebov, Leonid B., 0P  
Grishkanich, Aleksandr, 12  
Han, Seungryong, 14  
Haslett, T., 0C  
Hauschild, Dirk, 0J  
Hayakawa, Tomohiko, 0Z  
Hettler, N., 0Y  
Hofmann, Julian, 06  
Huber, M., 0B  
Hubrich, Ralf, 0G  
Iakovlev, Alexey, 12  
Ishikawa, Masatoshi, 0Z  
Jedzejczyk, Daniel, 06  
Jia, Guannan, 0D  
Jimenez, Alvaro, 05  
Kascheev, Sergey V., 12  
Kemke, R., 02  
Kindervater, Tobias, 0G  
Kissel, Heiko, 09  
Könning, Tobias, 09, 0G  
Köhler, Bernd, 0G  
Kompan, Fedor, 0P  
Krüger, M., 0F  
Kürbis, Ch., 0F  
Küster, Matthias, 0G  
Laskin, Alexander, 0K  
Laskin, Vadim, 0K  
Lee, Yeung Lak, 14  
Legg, Thomas, 0Q  
Liang, Xuejie, 04, 0I  
Liu, Hui, 04  
Liu, Jinghui, 0R  
Liu, Xingsheng, 04, 0A, 0I  
Liu, Yalong, 04  
Lotz, Jens, 09  
Luo, Xiaoying, 0D  
Mahnkopf, S., 0C  
Mak, Andrey, 12  
Milde, Tobias, 05  
Morin, M., 0N  
Moser, H., 0B  
Müller, T., 0Y  
Nakano, Hitoshi, 13  
Nie, Zhiqiang, 0I  
O'Gorman, James, 05  
Ostrun, Aleksei, 0K  
Paschke, Katrin, 06  
Patterson, Steve, 09  
Peckus, Martynas, 10  
Perrone, Guido, 08  
Peters, A., 0F  
Plappert, Nora, 0G  
Platonov, Nikolai, 0M  
Purlys, Vytautas, 10  
Rieprich, J., 02  
Rossi, Giammarco, 08  
Sacher, Joachim R., 05  
Sahm, Alexander, 06  
Samartsev, Igor, 0S  
Sauer, S., 0Y  
Schiemangk, M., 0F  
Shin, WooJin, 14  
Simmerle, G., 0C  
Smirnov, Leonid, 12  
Smirnov, Vadim, 0P  
Smol, R., 0F  
Stacke, Niklas, 05  
Staliunas, Kestutis, 10  
Tanaka, Miyu, 13

Tei, Masaya, 13  
Tomm, J., 02  
Tränkle, G., 0F  
Trépanier, F., 0N  
Uno, Kazuyuki, 13  
Villeneuve, A., 0N  
Wang, Jingwei, 04, 0A, 0I  
Wang, Zhiyong, 0D  
Wei, Xi, 0R  
Werner, Nils, 06  
Wicht, A., 0F  
Winterfeldt, M., 02  
Wolf, Paul, 0G  
Wu, Dihai, 04, 0I  
Wuest, P., 0B  
Xu, Jun, 0R  
Yagodkin, Roman, 0M  
Yao, Shun, 0D  
Yu, Dongshan, 04  
Yu, Hao, 08  
Yusim, Alexander, 0M  
Zah, Chung-en, 04  
Zhang, Pu, 0A, 0I  
Zhevlakov, Aleksandr, 12  
Zhu, Pengfei, 04  
Zhu, Qiwen, 0A  
Zontar, D., 0Y

# Conference Committee

## *Symposium Chairs*

**Reinhart Poprawe**, Fraunhofer-Institut für Lasertechnik (Germany)  
**Koji Sugioka**, RIKEN (Japan)

## *Symposium Co-chairs*

**Guido Hennig**, Daetwyler Graphics AG (Switzerland)  
**Yongfeng Lu**, University of Nebraska-Lincoln (United States)

## *Program Track Chairs*

**Kunihiko Washio**, Paradigm Laser Research Ltd. (Japan)  
**John Ballato**, Clemson University (United States)

## *Conference Chairs*

**Alexei L. Glebov**, OptiGrate Corporation (United States)  
**Paul O. Leisher**, Rose-Hulman Institute of Technology (United States)

## *Conference Program Committee*

**Igor Anisimov**, Air Force Research Laboratory (United States)  
**Gunnar Böttger**, Fraunhofer-Institut für Zuverlässigkeit und  
Mikrointegration (Germany)  
**Kristian J. Buchwald**, Ibsen Photonics A/S (Denmark)  
**Te-Yuan Chung**, National Central University (Taiwan, China)  
**Joseph L. Dallas**, Avo Photonics, Inc. (United States)  
**Allen M. Earman**, AOSense, Inc. (United States)  
**Martin Forrer**, FISBA AG (Switzerland)  
**Alexander V. Laskin**, AdlOptica Optical Systems GmbH (Germany)  
**Xingsheng Liu**, Xi'an Institute of Optics and Precision Mechanics  
(China)  
**Jens Meinschien**, LIMO Lissotschenko Mikrooptik GmbH (Germany)  
**Christian V. Poulsen**, NKT Photonics Inc. (United States)  
**Mark A. Stephen**, NASA Goddard Space Flight Center (United States)  
**Takunori Taira**, Institute for Molecular Science (Japan)  
**Torsten Vahrenkamp**, ficonTEC Service GmbH (Germany)  
**Alexander Yusim**, IPG Photonics Corporation (United States)  
**Chungen Zah**, Focuslight Technologies, Inc. (China)  
**Arnaud Zoubir**, ALPhANOV (France)



### *Session Chairs*

- 1 Laser Diode Packaging I: Joint Session with Conferences 10085 and 10086  
**Paul O. Leisher**, Rose-Hulman Institute of Technology (United States)  
**Robert Martinsen**, nLIGHT Corporation (United States)
- 2 Laser Diode Packaging II  
**Martin Forrer**, FISBA AG (Switzerland)
- 3 Laser Diode Packaging III  
**Chungen Zah**, Focuslight Technologies, Inc. (China)
- 4 Laser Diode Packaging IV  
**Joseph L. Dallas**, Avo Photonics, Inc. (United States)
- 5 Components and Packaging for High Power/Energy Lasers I  
**Christian V. Poulsen**, NKT Photonics Inc. (United States)
- 6 Components and Packaging for High Power/Energy Lasers II  
**Alexander V. Laskin**, AdlOptica Optical Systems GmbH (Germany)
- 7 Components and Packaging for Pulsed High Power/Energy Lasers  
**Alexander Yusim**, IPG Photonics Corporation (United States)
- 8 Components and Packaging for Laser Beam Engineering  
**Evan Robert Hale**, CREOL, University of Central Florida (United States)