

PROCEEDINGS OF SPIE

Advanced Laser Processing and Manufacturing II

**Rongshi Xiao
Minghui Hong
Jian Liu**
Editors

**11–13 October 2018
Beijing, 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) • Shanghai Institute of Optics and Fine Mechanics (China) • Changchun Institute of Optics and Fine Mechanics (China) • Institute of Semiconductors (China) • Institute of Optics and Electronics (China) • Institute of Physics (China) • Shanghai Institute of Technical Physics (China) • China Instrument and Control Society (China) • Optoelectronics Technology Committee, COS (China) • Optical Society of Japan (Japan) • Optical Society of Korea (Korea, Republic of) • The Australian Optical Society (Australia) • Optics and Photonics Society of Singapore (Singapore) • European Optical Society

Supporting Organizations
CAST—China Association for Science and Technology (China)
NSFC—National Nature Science Foundation (China)

Published by
SPIE

Volume 10813

Proceedings of SPIE 0277-786X, V. 10813

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 II*, edited by Rongshi Xiao, Minghui Hong, Jian Liu, Proceedings of SPIE Vol. 10813 (SPIE, Bellingham, WA, 2018) Seven-digit Article CID Number.

ISSN: 0277-786X

ISSN: 1996-756X (electronic)

ISBN: 9781510622241

ISBN: 9781510622258 (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

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>Symposium Committees</i>
xi	<i>Conference Committee</i>

LASER WELDING, CLADDING, AND ADDITIVE MANUFACTURING I

10813 04	Investigation on Inconel 718 repairing by using laser additive and subtractive hybrid manufacturing technology [10813-2]
----------	---

LASER MICRO-/NANOFABRICATION AND ULTRAFAST LASER PROCESSING

10813 0K	Laser direct writing of nanomaterials and device applications towards IoT technology (Invited Paper) [10813-19]
10813 0O	Research progress of laser trimming: a mini review [10813-25]

LASER SHOCK PEENING

10813 0Q	Fundamental mechanisms of laser shock processing of metals and ceramics (Invited Paper) [10813-27]
10813 0U	HILASE center: development of new-generation lasers for laser shock peening (Invited Paper) [10813-31]

LASER ADDITIVE MANUFACTURING I

10813 0V	Process study and characterization of properties of FerCrNiMnCo high-entropy alloys fabricated by laser-aided additive manufacturing (Invited Paper) [10813-32]
----------	--

LASER ADDITIVE MANUFACTURING II

10813 0Z	Microscopic simulation of the effect of process parameters by the Marangoni convection on the temperature field of Inconel 718 alloy using selective laser melting [10813-36]
----------	--

10813 10 **Numerical simulation in the laser energy absorption behavior of Ti6Al4V powder materials during SLM** [10813-37]

POSTER SESSION

10813 13 **A simple way to achieve superhydrophobic surfaces with tunable water adhesion by a nanosecond pulse laser** [10813-40]

10813 18 **Mechanism study of nanomaterial synthesis by pulsed laser ablation in liquid** [10813-46]

10813 1A **Microstructure and mechanical properties of the coatings in laser cladding and laser-induction hybrid cladding of full-scale rail** [10813-48]