PROCEEDINGS OF SPIE

XXIII International Symposium on High Power Laser Systems and Applications

Tomáš Mocek

Editor

13-16 June 2022 Prague, Czech Republic

Organized by
Institute of Physics of the Czech Academy of Sciences (Czech Republic)
C-IN (Czech Republic)

Sponsored by
Coherent (United States)
iXblue (France)
Korea Electro-Optics Co. (Korea, Republic of)
OptoSigma Europe (France)
STREICHER (Czech Republic)
Amplitude (France)
Dynamic Optics Srl (Italy)
EKSPLA (Lithuania)

Published by SPIE

Volume 12347

Proceedings of SPIE 0277-786X, V. 12347

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 XXIII International Symposium on High Power Laser Systems and Applications, edited by Tomáš Mocek, Proc. of SPIE 12347, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

ISSN: 0277-786X

ISSN: 1996-756X (electronic)

ISBN: 9781510657670

ISBN: 9781510657687 (electronic)

Published by

SPIE

P.O. Box 10, Bellingham, Washington 98227-0010 USA Telephone +1 360 676 3290 (Pacific Time)

SPIE.org

Copyright © 2022 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.



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

v Conference Committee

	ADVANCED GAS LASERS INCLUDING DPAL
12347 02	DPAL activities in Japan: update (Invited Paper) [12347-7]
12347 03	Advanced DPAL modeling (Invited Paper) [12347-8]
12347 04	Simulations of the exciplex pumped alkali laser using temperature-dependent energy pooling reactions [12347-3]
12347 05	Experimental results from a high performance Froth Singlet Oxygen Generator (FSOG) [12347-2]
12347 06	CO and CO ₂ laser beam guiding with silver halide polycrystalline fibers and hollow waveguides $[12347-11]$
12347 07	Chemical laser based on polyatomic chemical reaction dynamics [12347-4]
	LASER APPLICATIONS
12347 08	Overview and numerical analysis of 3D printing of steel (Invited Paper) [12347-6]
12347 08 12347 09	
	Overview and numerical analysis of 3D printing of steel (Invited Paper) [12347-6] High-brilliance and VIS wavelength laser: perspective for laser welding and laser metal fusion
	Overview and numerical analysis of 3D printing of steel (Invited Paper) [12347-6] High-brilliance and VIS wavelength laser: perspective for laser welding and laser metal fusion
	Overview and numerical analysis of 3D printing of steel (Invited Paper) [12347-6] High-brilliance and VIS wavelength laser: perspective for laser welding and laser metal fusion (Invited Paper) [12347-13]
12347 09	Overview and numerical analysis of 3D printing of steel (Invited Paper) [12347-6] High-brilliance and VIS wavelength laser: perspective for laser welding and laser metal fusion (Invited Paper) [12347-13] FIBER LASERS AND BEAM COMBINING Coherent beam combining of lasers: toward wavelength versatility and long-range operation

Conference Committee

Conference Chair

Tomáš Mocek, Institute of Physics of the Czech Academy of Sciences (Czech Republic)

Local Organizing Committee

Jarmila Kodymová, Institute of Physics of the Czech Academy of Sciences (Czech Republic)

Martin Smrž, Institute of Physics of the Czech Academy of Sciences (Czech Republic)

Libor Juha, Institute of Physics of the Czech Academy of Sciences (Czech Republic)

Program Committee

Michel L. Autric, Protisvalor Méditerranée SAS (France)

Boris D. Barmashenko, Ben-Gurion University of the Negev (Israel)

Willy L. Bohn, BohnLaser Consult (Germany)

Anatoly Sergey Boreysho, Laser Systems Ltd. (Russian Federation)

Pierre Bourdon, ONERA (France)

Paolo Di Lazzaro, ENEA (Italy)

Jarmila Kodymová, Institute of Physics of the Czech Academy of Sciences (Czech Republic)

Antonio Lapucci, Istituto Nazionale di Ottica (Italy)

Robert Walter, Consultant (United States)

David Carroll, CU Aerospace LLC (United States)

Hans Eichler, Technische Universität Berlin (Germany)

Masamori Endo, Tokai University (Japan)

Andrey Ionin, Lebedev Physical Institute Moscow (Russian Federation)

Koichi Kasuya, Insitute of Laser Technology (Japan)

Valery Losev, Institute of High Current Electronics (Russian Federation)

Timothy Madden, Air Force Research Laboratory (United States)

Kazuo Maeno, Katayanagi Institute (Japan)

Mohammad Mahdieh, University of Science and Technology (Iran)

Richard Mildren, Macquaire University (Australia)

Tomáš Mocek, Institute of Physics of the Czech Academy of Sciences (Czech Republic)

Bo Qi, Chengdu Institute of Optics and Electronics (China)

Zamik Rosenwaks, Ben Gurion University (Israel)

Feng-Ting Sang, Dalian Institute of Chemical Physics (China)

Dieter Schuöcker, Oberosterreichisches Laserzentrum (Austria)

Chun Tang, Institute of Applied Electronics (China)

Session Chairs

Advanced Gas Lasers Including DPAL Willy L. Bohn, BohnLaser Consult (Germany) Jarmila Kodymová, Institute of Physics of the Czech Academy of Sciences (Czech Republic)

2 Laser Beam Control

Martin Smrž, Institute of Physics of the Czech Academy of Sciences (Czech Republic)

3 Laser Applications

Willy L. Bohn, BohnLaser Consult (Germany)
Libor Juha, Institute of Physics of the Czech Academy of Sciences
(Czech Republic)

Fiber Lasers and Beam Combining
Pierre Bourdon, ONERA (France)

5 Ultra-high Intensity Lasers

Tomáš Mocek, Institute of Physics of the Czech Academy of Sciences (Czech Republic)

6 High-power solid-state lasers

Martin Smrž, Institute of Physics of the Czech Academy of Sciences (Czech Republic)

7 Space applications & novel concepts

Willy L. Bohn, BohnLaser Consult (Germany)

8 Laser-Plasma Interactions

Takunori Taira, RIKEN SPring-8 (Japan)

Tomáš Mocek, Institute of Physics of the Czech Academy of Sciences (Czech Republic)