

2022 IEEE Photonics Conference (IPC 2022)

**Vancouver, British Columbia, Canada
13-17 November 2022**



**IEEE Catalog Number: CFP22LEO-POD
ISBN: 978-1-6654-3488-1**

**Copyright © 2022 by the Institute of Electrical and Electronics Engineers, Inc.
All Rights Reserved**

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

****** This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

| | |
|-------------------------|-------------------|
| IEEE Catalog Number: | CFP22LEO-POD |
| ISBN (Print-On-Demand): | 978-1-6654-3488-1 |
| ISBN (Online): | 978-1-6654-3487-4 |
| ISSN: | 2374-0140 |

Additional Copies of This Publication Are Available From:

Curran Associates, Inc
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: (845) 758-0400
Fax: (845) 758-2633
E-mail: curran@proceedings.com
Web: www.proceedings.com

CURRAN ASSOCIATES INC.
proceedings
.com

TABLE OF CONTENTS

SU3: QUANTUM RESEARCH

| | |
|--|---|
| Telecom-Compatible, Affordable and Scalable Quantum Technologies | 1 |
| <i>Nicola Montaut, Piotr Roztocki, Hao Yu, Mario Chemnitz, Stefania Sciara, Benjamin Maclellan, Bennet Fischer, Yoann Jestin, Luis Romero Cortes, Yanbing Zhang, José Azaña, Roberto Morandotti, Sai T. Chu, Christian Reimer, David J. Moss, Michael Kues, Brent E. Little, Hao Yu, Zhiming Wang, Lucia Caspani, Benjamin Wetzel, William J. Munro, Sebastian Loranger, Raman Kashyap, Alfonso Cino</i> | |

MA1: FREE SPACE COMMUNICATIONS AND SENSING

| | |
|---|----|
| Free-Space Laser Communications with Quantum Cascade Devices in the Thermal-Infrared Atmospheric Window..... | 3 |
| <i>Frédéric Grillot, Pierre Didier, Hamza Dely, Thomas Bonazzi, Olivier Spitz, Elie Awwad, Étienne Rodriguez, Angela Vasanelli, Carlo Sirtori</i> | |
| High-Power Mid-Infrared Quantum Cascade Lasers for Free-Space Communications..... | 5 |
| <i>M. Turville-Heitz, J. Ryu, J. D. Kirch, S. Jacobs, R. Marsland, T. Earles, S. Ruder, K. Oresick, D. Botez, L. J. Mawst</i> | |
| 940 nm VCSEL Arrays for Optical Wireless | 7 |
| <i>Nasibeh Haghighi, Weronika Glowadzka, Tomasz Czystanowski, Martin Zorn, James. A. Lott</i> | |
| 850nm Dual-Metal VCSEL Arrays for Indoor 3D Sensing Applications | 9 |
| <i>Hemashilpa Kalagara, Guowei Zhao, Jun Yang, Benjamin Kesler, Matthew G. Peters</i> | |
| High-Power and High-Speed Multi-Junction VCSEL Arrays for Automotive LiDAR | 11 |
| <i>Suning Xie, Guowei Zhao, Jun Yang, Hemashilpa Kalagara, Yuefa Li, Maxwell Lassise, Steven Chai, Matthew Peters, Jay Skidmore</i> | |

MB1: QUANTUM NETWORKS

| | |
|---|----|
| Simulation of Quantum Key Distribution Using Entangled Photon Pairs Over Free-Space Channels | 13 |
| <i>Daniel E. Jones, Dashiell L. P. Vitullo, Trevor Cook, Lisa M. Scott, Andrew Toth, Brian T. Kirby</i> | |
| Optimizing Resource Allocation in Flex-Grid Entanglement Distribution Networks..... | 15 |
| <i>Jude Alnas, Muneer Alshowkan, Nageswara S. V. Rao, Nicholas A. Peters, Joseph M. Lukens</i> | |
| Scalable and Secure Architecture for Quantum Networks | 17 |
| <i>Muneer Alshowkan, Philip G. Evans, Brian P. Williams, Nageswara S. V. Rao, Claire E. Marvinney, Yun-Yi Pai, Benjamin J. Lawrie, Nicholas A. Peters, Joseph M. Lukens</i> | |

MC1: COMPONENTS FOR INTEGRATED PHOTONIC CIRCUITS

| | |
|---|----|
| Broadband Telecom to Short-Wave Infrared Spanning Reconfigurable MZI Filter | 19 |
| <i>Neetesh Singh, Milan Sinobad, Sarvagya Dwivedi, Franz X. Kärtner</i> | |

| | |
|--|----|
| Broadband Mach-Zehnder Interferometer Modulator on Indium Tin Oxide (ITO) Platform Operating at 100 GHz with Asymmetric Power Splitting | 21 |
| <i>Yaliang Gui, Hao Wang, Behrouz Movahhed Nouri, Volker J. Sorger, Hamed Dalir</i> | |

| | |
|--|----|
| In-Situ Optical Characterisation of Integrated Photonic Devices During Transfer Printing | 23 |
| <i>Sean P. Bommer, Changyu Hu, Benoit Guilhabert, Martin D. Dawson, Michael J. Strain</i> | |

ME1: PHOTONICS AND CLIMATE CHANGE

| | |
|--|----|
| Diffuse LiDAR and Laser Reflectometry for Measuring Snow and Ice Properties..... | 25 |
| <i>Markus Allgaier, Jonathan Ryan</i> | |

MF1: ACCESS AND SHORT REACH COMMUNICATIONS

| | |
|---|----|
| High Speed Optical Access Networks for This Decade and the Next (Invited) | 27 |
| <i>Vincent Houtsma, Doukje Van Veen</i> | |

| | |
|--|----|
| Samples Vs. Symbols-Based Feedforward Neural Network Equalization for Short Reach Transmission | 29 |
| <i>Yevhenii Osadchuk, Stenio M. Ranzini, Roman Dischler, Vahid Aref, Darko Zibar, Francesco Da Ros</i> | |

| | |
|---|----|
| On the Feasibility of Using DML-Based Transmitter for Quasicoherent Receiver..... | 31 |
| <i>Kh Arif Shahriar, Md Samiul Alam, Reza Maram, Ali Bayat, Jose A. Altabas, Jesper B. Jensen, Pasquale Ricciardi, David V. Plant</i> | |

| | |
|--|----|
| High-Speed Optical Camera Communication Using a CMOS-Driven Micro-LED Projector | 33 |
| <i>Yingjie Shao, Jonathan J. D. McKendry, Fahimeh Dehkoda, Enyuan Xie, Johannes Herrnsdorf, Michael J. Strain, Robert K. Henderson, Martin D. Dawson</i> | |

| | |
|---|----|
| Optical Camera Communication Using Plastic Fiber Array for Spatial Multiplexing | 35 |
| <i>Liqiong Liu, Shuyan Chen, Lian-Kuan Chen</i> | |

MG1: TECHNOLOGY PLATFORMS AND FOUNDRIES FOR SILICON PHOTONICS

| | |
|--|----|
| The Road Ahead for Integrated Photonics (Tutorial) | 37 |
| <i>Martijn J. R. Heck</i> | |

MA2: QD MATERIALS AND DEVICES

| | |
|---|----|
| Si-Based 1.3 μm InAs/GaAs QD Lasers | 39 |
| <i>Huiwen Deng, Junjie Yang, Hui Jia, Mingchu Tang, Benjamin Maglio, Lydia Jarvis, Sam Shutts, Peter M. Smowton, Siming Chen, Alwyn Seeds, Huiyun Liu</i> | |

| | |
|--|----|
| C- And L-Band InAs/InP Quantum Dot Lasers..... | 41 |
| <i>Zhongming Cao, Maryam Alsayyadi, Ben Salmond, Harry Gordon-Moys, Josie Nabialek, Richard Forrest, Craig P. Allford, Bogdan Ratiu, Oumaima Abouzaid, Qiang Li, Samuel Shutts, Peter M. Smowton</i> | |

| | |
|---|----|
| Co-Doped 1.3 μm InAs Quantum Dot Lasers with High Gain and Low Threshold Current | 43 |
| <i>Benjamin Maglio, Lydia Jarvis, Craig P. Allford, Sara Gillgrass, Abigail Enderson, Sam Shutts, Huiwen Deng, Mingchu Tang, Huiyun Liu, Peter M. Smowton</i> | |

MB2: NEUROMORPHIC COMPUTING

| | |
|---|----|
| Brain-Derived 3D NanoPhotonic-NanoElectronic Neuromorphic Computing | 45 |
| <i>S. J. Ben Yoo</i> | |
| GHz-Rate Neuromorphic Photonic Spiking Neural Network with a Vertical-Cavity Surface-Emitting Laser | 47 |
| <i>Dafydd Owen-Newns, Matej Hejda, Antonio Hurtado, Joshua Robertson</i> | |
| Artificial Optoelectronic Spiking Neurons with Laser-Coupled Resonant Tunnelling Diode Systems..... | 49 |
| <i>Matej Hejda, Ekaterina Malysheva, Qusay Raghieb Ali Al-Taai, Edward Wasige, Victor Dolores-Calzadilla, José Figueiredo, Bruno Romeira, Antonio Hurtado</i> | |
| Interconnected VCSEL-Based Photonic Synapses for Neuromorphic Processing Architectures | 51 |
| <i>Joshua Robertson, Antonio Hurtado, Matej Hejda, Dafydd Owen-Newns, Juan Arturo Alanis</i> | |

MC2: MICROWAVE AND TERAHERTZ INTEGRATED PHOTONICS

| | |
|--|----|
| Thin-Wire Array Based Resonator for Targeted Clinical 1.5T Magnetic Resonance Imaging | 53 |
| <i>Jegyasu Gupta, Priyanka Das, Ashish Kumar Chowdhary, Ratnajit Bhattacharjee, Debabrata Sikdar</i> | |
| Design and Analysis of a Thin Metamaterial for Magnetic Field Enhancement in 1.5T MRI | 55 |
| <i>Priyanka Das, Jegyasu Gupta, Debabrata Sikdar, Ratnajit Bhattacharjee</i> | |
| Actively Controlled Two Bit Binary Coding in Graphene Assisted Terahertz Metasurface..... | 57 |
| <i>KM Dhriti, Gagan Kumar</i> | |
| Graphene-Dielectric Based Tunable Terahertz Polarisation Insensitive Modulator..... | 59 |
| <i>Bhagwat Singh Chouhan, Km Dhriti, Gagan Kumar</i> | |

MD2: DEVELOPMENTS IN OCT

| | |
|--|----|
| Ocular Melanoma Imaging Study Using Polarization-Diversity Optical Coherence Tomography | 61 |
| <i>Destiny Hsu, Yusi Miao, Jun Song, Zaid Mammo, Myeong Jin Ju</i> | |
| Multimodal Optical Elastography Measures the Stiffness of the Cornea in a Collagen XII Deficient Murine Model..... | 63 |
| <i>Achuth Nair, Yogeshwari Ambekar, Christian Zevallos-Delgado, Manmohan Singh, Fernando Zvietcovich, Taye Mekonnen, Salavat Aglyamov, Manuel Koch, Edgar M. Espana, Kirill V. Larin</i> | |
| Automated Counting Method to Assess Cerebral Penetrating Vessels in Perfusion Using Optical Coherence Tomography | 65 |
| <i>Woo June Choi, Jun Ki Kim</i> | |
| Correlation Matrix-Based Cross-Calibration of Multiple Spectrometer-Based Optical Coherence Tomography | 67 |
| <i>Yusi Miao, Jun Song, Myeong Jin Ju</i> | |
| Investigating the Modal Contents of Multi-Clad Fibers to Improve Multimodal Imaging | 69 |
| <i>A. Tansksanen, J. Malone, G. Hohert, P. Lane</i> | |

| | |
|--|----|
| System-Agnostic 3D Volume Registration for Motion-Free Contrast-Enhanced Optical Coherence Tomography Retinal Image..... | 71 |
| <i>Mahsa Siadati, Yusi Miao, Arman Athwal, Da Ma, Myeong Jin Ju</i> | |

ME2: FILTERS AND SWITCHES

| | |
|--|----|
| Energy Efficient Wavelength-Selective Silicon Photonic Switch in the O-Band..... | 73 |
| <i>Viviana Arrunategui Norvick, Evan Chansky, Takako Hirokawa, Yujie Xia, Adel Saleh, Clint Schow</i> | |
| Random Subwavelength Grating Waveguide Bragg Gratings | 75 |
| <i>Bruno Taglietti, Hao Sun, Sehr Moosabhoy, Lawrence R. Chen</i> | |
| Subwavelength Grating Waveguide-Based 1310/1550 nm Diplexer | 77 |
| <i>Bruno Taglietti, Lawrence R. Chen</i> | |
| Low-Loss, High Finesse, Add-Drop Resonators from a Commercial Silicon Photonics Foundry..... | 79 |
| <i>Lucas M. Cohen, Saleha Fatema, Karthik V. Myilswamy, Scott E. Kenning, Navin B. Lingaraju, Andrew M. Weiner</i> | |

MF2: OPTICAL TRANSMISSION OPTIMIZATION

| | |
|--|----|
| Performance Optimization in Subsea Systems | 81 |
| <i>Siddharth Varughese, Sumudu Edirisinghe, Pierre Mertz</i> | |
| Relative Impact of Impairments in Subsea Fiber Optic Transmission Systems | 83 |
| <i>Viacheslav V. Ivanov, John D. Downie, Sergejs Makovejs</i> | |
| Real-Time Span-Wise Launch Power Optimization for Coherent Optical Systems | 85 |
| <i>Tianyu Zhao, Xiang Lin, Zhiping Jiang</i> | |
| SLA-Differentiated Protection in Multi-Band Elastic Optical Networks..... | 87 |
| <i>Soheil Hosseini, Ramón J. Durán Barroso, Ignacio De Miguel, Óscar González De Dios, Noemi Merayo, Juan Carlos Aguado, Edward Echeverry, Patricia Fernández, Rubén M. Lorenzo, Evaristo J. Abril</i> | |

MA3: DETECTORS FOR PHOTONIC INTEGRATED CIRCUITS

| | |
|---|----|
| Analytical Modeling of Silicon Microring Photodetectors..... | 89 |
| <i>Yiwei Peng, Yuan Yuan, Wayne V. Sorin, Stanley. Cheung, Zhihong Huang, Marco Fiorentino, Raymond G. Beausoleil</i> | |
| Self-Powered Photodetector Based on Mos2/Sb2Te3 Heterojunction | 91 |
| <i>Hao Wang, Yaliang Gui, Chaobo Dong, Hamed Dalir, Volker J. Sorger</i> | |

MB3: QUANTUM SENSING

| | |
|---|----|
| Electro-Optic Fourier Transform Chronometry of Pulsed Quantum Light | 93 |
| <i>Ali Golestani, Alex O. C. Davis, Filip Sosnicki, Michal Mikolajczyk, Nicolas Treps, Michal Karpinski</i> | |

MC3: HYBRID PHOTONICS WITH LOW-DIMENSIONAL MATERIALS

- High Quality Fano Resonance in Graphene-Based Terahertz Metamaterial 95
Chandan Bagri, Sukhvinder Kaur, R. K. Varshney
- Graphene-Based Metamaterial for In-Situ Spectral Absorption Tailoring in the Mid-Infrared 97
Romil Audhkhasi, Mashnoon A. Sakib, Michelle L. Povinelli

MD3: EXTENDING RESOLUTION AND FIELD OF VIEW

- Panoramic Retinal Optical Coherence Tomography 99
Yifan Jian, Shuibin Ni, Thanh-Tin P. Nguyen, Alison Skalet, Peter J. Campbell

ME3: HIGH SPEED DIRECT DETECTION TRANSMISSION

- Improvement in High-Speed Data Transmission of Coupled Cavity VCSEL Arrays at 850 nm
Using Separated Electrodes 101
*Zuhaib Khan, Min-Long Wu, Yaung-Cheng Zhao, Cheng-Chun Chen, Chia-Jui Chang, Tien-
Chang Lu, Jin-Wei Shi*
- 550-Km Amplified Direct-Detection Transmission at 1.3 μ m 103
*Yang Hong, Natsupa Taengnoi, Kyle R. H. Bottrill, Yu Wang, Jayanta K. Sahu, Periklis
Petropoulos, David J. Richardson*

MF3: ADVANCES IN NEUROPHOTONICS

- In-Vivo Mouse Brain Imaging Using Three-Photon Fluorescence Adaptive Optics 105
*David Sinefeld, Fei Xia, Mengran Wang, Tianyu Wang, Chunyan Wu, Hari P. Paudel,
Dimitre G. Ouzounov, Thomas G. Bifano, Chris Xu*

MG3: NOVEL MATERIALS AND ADVANCED FABRICATION

- Enhancement of Nonlinear Interaction for Efficient Graphene-Based Mode-Locked Lasers 107
Bowon Ryu, Sungjae Lee, Jin Tae Kim, Yong-Won Song
- 2.5D Etching of Silicon Dioxide for Optical and Photonic Structures 109
Arne Behrens, Stefan Sinzinger
- Metal Ion Implanted Waveguides in Thin Film Barium Titanate-On-Insulator 111
Yu Cao, Hong-Lin Lin, Elhadj Dogheche, Aaron Danner
- Visualization of Environment-Dependent Carrier Dynamics on 2D Transition Metal
Dichalcogenides Using Ultrafast Pump-Probe Microscopy 113
Chih-Wei Luo

MA4: DETECTORS BASED ON NOVEL MATERIALS AND SYSTEMS

- Photodetection from SWIR to MWIR with Ge/GeSn Core/Shell Nanowires 115
*Lu Luo, Mahmoud R. M. Atalia, Simone Assali, Sebastian Koelling, Anis Attiaoui, Oussama
Moutanabbir*

| | |
|---|-----|
| Solution-Processed PbS Quantum Dots Infrared Photodetector with Ultra-High Responsivity..... | 117 |
| <i>Wei Ching-Fang, Liu Yen-Tzu, Hsu Chia-Ming, Pei Zingway</i> | |
| Focus-Induced Photoresponse in Amorphous Silicon Photodetectors for Low-Light and Sub-Mm Resolution 3D Imaging Applications | 119 |
| <i>Maurice Müller, Andreas Bablich, Rainer Bornemann, Peter Haring Bolívar</i> | |
| Plasmonic Slot Waveguide - Integrated MoTe2 Photodetector with 30-GHz Bandwidth at Telecom Wavelength..... | 121 |
| <i>Hao Wang, Volker J. Sorger, Hamed Dalir</i> | |

MB4: ULTRAFAST AND PROGRAMMABLE OPTICAL PROCESSING

| | |
|--|-----|
| Autoencoder-Based Four Dimensional Constellation for Phase Noise Channels | 123 |
| <i>Amir Omid, Ming Zeng, Leslie A. Rusch</i> | |
| Automatic Realization of Light Processing Functions for Programmable Photonics..... | 125 |
| <i>Zhengqi Gao, Xiangfeng Chen, Zhengxing Zhang, Uttara Chakraborty, Wim Bogaerts, Duane S. Boning</i> | |
| A 64×64 Integrated Photonic Accelerator | 127 |
| <i>Bo Peng, Shiyue Hua, Zhan Su, Yelong Xu, Yichen Shen</i> | |
| Automatic Self-Calibration of Programmable Photonic Processors..... | 129 |
| <i>Aitor López-Hernández, Mikel Gutiérrez-Zubillaga, Daniel Pérez-López</i> | |

MC4: FABRICATION AND MATERIALS ENGINEERING FOR NANOPHOTONICS

| | |
|--|-----|
| Post-Fabrication Trimming of High Q/V Silicon Photonic Slot-Bridge Nanobeam Cavities | 131 |
| <i>Joshua Fabian, Wesley Cassidy, Lesley Hill, Cassandra Hawes, David Neilson, Adan Azem, Xiruo Yan, Donald Witt, Matthew Mitchell, Andreas Pfenning, Lukas Chrostowski, Jeff F. Young</i> | |
| Improving Minimum Feature Sizes of Subwavelength Grating Slot Waveguide Optical Sensors..... | 133 |
| <i>Can Ozcan, J. Stewart Aitchison, Mo Mojahedi</i> | |
| Free Carriers Lifetime in Silicon Rib Waveguides..... | 135 |
| <i>Mohammad Ahmadi, Jacque Lefebvre, Wei Shi, Sophie Larochelle</i> | |
| Enhanced Diffraction Efficiency Using Metal Nanoparticle Based Grating on Flexible Substrate | 137 |
| <i>Agnimitra Sutradhar, Joel Cherian Sam, Shilpi Gupta</i> | |
| Compact Metamaterial Grating Antenna in a 300-Nm Silicon-On-Insulator Waveguide..... | 139 |
| <i>Shahzad Khajavi, Daniele Melati, Pavel Cheben, Jens H. Schmid, Dan Xia Xu, Winnie N. Ye</i> | |
| All-Optical Biophotonic and Microfluidic Circuits for Photo-Thermal Applications..... | 141 |
| <i>Carlo Santini, Luciano De Sio, Francesca Petronella, Antonio D'Alessandro</i> | |

MD4: NONLINEAR PHOTONIC SYSTEMS

| | |
|--|-----|
| Liquid Light Computing: From Logic to Analogue Simulation..... | 143 |
| <i>Pavlos Lagoudakis</i> | |

| | |
|--|-----|
| Experimental Study of In-Line Nonlinearity Mitigation for a 400 Gb/s Dual-Carrier Superchannel with Joint Reception Using a Waveband-Shift-Free OPC..... | 144 |
| <i>Isaac Sackey, Robert Elschner, Carsten Schmidt-Langhorst, Gregor Ronniger, Tomoyuki Kato, Takeshi Hoshida, Colja Schubert, Ronald Freund</i> | |

| | |
|---|-----|
| Detection of Noisy Narrowband Optical Signals by All-Fiber Sampling and Lossless Decimation..... | 146 |
| <i>Manuel P. Fernández, Saket Kaushal, Benjamin Crockett, Laureano A. Bulus-Rossini, Pablo A. Costanzo-Caso, José Azaña</i> | |

ME4: COUPLERS

| | |
|---|-----|
| Misalignment-Tolerant Multi-Tip Inverse Tapered Silicon Nitride Edge Couplers..... | 148 |
| <i>Essam Berikaa, Santiago Bernal, Mustafa Hammood, Lukas Chrostowski, David V. Plant</i> | |

| | |
|--|-----|
| Nb ₂ O ₅ Horizontal Slot Waveguides with Side-Wall Grating Structures | 150 |
| <i>Takumi Hinata, Yoshiki Hayama, Naoya Katsumata, Katsumi Nakatsuhara, Masayuki Takeda, Takeshi Nishizawa</i> | |

| | |
|--|-----|
| Low-Loss, Single-Shot Fiber-Array to Chip Attach Using Laser Fusion Splicing | 152 |
| <i>Juniyali Nauriyal, Yi Zhang, Meiting Song, Jaime Cardenas</i> | |

| | |
|---|-----|
| Inverse-Designed, Normal Incidence Grating Couplers for Multi-Core Fiber I/O..... | 154 |
| <i>Michael J. Probst, Alec M. Hammond, Joel B. Slaby, Stephen E. Ralph</i> | |

| | |
|--|-----|
| 2D Electrothermal MEMS Waveguide Positioner..... | 156 |
| <i>Almur A. S. Rabih, Michaël Ménard, Suraj Sharma, Frederic Nabki</i> | |

| | |
|--|-----|
| Statistical Analysis of Silicon-Nitride Arrayed Waveguide Gratings | 158 |
| <i>Qi Han, Daniel Robin, Antoine Gervais, Michael Ménard, Wei Shi</i> | |

MF4: SIGNAL PROCESSING FOR OPTICAL COMMUNICATIONS

| | |
|--|-----|
| A Data-Driven Optimization of First-Order Regular Perturbation Coefficients for Fiber Nonlinearities | 160 |
| <i>Astrid Barreiro, Gabriele Liga, Alex Alvarado</i> | |

| | |
|--|-----|
| Low Complexity Blind Baud Rate Estimation in the Presence of Hidden Interference | 162 |
| <i>Alex Kaylor, Daniel Lippiatt, Varghese A. Thomas, David Patterson, Richard Desalvo, Stephen Ralph</i> | |

| | |
|--|-----|
| Kalman Filter Based Impairment Mitigation in Nonlinear Optical Systems with Equalization Enhanced Phase Noise..... | 164 |
| <i>Cenqin Jin, Mingming Tan, Yunfei Chen, Tianhua Xu</i> | |

| | |
|---|-----|
| Blind Polarization Demultiplexing of Probabilistically Shaped Signals | 166 |
| <i>Vinod Bajaj, Raf Van De Plas, Vahid Aref, Sander Wahls</i> | |

| | |
|--|-----|
| Optimizing Geometric Constellations for Phase Noise Channels Using Deep Learning | 168 |
| <i>Amir Omidi, Xun Guan, Ming Zeng, Leslie A. Rusch</i> | |

MG4: PROPAGATION

| | |
|--|-----|
| Theory for the CROWS Method for Measurement of the Directional Speed of Light..... | 170 |
| <i>Douglas M. Baney</i> | |

| | |
|--|-----|
| Diffraction Analysis of a Chiral Fresnel Zone Plate with Controllable on-Axis Foci and Dual Imaging..... | 172 |
| <i>Nagi Buaossa, Monish R. Chatterjee</i> | |
| Sub-DB/m Loss Integrated 103 and 90 Million Q Resonators for Laser Stabilization at Rubidium and Strontium Wavelengths | 174 |
| <i>Nitesh Chauhan, Andrei Isichenko, Jiawei Wang, Daniel J. Blumenthal</i> | |
| Highly-Efficient Apodized Grating Coupler in Visible Spectrum for Backward Coupling | 176 |
| <i>Rajat Kumar Sinha, Mo Mojahedi, Can Ozcan</i> | |

TUA1: MICROLASERS

| | |
|--|-----|
| Selective Area Epitaxy of InP/InAsP Multi-Quantum Well Micro-Ring Lasers..... | 178 |
| <i>Wei Wen Wong, Naiyin Wang, Stephen Church, Patrick Parkinson, Chennupati Jagadish, Hark Hoe Tan</i> | |
| Self-Assembled Semiconductor Microlaser Based on Colloidal Nanoplatelets | 180 |
| <i>Pedro Urbano Alves, Manoj Sharma, Emek Goksu Durmusoglu, Merve Izmir, Martin D. Dawson, Hilmi Volkan Demir, Nicolas Laurand</i> | |
| Dispersive Self-Q-Switching in a Microscopic Laser | 182 |
| <i>Kristian Seegert, Yi Yu, Mikkel Heuck, Jesper Mork</i> | |

TUB1: PHOTONIC LIDARS 1

| | |
|--|-----|
| Silicon Photonic Integrated Circuits for LiDAR | 184 |
| <i>John E. Bowers, Lin Chang, Mingxiao Li, Qiang Lin, Weiqiang Xie, Xingjun Wang, Haowen Shu, Kerry Vahala</i> | |
| All-Silicon Low Noise Photonic Frontend for LIDAR Applications | 187 |
| <i>Ranjan Das, Yanran Xie, Andrew P. Knights</i> | |
| Discretized Multi-Annular Ring Beamforming..... | 189 |
| <i>Aroutin Khachaturian, Artsroun Darbinian, Reza Fatemi, Ali Hajimiri</i> | |

TUC1: LIGHT-MATTER INTERACTIONS IN QUANTUM MATERIALS

| | |
|---|-----|
| Inverse Design of Solid-State Quantum Emitter Single-Photon Sources | 191 |
| <i>Emerson G. Melo, William Eshbaugh, Edward B. Flagg, Marcelo Davanco</i> | |
| Multimode Diamond Cavity Optomechanics | 193 |
| <i>Parisa Behjat, Prasoon K. Shandilya, Bishnupada Behera, Natalia C. Carvalho, Paul E. Barclay</i> | |

TUD1: LASER DYNAMICS

| | |
|---|-----|
| Thermal Stabilization of a Brillouin Laser | 195 |
| <i>William Loh, Dave Kharas, Ryan Maxson, Gavin N. West, Alexander Medeiros, Danielle Braje, Paul W. Juodawlkis, Robert McConnell</i> | |
| Intensity Noise and Nonlinear Properties of a Hybrid Plasmonic Distributed Feedback Laser | 197 |
| <i>D. Cui, J. Chen, H. Huang, S. Ding, D. Costantini, R. Colombelli, A. Boussekou, F. Grillot</i> | |

| | |
|--|-----|
| Gain and Cross-Saturation Effect on Injection Locking in Dual-Wavelength Lasers | 199 |
| <i>Shahab Abdollahi, Pablo Marin-Palomo, Martin Virte</i> | |
| Phase-Tuned Optical Feedback for Multi-Wavelength Laser Control | 201 |
| <i>Mathieu Ladouce, Pablo Marin-Palomo, Martin Virte</i> | |
| Time Delay Signature Suppression in Semiconductor Laser with Double Optical Feedback | 203 |
| <i>Robbe De Mey, Spencer W. Jolly, Alexandre Locquet, Martin Virte</i> | |
| Properties of FBG Feedback and Laser Dynamics | 205 |
| <i>Martin Skänderas, Spencer W. Jolly, Martin Virte</i> | |

TUE1: MODULATORS

| | |
|--|-----|
| 30 Gb/s NRZ Transmission with Lumped-Element Silicon Photonic Mach-Zehnder Modulator..... | 207 |
| <i>Simone Cammarata, Philippe Velha, Fabrizio Palla, Fabrizio Di Pasquale, Sergio Saponara, Stefano Faralli</i> | |
| Current-Driven Magneto-Optic Modulator for Low-Impedence Superconducting Circuits | 209 |
| <i>Paolo Pintus, Leonardo Ranzani, Sergio Pinna, Duanni Huang, Martin V. Gustafsson, Fotini Karinou, Giovanni Andrea Casula, Yuya Shoji, Yota Takamura, Tetsuya Mizumoto, Mohammad Soltani, John E. Bowers</i> | |
| A High-Speed EML on Sub-Mount for 200G PAM4..... | 211 |
| <i>Mizuki Shirao, Hiroshi Miura, Takuma Fujita, Shinya Okuda, Asami Uchiyama, Nobuo Ohata</i> | |

TUF1: MODULATION AND DETECTION SYSTEMS

| | |
|---|-----|
| Iterative Field Reconstruction in Direct-Detection Receiver Using the Fienup Input-Output Algorithm | 213 |
| <i>Masayuki Matsumoto</i> | |
| Mode Vector Modulation Direct-Detection Receivers with Linear Hardware Complexity | 215 |
| <i>Jaroslav Kwapisz, Ioannis Roudas, Eric Fink, Aishik Biswas</i> | |
| Multi-Dimensional Optical Transmission Based on QAM-PIRFSK-DPSK Optical Modulation | 217 |
| <i>Inho Ha, Joungmoon Lee, Jinwoo Park, Sang-Kook Han</i> | |
| Experimental Demonstration of an Optical Half-Adder of Two 4-PSK, 10-Gbit/s Channels Using Nonlinear Wave Mixing | 219 |
| <i>Hao Song, Kaiheng Zou, Narek Karapetyan, Amir Minoofar, Huibin Zhou, Xinzhou Su, Ahmed Almaiman, Jonathan L. Habif, Moshe Tur, Alan E. Willner</i> | |

TUG1: EMERGING MATERIAL PLATFORMS

| | |
|---|-----|
| Ferroelectric ScAlN: Epitaxy, Properties, and Emerging Photonic Device Applications | 221 |
| <i>Jiangnan Liu, Walter Shin, Ping Wang, Ding Wang, Mohammad Soltani, Zetian Mi</i> | |
| Elastic Properties of Amorphous Thin Film Oxides..... | 223 |
| <i>Mariana A. Fazio, Alena Ananjeva, Le Yang, Gabriele Vajente, Carmen S. Menoni</i> | |

| | |
|--|-----|
| MoO _x : A Transparent Phase Change Material for Integrated Photonics Applications? | 225 |
| <i>Sandeep S. Saseendran, Tangla D. Kongnyuy, Bruno Figeys, Kamal John Sundar, Jean Philippe Soulie, Danny Goosens, Shreya Kundu, Roelof Jansen, Xavier Rottenberg, Philippe Soussan</i> | |

TUH1: LIGHT IN THREE-DIMENSIONS

| | |
|--|-----|
| Multiple-View and Multi-Fluorophore Fluorescent Endoscopy Via Spectral Multiplexing | 227 |
| <i>Saeed Bohlooli Darian, Youngkyu Kim, Kwanhee Lee, Bjorn Paulson, Jun Ki Kim</i> | |
| Microfabricated Low-Profile High Tunable LC Fresnel Lens for Smart Contacts..... | 229 |
| <i>Aishwaryadev Banerjee, Chayanjit Ghosh, Mohit Karkhanis, Adwait Deshpande, Erfan Pourshaban, Hanseup Kim, Carlos H. Mastrangelo</i> | |

TUA2: AVALANCHE PHOTODETECTORS

| | |
|--|-----|
| Recent Advances in Low-Noise Avalanche Photodiodes..... | 231 |
| <i>Joe C. Campbell, Seth R. Bank</i> | |
| High-Speed Waveguide Integrated Avalanche Photodiode for InP-PICs..... | 233 |
| <i>Tobias Beckerwerth, Hendrik Boerma, Trung Thanh Tran, Patrick Runge, Felix Ganzer, Martin Schell</i> | |
| Temperature-Compensated Biasing for Single-Photon Avalanche Diode Sensors | 235 |
| <i>Wei Jiang, M. Jamal Deen</i> | |
| InGaAs/InP Single Photon Avalanche Diodes for Quantum Communication and Sensing | 237 |
| <i>Pascal Rustige, Lorenz Eckoldt, Alwaleed Fleehean, Felix Ganzer, Patrick Runge, Martin Schell</i> | |
| Junction Design Guideline of Silicon Single-Photon Avalanche Diodes for Edge Breakdown Suppression | 239 |
| <i>Haewon Lee, Dongseok Shin, Hyejeong Choi, Ilgu Yun</i> | |
| Power Handling Capability of All-Silicon Avalanche Photodetector Operating at 1550 nm..... | 241 |
| <i>Yanran Xie, Ranjan Das, Andrew P. Knights</i> | |

TUB2: PHOTONIC LIDARS 2

| | |
|--|-----|
| High-Resolution Wide-Angle Lidar Using Counter-Propagating Beams with Orthogonal Polarizations | 243 |
| <i>Yuxuan He, Qiang Wang, Zhongqi Pan, Yang Yue</i> | |
| Integrated Optical Beam Scanning and FMCW Ranging Using Multiplexed Tunable Lasers..... | 245 |
| <i>Wim Bogaerts, Mennatallah Kandil, Marcus S. Dahlem</i> | |
| Highly Linear FMCW Signal Using an InP Integrated Tunable Laser..... | 247 |
| <i>L. Zhang, F. Lemaitre, M. Gagino, S. Latkowski, K. A. Williams, V. Dolores</i> | |
| Coherent Doppler LiDAR Using Novel MEMS-Based Optical Phased Array Scanner..... | 249 |
| <i>Sean Wolfe, Naoki Yamaguchi, Yuki Ashida, Sze Yun Set, Shinji Yamashita</i> | |

TUC2: LIGHT-MATTER INTERACTIONS IN RESONANT STRUCTURES

| | |
|--|-----|
| Carrier Dynamics in Nonlinear Photonic Nanocavities with Extreme Dielectric Confinement..... | 251 |
| <i>Marco Saldutti, Yi Yu, Philip Trost Kristensen, George Kountouris, Jesper Mork</i> | |
| Double Strong Coupling in Perovskite and WS ₂ Monolayer Based on High-Q Mode..... | 253 |
| <i>Ibrahim A. M. Al-Ani, Nusrat Alim, Khalil As'Ham, Mohammed Alaloul, Lujun Huang, Andrey Miroshnichenko, Haroldo Hattori</i> | |
| Design and Fabrication of a Subwavelength Perforated Infrared Absorber with Reduced Thermal Mass | 255 |
| <i>Avijit Das, Merlin Mah, Joseph Talghader</i> | |

TUD2: NONLINEAR RESONATORS

| | |
|---|-----|
| Conditions for Dual-Pumped Optical Parametric Oscillation in Silicon Nitride Ring Cavities | 257 |
| <i>Menglong He, Kambiz Jamshidi</i> | |
| Determining the Transverse Mode that Produces Frequency Combs in Microresonators..... | 259 |
| <i>Logan Courtright, Zhen Qi, Thomas F. Carruthers, Curtis R. Menyuk, Tanvir Mahmood, Sang-Yeon Cho, James P. Cahill, Weimin Zhou</i> | |

TUE2: SIGNAL PROCESSING

| | |
|---|-----|
| Group-Velocity Dispersion Compensation Over a 70.56-Km Fibre-Optic Telecom Link Using a cm-Long In-Fibre Device | 261 |
| <i>Saket Kaushal, Anthony Roberge, Raman Kashyap, José Azaña</i> | |
| Optical Heterodyning with FP Laser Based Comb Source for 65 GHz MMW Generation | 263 |
| <i>Rangana Banerjee Chaudhuri, Haixuan Xu, Lakshmi Narayanan Venkatasubramani, Amol Delmade, Colm Browning, Yonglin Yu, Liam P. Barry</i> | |
| Gated Recurrent Neural Networks Based Pre-Distortion for Digital-To-Analog Converter..... | 265 |
| <i>Hamza Imtiaz, Zibo Zheng, Rizan Homayoun Nejad, Ming Zeng, Leslie A. Rusch</i> | |
| Linear and Nonlinear Compensation for High Baud Rate QAM Transmission with Silicon Modulator | 267 |
| <i>Zibo Zheng, Abdolkhalegh Mohammadi, Xiaoguang Zhang, Wei Shi, Leslie A. Rusch</i> | |

TUF2: ROF AND FREE SPACE OPTICAL SYSTEMS

| | |
|--|-----|
| Gb/s Optical Wireless Communications Up to 17 Meters Using a UV-C Micro-Light-Emitting Diode..... | 269 |
| <i>Daniel M. Maclure, Jonathan J. D. McKendry, Cheng Chen, Enyuan Xie, Jordan Hill, Erdan Gu, Johannes Herrnsdorf, Harald Haas, Martin D. Dawson</i> | |
| Investigation of Wavy Surface Impact on Non-Line-Of-Sight Underwater Optical Wireless Communication | 271 |
| <i>Chengwei Fang, Shuo Li, Ke Wang</i> | |
| Detection of Non-Line-Of-Sight Contributions for Visible Light Positioning by Polarization..... | 273 |
| <i>Jorik De Bruycker, Willem Raes, Stanislav Zvanovec, Nobby Stevens</i> | |

| | |
|--|-----|
| Constant-Envelope Modulation of Orbital Angular Momentum Modes with 25 Gbit/s Underwater Optical Communication Through Turbidity | 275 |
| <i>E. Robertson, J. Free, K. Dai, J. Wiley, J. K. Miller, E. Johnson Holcombe</i> | |

TUG2: QUANTUM PHOTONIC COMPUTATION

| | |
|---|-----|
| Quantum Photonic Chip for Binary Classification of Financial Data | 277 |
| <i>H. X. Lin, H. Zhang, L. X. Wan, M. F. Karim, H. Cai, L. C. Kwek, A. Q. Liu</i> | |
| Modeling Integrated Quantum Frequency Processors | 279 |
| <i>Benjamin E. Nussbaum, Andrew J. Pizzimenti, Navin B. Lingaraju, Hsuan-Hao Lu, Joseph M. Lukens</i> | |

TUH2: NOVEL TECHNIQUES

| | |
|---|-----|
| VCSEL Arrays as Chip Scale Sources for Ultra-High Density Diffuse Optical Tomography | 281 |
| <i>Ning Zhang, Quan Zhang, Kent D. Choquette, Arto Nurmikko</i> | |
| On-Chip Structured Illumination Microscopy (cSIM) with Large Imaging Area | 283 |
| <i>Firehun Tsige Dullo, Nikhil Jayakumar, Karolina Milenko, Balpreet Singh Ahluwalia</i> | |
| Photonic Chip for High-Contrast and High-Resolution Label-Free Optical Microscopy of Nano-Particles | 285 |
| <i>Nikhil Jayakumar, Balpreet Singh Ahluwalia, Firehun T. Dullo</i> | |

TUA3: LASER SPECTRAL CONTROL

| | |
|--|-----|
| Dual-Wavelength Laser in the C-Band with Narrow-Linewidth Reduced by Optical Feedback | 287 |
| <i>Mónica Far Brusatori, Holger Klein, Nicolas Volet</i> | |
| Flat Comb Convolution on Deeply Phase Modulated Light for Broader Spectral Enhancement of Comb Generation | 289 |
| <i>Takahide Sakamoto, Ishijima Tatsuki</i> | |
| Flat-Top Supercontinuum Generation Based on Electro-Optic Optical Frequency Combs with Programmable Repetition Rate Up to 50 GHz | 291 |
| <i>Minhyup Song, Minje Song, Hyunjong Choi, Taehyun Lee, Gyudong Choi, Youngjin Jung, Joon Tae Ahn, Seungyoung Lim</i> | |
| Wavelength Stabilization of Fabry-Pérot Tunable Filter Based Wavelength-Swept Laser for Dynamic Fiber-Optic Sensors | 293 |
| <i>Byeong Kwon Choi, Soyeon Ahn, Ji Su Kim, Srinivas Pagidi, Min Yong Jeon</i> | |

TUC3: TOPOLOGICAL PHOTONICS

| | |
|--|-----|
| Single-Mode Emission from a Monolithically Integrated III-V/Si Topological Lattice | 295 |
| <i>Markus Scherrer, Seonyeong Kim, Balz Hedinger, Hee Jin Choi, Heinz Schmid, Chang-Won Lee, Kirsten E. Moselund</i> | |
| Robust Programmable PIC Platform Based on Topological Photonic Insulator Lattice | 297 |
| <i>Hanfa Song, Vien Van</i> | |

TUD3: ADVANCES IN NEUROPHOTONICS II

| | |
|---|-----|
| Two-Person Multimodal Imaging Using Functional Near Infrared Spectroscopy Reveals Neural Mechanisms for Emotional Contagion | 299 |
| <i>Joy Hirsch</i> | |

TUE3: INTEGRATED PHOTONICS IN ARTIFICIAL INTELLIGENCE

| | |
|---|-----|
| High-Density Integrated Photonic Tensor Processing Unit with a Matrix Multiply Compile..... | 301 |
| <i>Hamed Dalir, Behrouz Movahhed Nouri, Xiaoxuan Ma, Peserico Nicola, Bhavin J. Shastri, Volker J. Sorger</i> | |
| AnalogVNN: A Fully Modular Framework for Photonic Analog Neural Networks..... | 303 |
| <i>Vivswan Shah, Nathan Youngblood</i> | |
| A High-Speed Photonic Tensor Accelerator | 305 |
| <i>Alireza Fardoost, Fatemeh Ghaedi Vanani, Zheyuan Zhu, Christopher Doerr, Shuo Pang, Guifang Li</i> | |
| Spectral Emissivity Prediction in Multi-Resonant Systems | 307 |
| <i>Romil Audhkhasi, Michelle L. Povinelli</i> | |
| FFT-Based Convolution Neural Network on Silicon Photonics Platform..... | 309 |
| <i>Nicola Peserico, Russell Schwartz, Hangbo Yang, Xiaoxuan Ma, Mostafa Hosseini, Puneet Gupta, Hamed Dalir, Volker J. Sorger</i> | |

TUF3: NOVEL TECHNOLOGIES FOR COMPUTING & HIGH CAPACITY TRANSMISSION

| | |
|--|-----|
| EDFA-Free Net 500 Gbps Transmission Over 2 Km Using a Thin-Film Lithium Niobate IQM | 311 |
| <i>Essam Berikaa, Md Samiul Alam, David V. Plant</i> | |
| High Bandwidth Thin-Film Lithium Niobate MZM for Net 300 Gbps/ λ IM/DD Transmission..... | 313 |
| <i>Md Samiul Alam, Essam Berikaa, David V. Plant</i> | |

TUG3: COMPONENTS, SUBSYSTEMS AND INTEGRATION TECHNOLOGIES

| | |
|---|-----|
| Si ₃ N ₄ Waveguide Polarization Components for Atomic Systems | 315 |
| <i>Kevin Gallacher, Paul F. Griffin, Erling Riis, Marc Sorel, Douglas J. Paul</i> | |
| Silicon Photonics Optical Mode Division Multiplexing Integrated with Internal Modulators..... | 317 |
| <i>Chen-Yu Ye, Rih-You Chen, Yong-Kuan Kuo, Chen-Feng Huang, Wei-Cheng Fong, Yi-Jen Chiu</i> | |
| Synthesis of Narrowband Spectral Filters in Active Photonic Multi-Project Wafer Runs | 319 |
| <i>Saleha Fatema, Lucas M. Cohen, Navin B. Lingaraju, Andrew M. Weiner</i> | |
| Compact Inverse Designed Integrated 1 x 3 Silicon Nitride Balanced Optical Power Splitter | 321 |
| <i>Joel B. Slaby, Alec M. Hammond, Stephen E. Ralph</i> | |

TUH3: COMPUTATION AND MACHINE LEARNING

| | |
|--|-----|
| Label-Free Hyperspectral Imaging and Deep-Learning Prediction of Retinal Amyloid β -Protein and Phosphorylated Tau | 323 |
| <i>Xiaoxi Du, Yosef Koronyo, Chengshuai Yang, Maya Koronyo-Hamaoui, Liang Gao</i> | |
| Laser Speckle Image Analysis and Classification of Atherosclerotic Plaques from Carotid Artery Phantoms | 326 |
| <i>Anoosha Venkatraman Hegde, Sujatha Narayanan Unni</i> | |

WA1: ULTRASHORT PULSES

| | |
|---|-----|
| Stochastic and Quantum Phenomena in Microcombs | 328 |
| <i>Fengyu Liu, Yanne K. Chembo</i> | |
| Q-Switched and Mode-Locked Fiber Laser Based on Uracil Doped DNA Thin Solid Film Saturable Absorber | 330 |
| <i>Marjan Ghasemi, Pulak Chandra Debnath, Byungjoo Kim, Dong Il Yeom, Kyunghwan Oh</i> | |
| Noise Suppression in a 10 GHz Octave-Spanning Frequency Comb | 332 |
| <i>Pooja Sekhar, Connor Fredrick, Tsung-Han Wu, Stephanie Swartz, Scott A. Diddams</i> | |

WB1: MACHINE LEARNING

| | |
|--|-----|
| Enhanced Photonic Time-Stretch Reservoir Computing Using All-Optical Input Masks..... | 334 |
| <i>Yuanli Yue, Shouju Liu, Yanrong Zhai, Chao Wang</i> | |
| Modeling of Optical Matrix Multipliers Using Transposed Convolutional Neural Networks | 336 |
| <i>Ali Cem, Siqi Yan, Uiana Celine De Moura, Yunhong Ding, Darko Zibar, Francesco Da Ros</i> | |

WC1: PIC TECHNOLOGIES FOR EMERGING APPLICATIONS

| | |
|--|-----|
| High Performance 300mm Silicon Photonics Platform for R&D and Product Prototyping..... | 338 |
| <i>B. Szelag, S. Garcia, L. Adelmini, M. Kazarmendes, S. Guerber, S. Congia, A. Myko, P. Grosse, L. Viro, Q. Wilmart</i> | |
| Hardware-Related Photonic Design on Silicon Monolithic Technology Using Process-Enabled Simulation Workflow | 340 |
| <i>Seyed Milad Mahpeykar, Jignesh Patel, Xu Wang, Frank Pavlik</i> | |

WD1: MICROWAVE PHOTONICS 1

| | |
|--|-----|
| Microwave Photonics: Opportunities and Challenges | 342 |
| <i>Shilong Pan, Yamei Zhang</i> | |
| Low-Noise Photonic Signal Synthesis for mm-Wave Radar..... | 344 |
| <i>Eric Kittlaus, Peter Rakich, Ken Cooper</i> | |

WE1: DETECTORS

- Low Crosstalk InP-Based Arrayed Waveguide Grating PIC..... 346
Alexander Schindler, Anna-Belle Garten, Hendrik Boerma, Felix Ganzer, Patrick Runge, Martin Schell
- High Speed Si-Waveguide Coupled III-V Photodetectors Selectively Grown on SOI by Lateral MOCVD 348
Ying Xue, Yu Han, Yi Wang, Jie Li, Jingyi Wang, Zunyue Zhang, Xinlun Cai, Hon Ki Tsang, Kei May Lau
- High-Speed Avalanche Photodiodes with Composite Charge Layer and Flip-Chip Bonding Package for 106 Gbit/sec Transmission..... 350
Naseem Naseem, Syed Hasan Parvez, Zohauddin Ahmad, Jin-Wei Shi
- Influences of Charge Layer Doping Density in Avalanche Photodiode with Multiple M-Layers Facilitating Higher Saturation Current and Responsivity for FMCW Lidar Applications 352
Zohauddin Ahmad, Po-Shun Wang, Naseem Naseem, You-Chia Chang, Jin-Wei Shi

WF1: SPATIAL DIVISION MULTIPLEXING

- Scaling Up SDM Transmission Capacity 354
Filipe Marques Ferreira, Fabio Aparecido Barbosa, Alfonso Ruocco, Mu-Chieh Lo
- 109.3-Tb/s Transmission Over a 3,120 Km Uncoupled 4-Core Fiber Using Probabilistic Shaping Techniques..... 356
Shohei Beppu, Daiki Soma, Noboru Yoshikane, Takehiro Tsuritani
- Scaling Spatial Multiplexing with Principal Modes 358
Fabio Aparecido Barbosa, Filipe Marques Ferreira
- Equalizer Complexity in OAM Transmission Systems Using a Standard PDM Coherent Receiver 360
Mai Banawan, Satyendra K. Mishra, Ariane Gouin, Nathalie Bacon, Xun Guan, Lixian Wang, Sophie Larochelle, Leslie A. Rusch
- Crosstalk Analysis in a Standard 3-Ring Core 40-OAM Mode Fiber for Data Center Application..... 362
Rizan H. Nejad, Mai Banawan, Leslie A. Rusch

WG1: INTEGRATED PHOTODETECTION SYSTEMS

- New Generation of Embedded Planar Optics for In-Situ, through-Thickness and Real-Time Strain Measurements in Carbon Fiber Reinforced Polymer Composites During the Cure Process..... 364
Shahrzad Zahertar, Michael Godfrey, Martynas Beresna, Timothy Lee, Charlie Godfrey, Bruno Moog, Richard Day, Janice Dulieu-Barton, Christopher Holmes
- Double Slot Micro Ring Resonators with Inner Wall Angular Gratings as Ultra Highly Sensitive Biochemical Sensors 366
Weiying Cheng, Shengwei Ye, Xiao Sun, Bocheng Yuan, John H. Marsh, Lianping Hou
- Suppression of External Vibrations Using an Electrowetting Lens..... 368
Eduardo J. Miscles, Wei Yang Lim, Omkar D. Supekar, Mo Zohrabi, Juliet T. Gopinath, Victor M. Bright

| | |
|---|-----|
| Directional Bending Sensor Using Negative Curvature Fibers with Asymmetric Nested Cladding Tubes | 370 |
| <i>Chengli Wei, Curtis R. Menyuk, Jonathan Hu</i> | |
| Folding Boundary Reduction in Self-Reset Image Sensor by Double Readout Technique..... | 372 |
| <i>Kiyotaka Sasagawa, Makito Haruta, Pakpuwadon Thanet, Hironari Takehara, Hiroyuki Tashiro, Jun Ohta</i> | |
| Exceeding Hardware Confined Bandwidth in Incoherent Optical Frequency Domain Reflectometry | 374 |
| <i>Lisa-Sophie Haerteis, Esther Renner, Bernhard Schmauss</i> | |

WH1: PROGRESS IN MICROSCOPY I

| | |
|---|-----|
| Full-Wave Modelling of Two-Photon Microscopy with Spatiotemporal Focussing..... | 376 |
| <i>Philip Wijesinghe, Kishan Dholakia, Peter R. T. Munro</i> | |
| Tunable Depth Illumination with Multi-Angle TIRF and Epi-Fluorescence Implemented on Selective Regions in the Field-Of-View | 378 |
| <i>Yundon Jeong, Taeseong Woo, Jung-Hoon Park</i> | |
| High-Speed Drift Tracking for High-Throughput Localization Microscopy | 380 |
| <i>Hongqiang Ma, Maomao Chen, Yang Liu</i> | |

WA2: HIGH POWER EMITTERS AND FIBER LASERS

| | |
|--|-----|
| Capture Time as a Limit to Pulsed Power in 940 nm Broad Area Diode Lasers..... | 382 |
| <i>Anisuzzaman Boni, Hans Wenzel, Paul Crump</i> | |
| Stability Analysis of Diode Pumped Actively Mode-Locked Thulium Doped Fiber Laser | 384 |
| <i>Anjali P. S., Balaji Srinivasan, Deepa Venkitesh</i> | |
| Dual Wavelength Continuous-Wave E-Band Bismuth-Doped Fiber Laser | 386 |
| <i>Corentin Botzung, Kaboko Jean-Jacques Monga, Nelson Landry, Sophie Larochelle</i> | |
| Analysis and Reduction of Relative Intensity Noise in Thulium Doped Fiber Ring Laser | 388 |
| <i>Arjun Kurur, Anjali P. S., Balaji Srinivasan, Deepa Venkitesh</i> | |

WB2: PHOTONICS COMPUTING

| | |
|---|-----|
| Inverse Design of Mid-IR Quantum Cascade Lasers | 390 |
| <i>Y. Hu, S. Suri, J. D. Kirch, B. Knipfer, Z. Yu, D. Botez, L. J. Mawst</i> | |
| Optical Linear Operator with Optimal Fidelity | 392 |
| <i>Apostolos Tsakyridis, George Giamougiannis, Angelina Totovic, Miltiadis Moralis-Pegios, David Lazovsky, Nikos Pleros</i> | |

WC2: NANOPHOTONICS FOR SPECTROSCOPY AND SENSING

| | |
|---|-----|
| Arrayed Waveguide Grating with Reusable Delay Lines (RDL-AWG) for High Resolving Power, Highly Compact, Photonic Spectrographs..... | 394 |
| <i>Yang Zhang, Jiahao Zhan, Sylvain Veilleux, Mario Dagenais</i> | |

Silica Coated Colloidal Semiconductor Quantum Dot Supracrystal Microlasers 396
Charlotte J. Eling, Nicolas Laurand, Naresh-Kumar Gunasekar, Paul R. Edwards, Robert W. Martin

Large-Period Sinusoidal Plasmonic Grating for High Sensitivity in Refractive Index Sensing 398
Vaswati Biswas, R. Vijaya

Multi-Objective Optimization of all-Dielectric Metasurfaces Using 2D RCWA Algorithm for Sensing Applications 400
Abdullah Bin Shams, Rajat Kumar Sinha, Mo Mojahedi, J. Stewart Aitchison

WD2: NONLINEAR PHOTONIC DEVICES

Critical Coupling-Based ITO Integrated Photonics High Speed and Energy Efficient Modulator 402
Chandraman Patil, Hamed Dalir, Behrouz Movahhed Nouri, Mohammad-Ali Miri, Volker J. Sorger

Efficient and Accurate Calculation of Photodetector RF Output Power 404
Ergun Simsek, Ishraq Md Anjum, Thomas F. Carruthers, Curtis R. Menyuk, David A. Tulchinsky, Keith J. Williams, Joe C. Campbell

WE2: DISTRIBUTED FEEDBACK LASERS

AlGaInAs/InP EML with Sidewall Grating Distributed Feedback Laser and Quantum Well Intermixing Technology 406
Xiao Sun, Weiqing Cheng, Shengwei Ye, Yiming Sun, John H. Marsh, Lianping Hou

DFB Laser Array Based on Four Phase-Shifted Sampled Bragg Gratings 408
Yiming Sun, Xiao Sun, Bocheng Yuan, Yizhe Fan, John H. Marsh, Lianping Hou

Dual-Wavelength DFB Laser with 640 GHz Frequency Spacing Based on Sidewall Grating and Reconstruction Equivalent-Chirp Technology 410
Bocheng Yuan, Shengwei Ye, Yunshan Zhang, Xiangfei Chen, John H. Marsh, Lianping Hou

Dual-Wavelength DFB Laser with 1.28 THz Frequency Spacing Based on Four Phase Shifted Sampling Gratings 412
John H. Marsh, Shengwei Ye, Bocheng Yuan, Yizhe Fan, Yongguang Huang, Lianping Hou

Asymmetric Twin-Waveguide 1.55- μm DFB Lasers for an Optical Beam Forming Network 414
Shengwei Ye, Xiao Sun, Peter Read, Anthony Kelly, Lianping Hou, John H. Marsh

WF2: SECURE COMMUNICATIONS & FIBRE TRANSMISSION

Time-Gated Circuit for SPAD-Based OWC 416
Junzhi Liu, Wei Jiang, M. Jamal Deen

Eavesdropping Against Bidirectional Physical Layer Secret Key Generation in Fiber Communications 418
Wenxiu Hu, Zhuangkun Wei, Mark Leeson, Tianhua Xu

Security Performance of Physical-Layer Encryption Based on Randomized Phase Space in Optical Fiber Communication 420
Kh Arif Shahriar, Mostafa Khalil, Adrian Chan, Lawrence R. Chen, Randy Kuang, David V. Plant

| | |
|--|-----|
| Site-To-Site Tunnels Authenticated by Quantum Keys..... | 422 |
| <i>Nageswara S. V. Rao, Muneer Alshowkan, Anees Al-Najjar, Susan E. Hicks, Philip G. Evans, Joseph M. Lukens, Nicholas A. Peters</i> | |

WH2: SENSORS AND POWER GENERATION

| | |
|--|-----|
| Nighttime Electric Power Generation at a Density of 50 mW/m ² Via Radiative Cooling of a Photovoltaic Cell | 424 |
| <i>Sid Assawaworrarit, Zunaid Omair, Shanhui Fan</i> | |
| Enhanced Sensitivity Photonic Molecule Sensor Based on Embedded Tapered Microring Resonators | 426 |
| <i>André L. Moras, C. S. Valnir, Gabriel R. Ascenção, Marcus V. A. Pires, Newton C. Frateschi, Luis A. M. Barea</i> | |
| Developing a Gold Coated Fiber Brag Grating (FBG) Sensor to Monitor Chlorine Levels in Water..... | 428 |
| <i>Summer Dalgamouni, Driss Benhaddou, Stanko Brankovic</i> | |
| Development of Implantable Multimodal Sensor for Optical and Electrophysiological Recording of Mouse Brain Activity | 430 |
| <i>Kenji Sugie, Ryoma Okada, Yasumi Ohta, Hironari Takehara, Makito Haruta, Hiroyuki Tashiro, Kiyotaka Sasagawa, Jun Ohta</i> | |
| Real-Time Detection of Anthropoc Events by 10G Channels in Metro Network Segments..... | 432 |
| <i>Stefano Straullu, Francesco Aquilino, Rudi Bratovich, Fransisco M. Rodriguez, Andrea D'Amico, Emanuele Virgillito, Rosanna Pastorelli, Vittorio Curri</i> | |

WA3: INTEGRATED PHOTONICS

| | |
|--|-----|
| Visible Light Generation in Integrated Photonics | 434 |
| <i>Lin Chang, Mingxiao Li, Kerry Vahala, Qiang Lin, John E. Bowers</i> | |
| Finely Tunable Monolithically Integrated Laser with a Simple Wavelength Control Mechanism | 437 |
| <i>Martin Skänderas, Spencer W. Jolly, Martin Virte</i> | |
| Extending on-Chip Silicon Raman Lasers to 2.2 μm | 439 |
| <i>Mohammad Ahmadi, Jacques Lefebvre, Simon Lévassieur, Nelson Landry, Wei Shi, Sophie Larochelle</i> | |
| Coherent and Robust Supercontinuum Generation Based on Electro-Optic Optical Frequency Comb Generator | 441 |
| <i>Minje Song, Seungyoung Lim, Hyunjong Choi, Taehyun Lee, Gyudong Choi, Youngjin Jung, Joon Tae Ahn, Minhyup Song</i> | |

WC3: OPTICAL PHASED ARRAYS

| | |
|--|-----|
| Design and Implementation of a Flat-Focal-Field Arrayed Waveguide Grating on a Si ₃ N ₄ Platform | 443 |
| <i>Jiahao Zhan, Yang Zhang, Sylvain Veilleux, Mario Dagenais</i> | |
| High-Resolution Radiation Characterization for an Uniformly Emitted SiNx Nanophotonic Phased Array..... | 445 |
| <i>Caiming Sun Shenzhen, Binghui Li Shenzhen, Aidong Zhang Shenzhen</i> | |

Optical Phased Array with Radial Optical Antennas in a Circular Configuration..... 447
Daniel Benedikovic, Ahmad Atieh, Vincent Liu, Pavel Cheben, Tom Smy, Winnie N. Ye

Brewster Effect in Plasmonic Random Metasurfaces..... 449
Isabel Y. Rojas-Martinez, Alma K. González-Alcalde, Alejandro Reyes Coronado

WD3: QUANTUM AND NONLINEAR PHOTONIC TECHNIQUES AND APPLICATIONS

Entanglement Assisted Multistatic Radars 451
Ivan B. Djordjevic

Ultrafast Spectrogram with Sub-THz Bandwidth..... 453
Benjamin Crockett, Connor M. L. Rowe, José Azaña

High-Resolution Line-By-Line Pulse Shaper for Optically Driving Cryogenic Josephson Junctions 455
Dahyeon Lee, Takuma Nakamura, Andrew J. Metcalf, Franklyn Quinlan

WE3: MODULATORS, MODE DIVISION MULTIPLEXING AND FREE SPACE OPTICAL COMMUNICATION

High-Speed SiGe EAMs at Cryogenic Temperatures 457
Evan Chansky, Thomas Dorch, Aaron Maharry, Roshanak Shafliha, Guomin Yu, Aaron Zilkie, Steven Estrella, Larry Coldren, Clint Schow

Circularly Polarized OAM Multiplexing Using an Integrated Phased Array 459
Yuxuan Chen, Simon Levasseur, Leslie A. Rusch, Wei Shi

Feature Correction of a Topologically Optimized Mode Demultiplexer Using Deep Neural Networks 461
Md Mahadi Masnad, Dusan Gostimirovic, Yuri Grinberg, Dan-Xia Xu, Odile Liboiron-Ladouceur

Lead-Free Perovskite for Ultraviolet Micro-LEDs Based White-Light Communication..... 463
Hang Lu, Bashir Hasanov, Omar Alkhazragi, Rounak Naphade, Tien Khee Ng, Omar F. Mohammed, Osman M. Bakr, Boon S. Ooi

A Polarization Sensitive Thin Film Optical Wireless Concentrator 465
Atchutananda Surampudi, Ravinder Singh, Guanxiong Zhang, Grahame Faulkner, Martin J. Booth, Steve J. Elston, Dominic O'Brien, Stephen M. Morris

WG3: SPECTROSCOPY

Subwavelength Focusing by Way of Terahertz Microjets..... 467
Alexis N. Guidi, Michael E. Mitchell, Mark H. Bergen, Jason Reich, Jonathan F. Holzman

Frequency Comb-Calibrated Laser Heterodyne Radiometry for Greenhouse Gas Monitoring..... 469
Ryan K. Cole, Connor Fredrick, Scott A. Diddams

WH3: PROGRESS IN MICROSCOPY II

Continuous-Wave Nonlinear Microscopy Using Rare-Earth Doped Upconverting Nanoparticles..... 471
Jeongmo Kim, Seunghun Lee, Yundon Jeong, Kyunghwan Kim, Kibum Nam, Heungjin Ryu, Jinmyoung Joo, Jung-Hoon Park

Unsupervised Analysis of FLIM-FRET Data..... 473
Francesco Masia, Walter Dewitte, Paola Borri, Wolfgang Langbein

Dual-Polarization Bimodal Waveguide Interferometer..... 475
Christian Schweikert, Shengyuan Zhao, Niklas Hoppe, Wolfgang Vogel, Manfred Berroth

POSTER SESSION & RECEPTION

Analysis of the Optical Coupling Between 2.3 μm GaSb Diode Lasers and Passive Waveguides for Monolithic Integration on Si Platforms..... 477
Michele Paparella, Laura Monge Barlome, Laurent Cerutti, Jean Baptiste Rodriguez, Marco Grande, Liam O'Faolain, Eric Tournié

Optimum Power for Incoherent Beam Combination in Atmospheric Turbulence 479
Mukesh Kumar, Arpit Khandelwal, Syed Azeemuddin, Jagannath Nayak

Designing a Wideband Silicon Nitride Interleaver..... 481
Farshid Shateri, Wei Shi, Alireza Geravand

Using Surrogate Models to Reduce the Design Complexity of Fiber Amplifiers with Heterogeneous Doping..... 483
Hamed Rabbani, Sophie Larochelle, Leslie A. Rusch

Phase-Predistortion of Optical On-Off-Keying with Direct Detection to Counteract Fiber Chromatic Dispersion..... 485
Ulrike Höfler, Norbert Hanik

White Light Propagation Through a Dispersive Thick Lens and Selective Pn Junction Placement in RGB Planes for Optimal Conversion Efficiency..... 487
Salaheddeen G. Bugoffa, Monish R. Chatterjee

Network Traffic Analysis of Modular Multiband Integrated WSS Based ROADMs 489
Muhammad Umar Masood, Ihtesham Khan, Lorenzo Tunesi, Bruno Correia, Enrico Ghillino, Paolo Bardella, Andrea Carena, Vittorio Curri

Stabilization of Laser-Induced Plasma on Turbulent Flame Boundaries with Electron Seeding 491
Seonwoong Kim, Jongwun Choi, Hosung Byun, Taekeun Yoon, Hyungrok Do

Reducing Latency in Sensing for Optical Convolutional Neural Network..... 493
Russell L. T. Schwartz, Zibo Hu, Shurui Li, Maria Solyanik-Gorgone, Puneet Gupta, Volker J. Sorger

Performance Mapping of InP QDs Passively Monolithic Mode-Locked Lasers..... 495
Reem Alharbi, Craig P. Allford, Zhibo Li, Samuel Shutts, Andrey Krysa, Peter M. Snowton

Visible Colors Realized by TiO₂ Nanostructure..... 497
Nusrat Alim, Ibrahim A. M. Al-Ani, Reza Masoudian Saadabad, Lujun Huang, Haroldo T. Hattori, Andrey Miroshnichenko

Low-Profile Stacked Digitally Tunable LC Fresnel Lens for Smart Contact Lens System 499
Chayanjit Ghosh, Aishwaryadev Banerjee, Mohit Karkhanis, Erfan Pourshaban, Hanseup Kim, Carlos H. Mastrangelo

Photonic Crystal Slab Metalens..... 501
Zhonghe Liu, Mingsen Pan, Aaron Liu, George Kelly, Matthew Sampsell, Jian Liu, Weidong Zhou

| | |
|--|-----|
| Phase Modulation of the Input Signal Improves Performance of Reservoir Computing..... | 503 |
| <i>Ian Bauwens, Krishan Harkhoe, Peter Bienstman, Guy Verschaffelt, Guy Van Der Sande</i> | |
| Effect of N-Type Doped Layer on Side-Illuminated Photoconductive Semiconductor Switch | 505 |
| <i>Pyuenghwi Choi, Yongpyo Kim, Sung-Min Hong, Sungbae Lee, Jae-Hyung Jang</i> | |
| Accurate Generation of Eigenvalue Spectra for Lumped Laser Models Using Numerical Linearization..... | 507 |
| <i>Pradyoth H. Shandilya, Shaokang Wang, Curtis R. Menyuk</i> | |
| Machine Learning Compact Device Models Applied to Optoelectronic Memristor..... | 509 |
| <i>Albert Lin, Tejender Rawat, Ming Hsien Hsu, Han-Chun Tung, Tseung Yuen Tseng</i> | |
| Scalable Bandwidth and High-Precision Spectral Measurement by Frequency Chirped Comb | 511 |
| <i>Mu-Chieh Lo, Ronit Sohanpal, Zichuan Zhou, Zhixin Liu</i> | |
| Optical Interferometer with On-Chip Amorphous Silicon Photodiode for Biosensing Applications..... | 513 |
| <i>Badrul Alam, Alessio Buzzin, Francesca Grossi, Domenico Caputo, Giampiero De Cesare, Rita Asquini</i> | |
| Design of Silicon Photonic Mode-Sensitive Thermo-Optic Phase Shifter Based on Subwavelength Grating Structures..... | 515 |
| <i>Kaveh Rahbardar Mojaver, Guowu Zhang, Odile Liboiron-Ladouceur</i> | |
| Ultra-Broadband Silicon Polarization Independent 3-DB Coupler Using Multi-Parameter Adiabaticity Engineering..... | 517 |
| <i>Hung-Ching Chung, Shuo-Yen Tseng</i> | |
| Availability Analysis for Reliable Distributed Fiber Optic Sensors Placement | 519 |
| <i>Zilong Ye, Philip N. Ji, Ting Wang</i> | |
| Limit of Bandwidth, Output Power and Noise Figure of Bismuth Doped Fiber Amplifier for E and S Band | 521 |
| <i>Lixian Wang, Zhiping Jiang</i> | |
| Modeling of Evanescently Coupled Waveguide MUTC Photodiodes with High Bandwidth | 523 |
| <i>Yegao Xiao, Zhiqiang Li, Zhanming S. Li</i> | |
| Wavelength Agile Quantum Dot Laser for Lab-On-Chip Optical Biosensors | 525 |
| <i>Francesco Masia, Nadhia Monim, Wolfgang Langbein</i> | |
| Remote Photoplethysmography Unmasks Glabrous Skin Temporal Lead Over Non-Glabrous | 527 |
| <i>Timothy Burton, Gennadi Saiko, Meiyun Cao, Alexandre Douplik</i> | |

THA1: PHOTONIC CRYSTAL LASERS AND VCSELS

| | |
|---|-----|
| Analysis of Supermode Dynamics of Coherent Dual-Element Photonic Crystal VCSEL Arrays | 529 |
| <i>Nusrat Jahan, William North, Pawel Strzebonski, Kent D. Choquette</i> | |
| Impact of Cavity Resonance Detuning on Watt-Level PCSELS..... | 531 |
| <i>Akhil Kalapala, Kevin Reilly, Thomas Rotter, Chhabindra Gautam, Mingsen Pan, Zhonghe Liu, Yudong Chen, Ming Zhou, Ricky Gibson, Robert Bedford, Luke Overman, Shanhui Fan, Ganesh Balakrishnan, Weidong Zhou</i> | |

| | |
|--|-----|
| Comparative Study of 940 nm VCSELs Grown on Ge and GaAs Substrates | 533 |
| <i>Jack Baker, Craig P. Allford, Sara Gillgrass, T. Peach, Andrew D. Johnson, Andrew M. Joel, Sung Wook Lim, Matthew Geen, J. Iwan Davies, Samuel Shutts, Peter M. Smowton</i> | |
| Frozen Mode Regime and Stationary Inflection Points in a Coupled Three Waveguides Model | 535 |
| <i>Kessem Zamir, Jacob Scheuer</i> | |
| Machine Learning Assisted Extraction of Vertical Cavity Surface Emitting Lasers Parameters | 537 |
| <i>Ihtesham Khan, Lorenzo Tunesi, Muhammad Umar Masood, Enrico Ghillino, Andrea Carena, Vittorio Curri, Paolo Bardella</i> | |

THB1: NOVEL PHENAMENA

| | |
|--|-----|
| On-Chip Quasi-Light Storage for Long Optical Delays | 539 |
| <i>Lachlan Goulden, Max Kiewiet, Yang Liu, Choon Kong Lai, Duk-Yong Choi, Stephen J. Madden, Benjamin J. Eggleton, Moritz Merklein</i> | |
| Saturable Absorption of a Double Layer Graphene Modulator on a Slot Waveguide | 541 |
| <i>T. Reep, C. Wu, Z. Wang, S. Brems, S. Clemmen, C. Huyghebaert, J. Van Campenhout, M. Pantouvaki, D. Van Thourhout, B. Kuyken</i> | |

THC1: ADVANCED FABRICATION FOR SILICON PHOTONICS

| | |
|---|-----|
| Selective Regrowth of InGaAs/InP MQWs on SOI for Telecom Band Emission | 543 |
| <i>Jie Li, Ying Xue, Zhao Yan, Yu Han, Kei May Lau</i> | |
| Continuous Roller Transfer-Printing of QVGA Semiconductor Micro-Pixel Arrays | 545 |
| <i>Eleni Margariti, Benoit Guilhabert, Gemma Quinn, Dimitars Jevtics, Martin D. Dawson, Michael J. Strain</i> | |
| Manufacturing of Nanostructures in Silicon Carbide Using UV-Nanoimprint Lithography in Combination with Fluorine-Based Plasma Etching | 547 |
| <i>Thomas Handte, Martin Hofmann, Arne Behrens, Stefan Sinzinger</i> | |
| Two-Dimensional Individually Addressible Electrowetting Micro-Lens Array | 549 |
| <i>Samuel D. Gilinsky, Mo Zohrabi, Omkar D. Supekar, Wei Yang Lim, Victor M. Bright, Juliet T. Gopinath</i> | |

THD1: MICROWAVE PHOTONICS 2

| | |
|---|-----|
| 10-GHz Imaging by an Electro-Optic Imaging System Based on Polarization CMOS Image Sensor | 551 |
| <i>Ryoma Okada, Kiyotaka Sasagawa, Maya Mizuno, Hironari Takehara, Makito Haruta, Hiroyuki Tashiro, Jun Ohta</i> | |
| Fiber-Nonlinearity Cancellation of 8-PSK Radio-On-Fiber Signals by Conjugated RoF Based on Photonic Dual-Sideband Upconversion and Asymmetric Heterodyne Downconversion | 553 |
| <i>Takahide Sakamoto, Shuhei Otsuka, Tatsuki Ishijima, Hideto Takayasu</i> | |
| Towards 6G: The Evolution of Passive Optical Networks | 555 |
| <i>Elaine Wong</i> | |

THE1: SPECIALTY OPTICAL FIBERS FOR COMMUNICATION AND SENSING

- Distributed Optical Fiber Sensing Using Specialty Optical Fibers..... 557
Philip N. Ji, Giovanni Milione, Yue-Kai Huang, Jian Fang, Ezra Ip, Yaowen Li, Ming-Fang Huang, Shuji Murakami, Yuheng Chen, Ting Wang
- Semiconductor Optical Fiber: On-Chip Optoelectronics in Fiber Form..... 559
John Ballato

THF1: EMERGING PHOTONIC TECHNOLOGIES FOR QUANTUM APPLICATIONS

- Single-Mode Distributed Feedback Lasers for ^{87}Rb Two-Photon Quantum Technology Systems 561
Eugenio Di Gaetano, Brendan Keliehor, Paul Griffin, Marc Sorel, Erling Riis, Douglas J. Paul
- Compact and Robust Bent Axis Waveguide Coupler with a Sign Flip of the Phase Mismatch 563
Bing-Tsong Wu, Shuo-Yen Tseng
- Optomechanical Crystal Nanobeam Cavities in Single Crystal Diamond..... 565
Elham Zohari, Joseph E. Losby, Waleed El-Sayed, Parisa Behjat, Gustavo De Oliveira Luiz, John P. Davis, Paul E. Barclay
- Photon-Number Resolving Detection Based on High Efficiency InGaAs/InAlAs Single Photon Avalanche Diode 567
Chi-En Chen, Qi-Xian Wu, Wei-Hong Kan, Yu-Jie Teng, Jin-Wei Shi, Yi-Shan Lee

THG1: IMAGING AND MICROSCOPY

- Time-Resolved Complex Optical-Field Imaging of Laser Ablation Dynamics 569
Shotaro Kawano, Keiichiro Toda, Haruyuki Sakurai, Kuniaki Konishi, Takuro Ideguchi

THH1: ADVANCES IN IR DETECTORS

- Separate Absorption, Charge, and Multiplication Avalanche Photodiode with a Digital Alloy $\text{Al}_{0.05}\text{In}_{0.95}\text{As}_{0.93}\text{Sb}_{0.07}$ Absorber for Mid-IR Detection 571
Adam A. Dadey, J. Andrew McArthur, Seth R. Bank, Joe C. Campbell
- Bias-Free Operation of Type-II GaInAsSb/InP High Speed Uni-Travelling Carrier Photodiodes..... 573
Rimjhim Chaudhary, Akshay M. Arabhavi, Olivier Ostinelli, Colombo. R. Bolognesi
- MWIR InAs/InAsSb type-II Superlattice Photodetector for High-Speed Operation..... 575
Zhecheng Dai, Jian Huang, Baile Chen
- Proton Irradiation Effects on Mid-Wave Infrared InGaAs/InAsSb Superlattice nBn Photodetectors..... 577
Alexander T. Newell, Preston T. Webster, Julie V. Logan, Zinah M. Alsaad, Christian P. Morath, Rigo A. Carrasco, Chris Hains, Joshua M. Duran, Ganesh Balakrishnan, Gamini Ariyawansa, Marko S. Milosavljevic, Diana Maestas, Shane R. Johnson

POST-DEADLINE

| | |
|---|-----|
| Quantum Key Distribution Using True On-Demand Single Photons Over a Field-Installed Fiber Link | 579 |
| <i>Mujtaba Zahidy, Mikkel T. Mikkelsen, Ronny Müller, Beatrice Da Lio, Martin Krehbiel, Ying Wang, Michael Galili, Søren Forchhammer, Peter Lodahl, Leif K. Oxenløwe, Davide Bacco, Leonardo Midolo</i> | |
| All-Fiber Quantum-Inspired LiDAR with > 100dB Noise Rejection and Single Photon Sensitivity..... | 581 |
| <i>Han Liu, Yutian Zhang, Georgios Papangelakis, Amr S. Helmy</i> | |
| On-Chip Reconfigurable Phase Locking by Asymmetric Coupling in Two-Dimensional Laser Arrays..... | 583 |
| <i>Zihe Gao, Xingdu Qiao, Mingsen Pan, Shuang Wu, Bikashkali Midya, Li Ge, Liang Feng</i> | |
| Heterogeneous III-V/Si (De-)Interleaver Filters with Non-Volatile Memristive Behavior..... | 585 |
| <i>Stanley Cheung, Bassem Tossoun, Zhuoran Fang, Yuan Yuan, Yingtao Hu, Geza Kurczveil, Yiwei Peng, Di Liang, Raymond G. Beausoleil</i> | |
| Heterogeneous Integration of Brillouin Devices with Active Silicon Photonic Circuits..... | 587 |
| <i>Matthew Garrett, Moritz Merklein, Yang Liu, Cong Tinh Bui, Choon Kong Lai, Alvaro Casas-Bedoya, Benjamin J. Eggleton, Duk-Yong Choi, Stephen J. Madden</i> | |
| InGaN/GaN Short-Period Superlattices in Nanowires for Developing Efficient Red Submicron LEDs..... | 589 |
| <i>Ayush Pandey, Jungwook Min, Yakshita Malhotra, Maddaka Reddeppa, Yixin Xiao, Yuanpeng Wu, Zetian Mi</i> | |

Author Index