PROCEEDINGS OF SPIE

Next-Generation Optical Communication: Components, Sub-Systems, and Systems X

Guifang Li Kazuhide Nakajima Editors

6–11 March 2021 Online Only, United States

Cosponsored by
Corning Incorporated (United States)
NTT Electronics America, Inc. (United States)

Published by SPIE

Volume 11713

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 Next-Generation Optical Communication: Components, Sub-Systems, and Systems X, edited by Guifang Li, Kazuhide Nakajima, Proceedings of SPIE Vol. 11713 (SPIE, Bellingham, WA, 2021) Seven-digit Article CID Number.

ISSN: 0277-786X

ISSN: 1996-756X (electronic)

ISBN: 9781510642614

ISBN: 9781510642621 (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 SPIF org

Copyright © 2021, 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 \$21.00 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/21/\$21.00.

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: 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

LONG-HAUL/SDM TRANSMISSION 11713 06 Applicability of standard 125 µm-cladding multi-core fiber for wide-band and long-haul transmission (Best Technical Paper) [11713-2] 11713 07 Large capacity and wideband transmission over SDM fibers (Invited Paper) [11713-3] 11713 08 Fabrication of heat-induced long-period gratings for mode conversion in few-mode fibers [11713-4] Towards low loss hollow core optical fibers (Invited Paper) [11713-6] 11713 0A **SHORT-REACH TRANSMISSION** 11713 0C Optical data transmission at 44 terabits/s with a Kerr soliton crystal microcomb [11713-8] Simplified 3 channel PAM4 Nyquist TDM transmitter [11713-10] 11713 OE 11713 OF High-speed real-time transmissions supporting LTE/5G mobile fronthaul networks using discrete multitone format (Invited Paper) [11713-11] Indoor and outdoor geo-localization and navigation by visible light communication [11713-13] 11713 OH 11713 OI Crossroad management through visible light communication in cooperative vehicular systems [11713-14] **ADVANCED DEVICES AND AI** 11713 OJ Recent advances in integrated silicon photonics engine for coherent optical communications (Invited Paper) [11713-15] 11713 OK RF and microwave photonic, fractional differentiation, integration, and Hilbert transforms based on Kerr micro-combs [11713-16] 11713 OL Deep learning based digital backpropagation enabling SNR gain at low complexity (Invited Paper) [11713-17] 11713 ON Bandpass filter with flat-top transmission using multistage Fabry-Perot with unequal cavity lengths [11713-19]

POSTER SESSION

11713 0O	Sum rate utilization of 4×4 multiple-input multiple-output (MIMO) visible light communication (VLC) [11713-20]
11713 OP	Sampling of a periodic pulse train by a modulator in a ring resonator [11713-21]
11713 0Q	Machine-learning-aided abstraction of photonic integrated circuits in software-defined optical transport [11713-22]