PROCEEDINGS OF SPIE

Fiber Lasers and Glass Photonics: Materials through Applications

Stefano Taccheo
Jacob I. Mackenzie
Maurizio Ferrari
Editors

22–26 April 2018
Strasbourg, France

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Published by
SPIE

Volume 10683

Proceedings of SPIE 0277-786X, V. 10683

Fiber Lasers and Glass Photonics: Materials through Applications, edited by
Stefano Taccheo, Jacob I. Mackenzie, Maurizio Ferrari, Proc. of SPIE Vol. 10683
1068301 · © 2018 SPIE · CCC code: 0277-786X/18/$18 · doi: 10.1117/12.2502796

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.

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Please use the following format to cite material from these proceedings:
Author(s), "Title of Paper," in *Fiber Lasers and Glass Photonics: Materials through Applications*, edited by Stefano Taccheo, Jacob I. Mackenzie, Maurizio Ferrari, Proceedings of SPIE Vol. 10683 (SPIE, Bellingham, WA, 2018) Seven-digit Article CID Number.

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

ISBN: 9781510618923
ISBN: 9781510618930 (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

Printed in the United States of America.

Publication of record for individual papers is online in the SPIE Digital Library.

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Introduction

It is an honor and a great pleasure for us to introduce the inaugural proceedings of this new conference, "Fiber Lasers and Glass Photonics: Materials through Applications". Our concept for starting this conference in the framework of the SPIE Photonics Europe Symposium was driven by the need to have a multidisciplinary place where scientists researching fiber and waveguide lasers, photonics, and glasses, could discuss and cooperate to develop new physics, new devices, and new applications. The bottom up approach, through the whole scientific chain, from materials to lasers to applications and industrial end users has been targeted and we all hope the reader will find it a stimulating overview, with new inputs for new ideas. The main areas are glass materials and functionalized photonic structures, fiber and waveguide lasers, and device applications.

Glass materials, both active and passive, and photonic structures are the cornerstones of scientific and technological developments across a broad spectrum of applications. Glasses, optical and functionalized waveguides, planar photonic integrated circuits, waveguide gratings and arrays, photonic-crystal heterostructures, hybrid micro-resonators, optical fibers, solid state lasers, and nonlinear optical devices, are just some examples of glass-based photonic systems that play a major role in light generation and manipulation for applications in; healthcare, global communications networks, remote sensing systems, biophotonics, smart materials-processing for advanced manufacturing, and next generation computing.

Optical waveguide technologies are becoming increasingly important for novel sources and photonics functionalization on and off chip. These novel devices are opening the door for short-distance data communications and new areas such as dual-comb sources for metrological and sensing applications. Fiber lasers, thanks to their compactness and reliability, have demonstrated high impact in several applications ranging from process, biomedicine, sensing, metrology, and industrial oriented contribution shows that are a suitable solution also for outdoor applications.

This conference embraces a cross-disciplinary approach aim to show the whole potential of photonics, for which its pervasiveness has already been identified as an enabling technology. Through advanced research in laser devices and glass-based optical systems, photonics can contribute to finding new technical solutions

to still unsolved problems and pave the way to applications not yet imagined. In these proceedings you will find perspectives for fiber devices looking at improving cancer detection, and state-of the art and future trends on new lasers systems and on the fabrication, characterization, and application of modern glass-based materials and integrated optic structures.

Due to the open multidisciplinary approach a further aim is to underline all the possible convergences, synergies, and interaction among topics and scientific fields, and to provide a common framework for research on optical inorganic materials as well as crystal based waveguiding systems. Among all possible applications of laser sources, a significant focus was on biomedicine with a review of fiber lasers in biophotonics and new frontier based on mid-infrared sources.

The full set of papers submitted for publication in this conference were truly excellent, demanding an important peer review procedure by the committee. The conference consisted of 16 sessions with 145 submitted communications involving scientists from 38 countries across five continents. The results of this conference are represented by the proceedings, which include 80 papers providing a broad overview of state-of-the-art across these multi-disciplinary fields. The presented articles provide insight into fundamental principles and modeling, fabrication, processing, characterization and exploitation of optical glasses, fiber and waveguide lasers and photonic structures for the intelligent management of light. Several doped and undoped materials such as oxides, fluorides, chalcogenide glasses, films, are discussed as well as systems and devices ranging from fiber lasers to waveguides and sensors, with attention to crystals, nanocrystals and transparent glass-ceramics. We are also proud of the organization of the following special sessions focused on EU projects:

- Minerva (Mid- to Near infrared spectroscopy for improved medical diagnostics)
- PhotIND (Metrology for the photonics industry: optical fibres, waveguides, and applications)

and for the special session for early stage researchers and women scientists, a moment of great importance to encourage new open mind young scientists. Another significant event was the joint session with the conference, "Nonlinear Optics and its Applications," where laser devices as well and applications such as oil field leaking monitoring were discussed.

We are indebted to the very pro-active and motivated colleagues of the Program Committee for their crucial help in the organization of the session as well as for their efficient work promoting the conference.

Last but absolutely not least, we wish to express our sincere appreciation to all the staff of Photonics Europe, who kindly and very effectively supported us in building this new conference and the related valuable technical program. A special thanks to Bob Hainsey, who believed in this initiative, to the fantastic SPIE staff who led the construction of this new conference, managed the event flawlessly, and coordinated the proceedings publication.

Stefano Taccheo
Jacob I. Mackenzie
Maurizio Ferrari