PROCEEDINGS OF SPIE

Frontiers in Ultrafast Optics: Biomedical, Scientific, and Industrial Applications XXI

Peter R. Herman Michel Meunier Roberto Osellame Editors

6–11 March 2021 Online Only, United States

Sponsored by Amplitude (France) TRUMPF Inc. (United States)

Published by SPIE

Volume 11676

Proceedings of SPIE 0277-786X, V. 11676

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 Frontiers in Ultrafast Optics: Biomedical, Scientific, and Industrial Applications XXI, edited by Peter R. Herman, Michel Meunier, Roberto Osellame, Proc. of SPIE 11676, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

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

ISBN: 9781510641877 ISBN: 9781510641884 (electronic)

Published by **SPIE** P.O. Box 10, Bellingham, Washington 98227-0010 USA Telephone +1 360 676 3290 (Pacific Time) SPIE.org Copyright © 2021 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

INDUSTRIAL APPLICATIONS FOR ULTRAFAST LASER SYSTEMS

11676 OG Efficiency of ultrafast laser ablation in burst mode as a function of intra-burst repetition rate and pulse fluence [11676-12]

NOVEL ULTRAFAST LASER SOURCES

11676 0M Few-cycle all-fiber temporally coherent supercontinuum sources [11676-18]

ULTRAFAST LASER MICRO/NANO-MACHINING

- 11676 OP Reliable and strong micro-welding of glass by ultrashort pulsed laser (Invited Paper) [11676-21]
- 11676 OR Charged fluorophores-assisted fabrication of metallic structures inside hydrogel by multiphoton photoreduction [11676-23]

MICROMACHINING INSIDE OF TRANSPARENT MATERIALS

- 11676 OW Glass tube cutting for medical applications using ultrashort-pulsed lasers [11676-28]
- 11676 0X From filaments to light-sheets: tailoring the spectrum of fiber Bragg gratings with femtosecond lasers [11676-29]
- 11676 0Y **2D** filament grating array: enabling an efficient, high-resolution lens-less all-fiber spectrometer [11676-30]

ULTRAFAST LASER-MATTER INTERACTION

- 1167610 Semiconductor-metal ultrafast laser welding with relocated filaments [11676-32]
- 1167612 Study of optical nonlinearities in laser ablation produced gold nanoparticles through the Zscan technique [11676-34]

DIRECT WRITING OF INTEGRATED PHOTONIC DEVICES

- 1167615 Loss mechanisms in femtosecond laser written optical waveguides (Invited Paper) [11676-37]
- 1167616 Space qualification of integrated photonic circuits fabricated by ultrafast laser writing [11676-38]
- Femtosecond laser welding of silica glass fiber for robust Bragg grating sensing in high temperature environment [11676-40]
- 1167619Recent advances on femtosecond laser writing of waveguides in crystals (Invited Paper)
[11676-41]

HIGH-ORDER HARMONIC GENERATION

- 116761B Ultrafast nanoscale XUV table-top coherent diffractive imaging [11676-43]
- High repetition rate high-order harmonic generation up to the carbon K-edge in an antiresonant hollow-core fiber [11676-45]

POSTER SESSION

116761EDirect enzyme immobilization on SPEs for electrochemical pesticide detection in olive oil,
utilizing laser induced forward transfer [11676-46]