

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.

Frontiers in Ultrafast Optics: Biomedical, Scientific, and Industrial Applications XXI, edited by
Peter R. Herman, Michel Meunier, Roberto Osellame, Proc. of SPIE Vol. 11676, 1167601
© 2021 SPIE · CCC code: 0277-786X/21/\$21 · doi: 10.1117/12.2596727

Proc. of SPIE Vol. 11676 1167601-1

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.

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.

SPIE. DIGITAL LIBRARY
SPIDigitalLibrary.org

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 0G **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 0P **Reliable and strong micro-welding of glass by ultrashort pulsed laser (Invited Paper)** [11676-21]
- 11676 0R **Charged fluorophores-assisted fabrication of metallic structures inside hydrogel by multi-photon photoreduction** [11676-23]

MICROMACHINING INSIDE OF TRANSPARENT MATERIALS

- 11676 0W **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

- 11676 10 **Semiconductor-metal ultrafast laser welding with relocated filaments** [11676-32]
- 11676 12 **Study of optical nonlinearities in laser ablation produced gold nanoparticles through the Z-scan technique** [11676-34]

DIRECT WRITING OF INTEGRATED PHOTONIC DEVICES

- 11676 15 **Loss mechanisms in femtosecond laser written optical waveguides (Invited Paper)** [11676-37]
- 11676 16 **Space qualification of integrated photonic circuits fabricated by ultrafast laser writing**
[11676-38]
- 11676 18 **Femtosecond laser welding of silica glass fiber for robust Bragg grating sensing in high
temperature environment** [11676-40]
- 11676 19 **Recent advances on femtosecond laser writing of waveguides in crystals (Invited Paper)**
[11676-41]

HIGH-ORDER HARMONIC GENERATION

- 11676 1B **Ultrafast nanoscale XUV table-top coherent diffractive imaging** [11676-43]
- 11676 1D **High repetition rate high-order harmonic generation up to the carbon K-edge in an
antiresonant hollow-core fiber** [11676-45]

POSTER SESSION

- 11676 1E **Direct enzyme immobilization on SPEs for electrochemical pesticide detection in olive oil,
utilizing laser induced forward transfer** [11676-46]