## PROCEEDINGS OF SPIE

# Advanced Laser Processing and Manufacturing VI

Rongshi Xiao Minghui Hong Jianhua Yao Yuji Sano Editors

5–11 December 2022 ONLINE, China

Sponsored by SPIE COS—Chinese Optical Society

Cooperating Organizations

Tsinghua University (China) • Peking University (China) • University of Science and Technology of China (China) • Zhejiang University (China) • Tianjin University (China) • Beijing Institute of Technology (China) • Beijing University of Posts and Telecommunications (China) • Nankai University (China) • Changchun University of Science and Technology (China) University of Shanghai for Science and Technology (China) • Capital Normal University (China) • Huazhong University of Science and Technology (China) • Beijing Jiaotong University (China) • China Jiliang University (China) • Shanghai Institute of Optics and Fine Mechanics, CAS (China) • Changchun Institute of Optics, Fine Mechanics and Physics, CAS (China) Institute of Semiconductors, CAS (China) • Institute of Optics and Electronics, CAS (China) • Institute of Physics, CAS (China) Shanghai Institute of Technical Physics, CAS (China) • China Instrument and Control Society (China) • Optical Society of Japan (Japan) • Optical Society of Korea (Republic of Korea) • Australian and New Zealand Optical Society • Optics and Photonics Society of Singapore (Singapore) • European Optical Society

Supporting Organizations China Association for Science and Technology (CAST) (China) Department of Information of National Nature Science Foundation, China (NSFC) (China)

Published by SPIE

Volume 12312

Proceedings of SPIE 0277-786X, V. 12312

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 Advanced Laser Processing and Manufacturing VI, edited by Rongshi Xiao, Minghui Hong, Jianhua Yao, Yuji Sano, Proc. of SPIE 12312, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

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

ISBN: 9781510656901 ISBN: 9781510656918 (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 Symposium Committee
- ix Conference Committee

#### ULTRAFAST LASER PROCESSING/LASER MICRO AND NANO FABRICATION

- 12312 03 Ultrashort pulse laser drilling of the ceramic substrate [12312-2]
- 12312 06 Multiscale modeling of femtosecond laser processing quartz crystal [12312-5]
- 12312 08 Properties of femtosecond laser modified e-beam deposited SiO<sub>2</sub> films and their resistance to nanosecond ultraviolet lasers [12312-7]

#### LASER SOURCES AND OPTICAL COMPONENTS

- 12312 09 Intra-cavity mode control in a Nd:YAG laser by optimizing the single-mode power factor with a spatial light modulator [12312-8]
- 12312 OB Design of an adjustable working distance Bessel lens for femtosecond laser cutting [12312-10]
- 12312 0C Tight focusing properties of vector polarized partially coherent vortex beams [12312-11]
- 12312 0D The spherical-aberration-free 3D beam forming inside materials via the modified Ewald cap [12312-12]

#### LASER ADDITIVE MANUFACTURING AND 3D PROCESSING

- 12312 01 Oscillating laser-arc hybrid additive manufacturing of AZ31 magnesium alloy [12312-16]
- 12312 0K Research on laser selective intelligent processing based on coaxial spectral monitoring [12312-18]
- 12312 0N Burnout mechanism and control methods in laser soldering [12312-36]
- 12312 00 Method for determining the rational shape of the front surface of cutting inserts for computeraided manufacturing system of laser ablation [12312-24]
- 12312 OP System of machining using computer-aided design of three-tooth drills [12312-25]

12312 0Q Evaluation of surgical laser optical feedback on uneven surfaces using robotic manipulator [12312-35]

#### POSTER SESSION

12312 OS	Numerical research on Inconel718 laser additive repairing [12312-27]
12312 OV	Effect of secondary aberration induced by actual objective lens on 3D direct laser writing [12312-30]
12312 OX	Weld characteristics of narrow gap oscillating laser welding of dissimilar aluminum alloys with hot wire [12312-33]
12312 OY	Research on the formation mechanism of thermal crack for laser welding of IC 10 alloy [12312-34]
12312 OZ	Microstructure and mechanical properties of TiB <sub>2</sub> reinforced Al2319 matrix composites produced using laser-arc hybrid additive manufacturing [12312-37]
12312 10	Computer-aided design system based on spline interpolation of micromills for high-speed processing of products manufactured by laser ablation and grinding [12312-31]