Track 4: Optoelectronic Devices and Integration
VIP Room, 3F

13:30-15:30 • November 05, 2023 • Sunday
Photonics & Photonic Devices
Presider: Siyuan Yu, Sun Yat-sen University, China

13:30-14:00 • ACPPOEM-1009-20 *Invited*
Light-Matter Interaction in Exciton-Photon Hybrid Systems of TMDC Nanostructures
Fuhuan Shen[1], Zefeng Chen[2], **Jian-Bin Xu[1]**
1.Department of Electronic Engineering, and Materials Science and Technology Research Center, The Chinese University of Hong Kong, Hong Kong, China ;2.School of Electronic and Information Engineering, South China Normal University, China
Comprehensive understandings of optoelectronic properties and phenomena at hetero-interfaces and in atomically thin films play an important role for high-performance device realization. Manipulation of the interplay between matter and photonic structure yields numerous opportunities in fundamental understandings and practical applications.
In this presentation, we will first present our new understanding of the Fano-type asymmetry deviated from the Rabi-type asymmetry in the exciton-plasmon hybrid system, which is experimentally confirmed with two-dimensional (2D) layered WSe2 coupled to plasmonic lattice. We demonstrate the Fano-type asymmetry in the open plasmon-exciton system both theoretically and experimentally. The Fano-type interference process is found to enhance the lower energy branch (LEB) and reduce the higher energy branch (HEB), rendering the Fano-type asymmetry in the output spectra, even at zero detuning.
Secondly, to overcome the large Ohmic loss of plasmonic material, we apply the chemical vapor deposition (CVD) bottom-up method to fabricate the metaphotonic structure based on the bulk transition metal dichalcogenides (TMDCs). More specifically, we realize the magnetic-type surface lattice resonance (M-SLR) in the one-dimensional (1D) MoS2 metaphotonic structure with extremely low material loss. Bright Mie modes and self-coupled anapole-exciton polaritons with unambiguous anti-crossing behavior are also realized in 2D MoS2 metaphotonic structures. However, the aforementioned TMDCs structure does not demonstrate photoluminescence properties. By combining the multilayer (ML) TMDCs to the designed TMDCs metaphotonic structures, we are able to manipulate the polarization and direction of the photoluminescence from the ML TMDCs.
Thirdly we leverage the concept of Kerker's effects to demonstrate the dynamic control of scattering directionality in dielectric nanostructures by tuning the exciton-photon coupling. We first provide theoretical evidence for a significant modification of the scattering directionality of a dielectric metastructure engineered by excitonic polaritons. As a proof of concept, we construct self-coupled metasurfaces using bulk MoS2, which exhibit a forward/backward scattering ratio up to 20. Importantly, we achieve tunable directionality by thermally controlling the excitonic coupling to the Mie modes.
Fourthly we propose a synergistic effect of chiral near-field and hot carrier injection for actively controlling the valley polarization of WSe2 at room temperature (RT). The degree of valley polarization emission is enhanced from near zero (for pure WSe2) to 20% under non-resonant optical excitation (532 nm) when monolayer WSe2 is integrated with the chiral near field by the plasmonic metasurface.

14:00-14:30 • ACPPOEM-1010-2 *Invited*
Optoelectronics using one and two dimensional nanomaterials
Tawfique Hasan
Cambridge University, United Kingdom
An increasingly popular strategy to improve the performance of nanomaterial-enabled optoelectronics is to exploit computational algorithms. I will give specific examples of how such devices could benefit from computational approaches as the key enabler. The first example will be through the development of an ultraminiaturised computational spectrometer from a single nanostructure without complex optics or filters. I will next discuss how the philosophy of mathematically combining the output of seemingly unconnected devices could be applied to more sophisticated designs, where active modulation of optoelectronic properties can enable even more compact systems, representing a future application-agnostic platform with unmatched simplicity and compactness.

14:30-14:45 • ACPPOEM-0801-50
On-chip four mode-division (de)multiplexer for conventional telecom bands and the TDFA window
Qiyuan Yi, Guanglian Cheng, Zhiwei Yan, Zengfan Shen, Qiyuan Yi, Li Shen
Huazhong University of Science and Technology, China
We propose and demonstrate a four-mode division (de)multiplexer with two operation wavebands centered at 1550, and 1970 nm, respectively. The fabricated device shows low insertion losses and crosstalk 3.1 dB and −10.6 dB

14:45-15:00 • ACPPOEM-0731-59
On-chip Pulse Self-compression to Single-cycle Level in Silicon-rich Nitride Waveguides
Yuke Zhai[1], Lijuan Xu[2], Kexin Ren[1], Lin Zhang[1]
1.Key Laboratory of Integrated Opto-electronic Technologies and Devices, School of Precision Instruments and Opto-electronics Engineering, Tianjin University, China; 2.School of Electronic Engineering, Tianjin University of Technology and Education, China
We propose a silicon-rich nitride waveguide with slot-assisted dispersion flattening, which is suitable for on-chip pulse self-compression to a single-cycle level with a compression factor as high as 37, accompanied by octave-spanning supercontinuum generation.

15:00-15:15 • ACPPOEM-0731-183
Inverse-Designed Two-Dimensional Grating Coupler with Low Polarization-Dependent Loss
Ge Renyou[1], Gao Shengqiao[2], Wu Meiyan[3], Chen Ping[3], Chen Bigeng[1], **Luo Yannong**[3]
1.Zhejiang Lab, China; 2.Sun Yat-sen University, China; 3.Guangxi Medical University, China
We propose low polarization-dependent-loss (PDL) two-dimensional grating couplers (2D GC) on SOI platform, with perfectly vertical fiber-chip coupling, using inverse design method. Simulation results show that -3.17 dB (-1.90 dB) and -2.10 dB (-1.00 dB) of coupling efficiency can be achieved for 2-port and 4-port structures, without (with) metal mirror beneath the buried oxide. Low PDL of 0.2 dB and 0.025 dB can be obtained over a broad bandwidth of 52 nm and 100 nm, respectively. We fabricate and measure the proposed devices of 2-port and 4-port 2D GC. Coupling efficiency of the two are -5.3 dB and -5.0 dB, respectively. The PDL is 0.7 dB ranging from 1.49 μm to 1.57 μm.

15:15-15:30 • ACPPOEM-0730-9
A Broadband Metalens Exhibiting Superior Focusing Efficiency and Polarization Insensitivity
Junjing Huang, Xiaofeng Duan, Kai Liu, Yongqing Huang, Xiaomin Ren
Beijing University of Posts and Telecommunications, China
We proposed a broadband metalens that demonstrates efficient operation across the wavelength range of 1270 to 2070nm and exhibits polarization insensitivity. The average focusing efficiency is 56%, with a maximum focusing efficiency of 70.7%.

15:30-16:00 Coffee Break

16:00-18:00 • November 05, 2023 • Sunday
Modulators and Functional Devices
Presider: Xuhan Guo, Shanghai Jiao Tong University, China

16:00-16:30 • ACPPOEM-1009-16 *Invited*
3D laser heterogeneous integration in silicon photonics
Chao Xiang
The University of Hong Kong, Hong Kong, China
In this talk, I'll introduce recent progress in enabling wafer-scale three-dimensional (3D) integrated lasers with ultra-low-loss silicon nitride platform. The demonstrated lasers exhibit excellent performance including ultralow laser noise and high resistance to downstream reflections.

16:30-16:45 • ACPPOEM-0730-14
A Performance Comparison of Coplanar Strip-Line and Capacitive Loading Traveling Wave Electrode InP Mach-Zehnder Modulators
Ruoyun Yao[1], Weiwei Pan[1], Yili Liu[2], Zhangwan Peng[1], Yiti Xiong[2], Chen Ji[1]
1.Zhejiang University, China; 2.Zhejiang Lab, China
We present an InP Mach-Zehnder modulator with coplanar strip-line electrode enabling velocity and impedance matching anticipating to attain 93 GHz bandwidth, higher than a capacitive loading electrode design with similar length and waveguide parameters.

16:45-17:00 • ACPPOEM-0731-11
A Fast Silicon Polarization Scrambling Device Utilizing Novel Thermal Tuning Scheme
Weiqin Wang, Ziwen Zhou, Yifan Zeng, Yining Sun, Hao Wu, Siqi Yan, Ming Tang
Huazhong University of Science and Technology, China
Through an innovative design of a new heater placement scheme, we present the development of a silicon-based rapid polarization scrambling device with a scrambling rate of 150 krads^{-1}

17:00-17:15 • ACPPOEM-0801-76
Numerical demonstration of silicon micro-ring modulator with X-interleaved PN junction for high modulation efficiency
Wenkai YANG[1], Deji LI[1], Takaaki KAKITSUKA[1], Kiyoto TAKAHATA[1]
1.Graduate School of Information, Production and Systems, Waseda University, Japan
A silicon-based carrier depletion micro-ring modulator with X-interleaved PN junction is investigated. The enhanced modulation efficiency, low power consumption and satisfactory modulation performance (clearer eye diagram at 40 Gbit/s NRZ operation) is demonstrated.

17:15-17:30 • ACPPOEM-0815-116
Broadband Arbitrary Coupler Based on Asymmetric Mach-Zehnder Interferometers with Bezier Curves
Jiaqi Chen, Yuanbin Liu, Ziheng Ni, Liangjun Lu, Jianping Chen, Linjie Zhou
Shanghai Jiao Tong University, China
We propose a broadband coupler based on cascaded Mach-Zehnder interferometers with Bezier curves on the silicon nitride platform, which has a wide operation wavelength range of 110 nm and good width/thickness fabrication tolerance.

17:30-17:45 • ACPPOEM-0801-129
Accelerated FDFD Inverse Design of 1 × 2 Beam Splitter Based on Schur Complement Domain Decomposition-Adaptive Mesh Method
Jin Li[1,2], Houyu Chen[1], Simei Mao[1], Zhenmin Chen[2], Zhengtong Liu[2], Connie Chang-Hasnain[1], H. Y. Fu[1]
1.Tsinghua University, China; 2.Peng Cheng Laboratory, China
We realized the inverse design of 1×2 beam splitter through Schur complement domain decomposition- adaptive mesh method, improving the FDFD computational efficiency, which achieves 17.9 times the acceleration ratio and maintains good accuracy.

17:45-18:00 • ACPPOEM-0801-32
A comprehensive equivalent circuit model of silicon-based segmented microring modulators for electronic and photonic integrated circuit codesign
Shenlei Bao[1,2], Jintao Xue[1,2], Jinyi Wu[1,2], Binhao Wang[1,2]
1.State Key Laboratory of Transient Optics and Photonics, China; 2.University of Chinese Academy of Sciences, China
We present an equivalent circuit model for two-segment Si microring modulators(MRMs). The model consists of three blocks: electrical parasitics, electro-optic dynamics, and self-heating effects. Model parameters are derived through curve fitting based on Si MRM characterization. An excellent agreement between simulated and measured eye diagrams at a data rate of 106Gb/s was achieved. This equivalent circuit model can be effectively employed for driver design optimization and MRM wavelength stabilization circuitry improvement.

17:30-20:00 Welcome Reception

08:30-10:00 • November 06, 2023 • Monday
Compound Semiconductor Photonic Devices and Integration
Presider: Jiangwei Man, Hisilicon Optoelectronics, China

08:30-09:00 • ACPPOEM-1009-19 *Invited*
High-speed III-V photodetectors: from near-infrared to mid-infrared optoelectronicsdevices
Baile Chen
Shanghai Tech University, China
High-speed III-V photodiodes (PDs) have various applications from communications to sensing. Here we report back illuminated modified uni-traveling carrier (MUTC) PDs flip-chip bonded to AlN substrates. Due to the high thermal conductivity of AlN, the devices with diameters of 40 μm and 28 μm exhibites 23 dBm output power at 15 GHz and 20dBm output power at 25 GHz, respectively, with responsivity of 0.65 A/W. On the other hand, the development of terahertz (THz) technology has driven the demand for ultra-high-speed PDs. I will also discuss the evanescently-coupled waveguide MUTC PD with optimized high impedance coplanar waveguide (CPW) designs. The device shows a 3dB bandwidth above 220 GHz and external responsivity of 0.18 A/W. In the MWIR band, I will talk about the recent process of high-speed InAs/InAsSb photodiodes with bandwidth above 12 GHz.

09:00-09:30 • ACPPOEM-1009-23 *Invited*
Frequency-agile, low-noise Integrated lasers for FMCW Lidars
Grigorii Likhachev
EPFL, Switzerland
We show recent advances in the development of ultra-low loss silicon nitride integrated photonic circuits that have heralded a new generation of integrated lasers capable of reaching fiber laser coherence and fast tuning using monolithically integrated piezoelectrical actuators. Such lasers been achieved by self-injection locking of DFB or E-DBR lasers to SiN microresonators. We also show a photonic-electronic integrated circuit-based coherent LiDAR source comprised of a high voltage arbitrary waveform generator, a hybrid integrated tunable Vernier laser and an erbium-doped waveguide optical amplifier - all realized in wafer scale manufacturing compatible processes.

09:30-09:45 • ACPPOEM-0729-8 *Industry Innovation Nomination*
Transfer-Printing of III-V Photodetector for High Bandwidth Si-Photonic Integrated Coherent Receiver
Zhiheng Quan, Qichao Ding
JFS Laboratory, China
Wafer-scale integration of III-V photodetectors on silicon photonic coherent receiver through transfer-printing is demonstrated, showing responsivities up to 1 A/W, dark current 90 pA and 3dB bandwidth of 42 GHz at -2 V bias.

09:45-10:00 • ACPPOEM-0713-6
Narrow Linewidth, Tunable External Cavity Diode Laser using AlGaAs-Si_3N_4 Hybrid Integration
Chen Chen[1,2], Wei Fang[1,3], Han Xiuyou[2], Su Qingshuai[1], Pi Haoyang[1], Stroganov Anton[4], Ye Qing[1], Cai Haiwen[1,5]
1.Shanghai Institute of Optics and Fine Mechanics, CAS, China; 2.Dalian University of Technology, China; 3. Zhangjiang Laboratory, China; 4.Ligentec SA, Switzerland; 5.Zhangjiang Laboratory, China
We introduce a high-performance external cavity diode laser constructed with AlGaAs-Si_3N_4 hybrid integration, exhibiting a narrow linewidth of 18 kHz, a tuning range of 62.9 nm, and side mode suppression ratio better than 45 dB.

10:00-10:30 Coffee Break

10:30-11:45 • November 06, 2023 • Monday
Photonic Devices & Application
Presider: Baile Chen, ShanghaiTech University, China

10:30-11:00 • ACPPOEM-1009-15 *Invited*
Progress on MR-based photonic devices
Haisheng Rong
Intel, United States

11:00-11:30 • ACPPOEM-1009-18 *Invited*
Integrated Photonics For AL/ML Applications
Di Liang
Alibaba Group, United States
The recent emergence of regenerative artificial intelligence (AI) tools like ChatGPT marks the advent of a new AI era. It is also imposing an even heavier toll on the computing hardware. From the networking perspective, bandwidth, latency, energy efficiency, formfactor and cost all contribute to increasing challenges in next-generation optical interconnect. In this talk, I will attempt to discuss several scalable solutions based on integrated photonics to enable massive data transmission for exponentially grown AI and machine learning applications. Perspectives to use integrated photonics for future optical computing will be shared as well.

11:30-11:45 • ACPPOEM-0726-18
Bound state in the continuum enabled ultralong silicon waveguide grating antennas for integrated LiDAR applications
Zhipeng Ma[1,2], Yao Fu[1,2], Yuanjian Wan[1,2], Han Cao[1,2], Jian Wang[1,2], Yu Zhang[1,2]
1.Wuhan National Laboratory for Optoelectronics, Huazhong University of Science and Technology, China; 2.Optics Valley Laboratory, China
We report two kinds of silicon ridge-waveguide-based waveguide grating antennas with ultra-sharp instantaneous field-of-view for light detection and ranging (LiDAR) applications. Measured beam divergence of WGAs with 6mm length are 0.0251° and 0.0237°.

12:00-13:30 Lunch Break

13:30-15:30 • November 06, 2023 • Monday
Advanced Diode/ Quantum Dot Lasers
Presider: Siqi Yan, Huazhong University of Science and Technology, China

13:30-14:00 • ACPPOEM-0823-1 *Invited*
Monolithically integrated QD comb lasers on SOI substrates for optical I/O
Ting Wang
Institute of Physics, CAS, China
We have recently achieved multi-wavelength comb lasers on silicon substrates with Tbps transmission bandwidth, which can be a desirable on-chip laser source for silicon photonic optical I/O applications.

14:00-14:15 • ACPPOEM-0721-7
50 Gb/s Directly Modulated 1.3 μm InGaAlAs/InP DFB Laser Having MQW Based Passive DBR Section
Huan Li[1,2,3], Xuyuan Zhu[1,2,3], Jing Guo[1,2,3], Daibing Zhou[1,2,3], Lingjuan Zhao[1,2,3], Song Liang[1,2,3]
1.Institute of Semiconductors, CAS, China; 2.Center of Materials Science and Optoelectronics Engineering, University of Chinese Academy of Sciences, China; 3.Beijing Key Laboratory of Low Dimensional Semiconductor Materials and Devices, China
A directly modulated 1.3 μm InGaAlAs/InP DFB laser having MQW based passive DBR section has been fabricated. The modulation bandwidth of the device is 29 GHz. 50 Gb/s NRZ and PAM4 data transmission in up to 40 km standard single mode fiber have been demonstrated.

14:15-14:30 • ACPPOEM-0721-9
Comb Span Extension of a Mode-locked Laser Diode by Pumping a Highly Nonlinear Fiber Loop
Defan Sun[1,2,3], Dan Lu[1,2,3], Ruikang Zhang[1,2,3], Tingwu Ge[4], Jinlong Xiao[5], Lingjuan Zhao[1,2,3]
1.Key Laboratory of Semiconductor Materials Science, Institute of Semiconductors, CAS, China; 2.Center of Materials Science and Optoelectronics Engineering, University of Chinese Academy of Sciences, China; 3.Beijing Key Laboratory of Low Dimensional Semiconductor Materials and Devices, China; 4.Institute of Laser Engineering Beijing University of Technology, China; 5.Institute of Semiconductors, CAS, China
Optical comb span extension of a mode-locked laser diode by pumping a highly nonlinear fiber loop is demonstrated, with a 10-GHz repetition rate and an enhanced comb span of 50 nm.

14:30-14:45 • ACPPOEM-0729-23 *Industry Innovation Nomination*
Dual optical feedback dynamics of quantum dot lasers in silicon-based photonic integrated circuits
Yuanxiang Wang, Zhiyong Jin, Yong Yao, Xiaochuan Xu, Jianan Duan
Harbin Institute of Technology (Shenzhen), China;
This work investigated the dynamic characteristics of quantum dot lasers under dual optical feedback by solving the three-level rate equations in time-domain. Within long cavity feedback, the route to chaos of the quantum dot lasers and its dependence on the short cavity feedback dynamics are studied. The combination of the reduction of short cavity length and the increase of short cavity feedback strength can reinforce the coupling efficiency between the laser and the waveguide, thereby enhancing the insensitivity of the laser to external long cavity feedback. These results offer valuable insights for optimizing feedback insensitivity of quantum dot lasers for isolator-free photonic integrated circuits on silicon.

14:45-15:00 • ACPPOEM-0731-182
High linearity InAs/GaAs quantum dot distributed feedback lasers
Minghao Cai, Zhengqing Ding, Kun Zhan, Ying Yu, Siyuan Yu
Sun Yat-sen University, China
We demonstrate the modulation linearity performances of GaAs-based quantum dot (QD) distributed feedback (DFB) diode lasers, which are decisive for the QD lasers applied in analog optical communication.

15:00-15:15 • ACPPOEM-0814-59
Reliability of 100GHz Colliding Pulse Mode-Locked Quantum Dots Laser
Jiale Qin, Jingzhi Huang, Bo Yang, Zihao Wang, Jian-Jun Zhang, Ting Wang
Institute of Physics, CAS, China
We have investigated the performance of an InAs quantum dots colliding pulse mode-locked laser with 100GHz comb spacing. This laser shows temperature reliability up to 80 ˚C, with an extrapolated lifetime of over 20 years under the stress condition.

15:15-15:30 • ACPPOEM-0808-2
Gain-Coupled Wide-Ridge-Waveguide High-Power 1.55 μm Single-Mode DFB Laser
Mukun He, Hongtao Li, Jian Wang, Yanjun Han, Changzheng Sun, Bing Xiong, Zhibiao Hao, Lai Wang, Yi Luo
Tsinghua University, China
Gain-coupled 1.55 μm single-mode DFB laser with 6-μm-wide ridge-waveguide is demonstrated based on a double trench ridge waveguide structure. The fabricated laser exhibits over 100 mW kink-free output power and FWHM divergence angles of 11°×21°.

15:30-18:00 Coffee Break & Poster Session

18:30-21:00 Banquet and Awards Ceremony

08:30-10:00 • November 07, 2023 • Tuesday
Novel Integrated Photonics
Presider: Ke Wang, RMIT University, Australia

08:30-09:00 • ACPPOEM-1010-3 *Invited*
100Gb/s quantum-confined Stark effect optical modulator integrated with SiN waveguides
Ilias Skandalos
University of Southampton, United Kingdom
We present an O-band multiple quantum well Ge/SiGe quantum-confined Stark effect electro-absorption modulator with 100Gb/s data rate, integrated with a N-rich SiN photonic platform on 8-inch Si and SOI substrates.

09:00-09:15 • ACPPOEM-0801-124
Integrated Spectrometer by Using Counter-propagating Arrayed Waveguide Grating and Interleaved Micro-ring Resonators
Zunyue Zhang[1], Yi Wang[2], Zhenzhou Cheng[1], Hon Tsang[2]
1.Tianjin University, China; 2.The Chinese University of Hong Kong, Hong Kong, China
We reported an integrated spectrometer by using a counter-propagating arrayed waveguide grating and cascaded micro-ring resonators with interleaved resonance for spectral resolution enhancement and channel number expansion

09:15-09:30 • ACPPOEM-0731-15
Photonic crystals nanohole array-based silicon TM-pass polarizer for 1550/2000 nm wavebands
Guanglian Cheng, Qiyuan Yi, Zengfan Shen, Zhiwei Yan, **Qiyuan Li**, Li Shen
Huazhong University of Science and Technology, China
We propose an on-chip transverse magnetic (TM)-pass polarizer for multi-band operation. The measured BWs for PER 25dB are 100nm for both 1550/2000nm wavebands, while the measured ILs are 1/0.8 dB at wavelengths of 1550/2000nm.

09:30-09:45 • ACPPOEM-0731-42
Waveguide Ge/Si avalanche photodetector with ultra-high gain-bandwidth product of 1440GHz
Hengzhen Cao, Yuluan Xiang, Weichao Sun, Jin Xie, Jinshu Guo, Daoxin Dai
Zhejiang University, China
A lateral Reach-Through type waveguide Ge/Si avalanche photodetector is presented. The device exhibits a GBP of 918GHz under -18dBm and a GBP of 1440GHz under - 21dBm.The 50Gbps eye-diagrams under different optical power are also measured.

09:45-10:00 • ACPPOEM-0801-55
Integrated Scandium-doped Aluminum Nitride Microring Resonators on 8-inch Silicon Wafers
Kewei Bian, Zhenyu Li, Xingyan Zhao, Yang Qiu, Shaonan Zheng, Yuan Dong, Qize Zhong, Hu Ting
Shanghai University, China
Scandium-doped aluminum nitride (AlScN) on insulator is a potential platform for realizing a diverse range of applications in photonic devices, due to its large piezoelectric effects, large optical nonlinear effects, unique pyroelectric effects, and broad transparency window. In this work, we report the characterization of thin-film AlScN microring resonators with Sc doping of 9% and 18% fabricated on 8-inch silicon (Si) wafers. Through complementary metal-oxide semiconductor (CMOS) compatible fabrication processes, microring resonators with high-quality (Q) factors are successfully demonstrated, and their optical propagation losses are thoroughly assessed. Experimental results show promissing application of integrated AlScN-based photonics devices with Sc doping up to 18%.

10:00-10:30 Coffee Break

10:30-12:00 • November 07, 2023 • Tuesday
Integrated Photonic Signal Processing
Presider: Ting Wang, Institute of Physics, CAS, China

10:30-11:00 • ACPPOEM-1009-17 *Invited*
Low loss meta-silicon photonics for large-scale integration
Tingyi Gu
University of Delaware, United States
Integrating subwavelength components in silicon photonics enables advanced dispersion tailoring, wavefront control, and back reflection suppression functions. However, the primary concern is the foundry compatibility of the subwavelength device designs and the potential incremental loss. In this talk, I will share our progress toward developing low-loss on-chip mode conversion, back reflection suppression, photonic crystal switches, and spatial-spectral information classification.

11:00-11:15 • ACPPOEM-0731-129
7.12-Gbps Visible Light Communication Link Utilizing InGaN/GaN Micro-LED-based Photodetector
Yue Liao, Xinyi Shan, **Pengfei Tian**
Fudan University, China
We proposed a micro-LED acting as a photodetectorfor high-speed visible light communication. A data rate of 7.1291 Gbps at a distance of 0.3 m was demonstrated by using OFDM modulation and a bit-loading algorithm.

11:15-11:30 • ACPPOEM-0730-31
Compensation of Multi-channel Mismatches in OADC Based on MMI-Based Phase-Shift Quantization
Yiding Zhao, Jifang Qiu, Bowen Zhang, Yan Li, Jian Wu
State Key Laboratory of Information Photonics and Optical Communications, Beijing University of Posts and Telecommunications, China
We apply a blind compensation method to OADC. Simulation results show that timing mismatches are suppressed from -50.58dB to below -66.31dB. Compensation method improves system ENOB and SFDR at 1~49 GHz input frequency.

11:30-11:45 • ACPPOEM-0801-101
Neuromorphic computing with the plasmonic microcavity for all types of logic tasks
Lai Yihang[1], Zhiwei Yang[1], Jian Dai[1], Tian Zhang[1], Kun Xu[1]
Beijing University of Posts and Telecommunications, China
We propose a new passive-integrated photonic reservoir computer. It has a tiny footprint and a high information processing speed and can handle all types of sequential logic tasks after simple training.

11:45-12:00 • ACPPOEM-0801-117
A 100Gbps Monolithic Integrated Analog Coherent QPSK Optical Receiver Based on a COSTAS Optical Phase-Locked Loop
Yihao Yang[1,2], Yongliang Xiong[3], Yangming Ren[1], Qianli Ma[3,4], Jintao Xue[1,2], Zhiyuan Yu[1], Nan Qi[3,4], Binhao Wang[1,2]
1.State Key Laboratory of Transient Optics and Photonics, Xi'an Institute of Optics and Precision Mechanics, CAS, China; 2.School of Future Technology, University of Chinese Academy of Sciences, China; 3.State Key Laboratory of Superlattices and Microstructures, Institute of Semiconductors, CAS, China; 4.Center of Materials Science and Optoelectronics Engineering, University of Chinese Academy of Sciences, China
This paper presents a 100Gbps Quadrature Phase Shift Keying (QPSK) analog coherent optical receiver. The study emphasizes the utilization of optoelectronic monolithic integration technology to realize the proposed optical receiver, which is based on the COSTAS optical phase-locked loop (OPLL) technique. The analysis thoroughly examines the impact of loop filter bandwidth and loop delay on the system's phase locking accuracy. Moreover, it demonstrates an effective solution to address phase locking challenges arising from increased loop delay. When using a laser with a linewidth of 10MHz for the local oscillator, the optical receiver successfully achieves phase locking with a phase error of less than 0.8°.

12:00-13:30 Lunch Break

13:30-15:30 • November 07, 2023 • Tuesday
Heterogeneous Integration
Presider: Lei Shi, Huazhong University of Science and Technology, China

13:30-14:00 • ACPPOEM-0930-1 *Invited*
Towards chip-scale octave-spanning frequency combs in emerging platforms
Minhao Pu
Technical University of Denmark, Denmark
Octave-spanning optical frequency combs are essential for metrology and spectroscopy applications that require self-referencing. This talk will present the recent works on low-power octave-spanning frequency comb generation in the AlGaAs- and SiC-on-insulator platforms.

14:00-14:15 • ACPPOEM-0814-77
A new high-precision micro-accelerometer based on optomechanical system
Zhang Senyu, Li Zhe, Li Xinwei, Huang Wenyi, Chen Dingwei, Huang Yongjun
University of Electronic Science and Technology of China, China;
In this paper, a new linear accelerometer based on the optomechanical system of silicon photonic crystal cavity is designed.

14:15-14:30 • ACPPOEM-0815-106
Tunable MEMS-VCSEL with High-Contrast Grating
Minglu Wang[1,2], Wanhua Zheng[1,3,4], Anjin Liu[1,4]
1.State Key Laboratory on Integrated Optoelectronics, Institute of Semiconductors, CAS, China; 2.School of Electronic, Electrical and Communication Engineering, University of Chinese Academy of Sciences, China; 3.Key Laboratory of Solid-State Optoelectronics Information Technology, Institute of Semiconductors, CAS, China; 4.Center of Materials Science and Optoelectronics Engineering, University of Chinese Academy of Sciences, China
We designed and fabricated a MEMS-VCSEL with a tunable HCG mirrorat 940-nm range. At present, we have realized a tuning range of 3.7 nm at room temperature.

14:30-14:45 • ACPPOEM-0815-29 *Industry Innovation Nomination*
Heterogeneous integration of GaSb on Ge-SOI photonic integrated circuits for SWIR applications
Xin Guo[1], Andreas De Groote[2], Roger Loo[3], Gunther Roelkens[1]
1.Ghent University - IMEC, Belgium; 2.Brolis Sensor Technology, Belgium; 3.imec, Belgium
We report on the development of a germanium-on-SOI platform for short-wave-infrared applications. Heterogeneous integration of GaSb opto-electronic devices via micro-transfer-printing is reported.

14:45-15:00 • ACPPOEM-0727-18
Comparison of InAs waveguide Photodetectors on Silicon Platform via different heteroepitaxial structures
Hao Luo[1], Wang Shengyi[1], Hua Ge[1], Xiang Li[2], Bowen Jia[1]
1.Wuhan University of Technology, China; 2.China University of Geosciences (Wuhan), China
A mid-infrared InAs waveguide detector on silicon is proposed based on the heteroepitaxial growth. The influences of GeSi and SOI platforms on the optical properties of detectors are numerically investigated and discussed.

15:00-15:15 • ACPPOEM-0801-57
Fast Characterization System of Multi-Channel Interference Widely Tunable Lasers
Ying Li, Jiajun Lou, Kuankuan Wang, Zifeng Chen, Qiaoyin Lu, Weihua Guo
Wuhan National Laboratory for Optoelectronics, Huazhong University of Science and Technology, China
We demonstrate a fast characterization system integrated on a compact printed circuit board for multi-channel interference widely tunable lasers with frequency deviations of less than 1.5 GHz and characterization time of 3 hours.

15:15-15:30 • ACPPOEM-0801-49
Feedback Insensitivity of Self-Chaotic Microcavity Laser
Yun-Xiao Dong[1,2], Jian-Cheng Li[1,2], Ya-Li Li[1,2], Yue-De Yang[1,2], Jin-Long Xiao[1,2], Yong-Zhen Huang[1,2]
1.Institute of Semiconductors, CAS, China; 2.Center of Materials Science and Optoelectronics Engineering, University of Chinese Academy of Sciences, China
A deformed square microcavity laser has achieved chaos operation with a standard bandwidth of 12.3 GHz without external optical feedback or injection. We investigate the influence of feedback strength on its chaotic properties. The results show that the self-chaotic microlaser is insensitive to strong feedback, and can provide stable chaotic signals.

15:30-16:00 Coffee Break

16:00-18:00 • November 07, 2023 • Tuesday
Optoelectronic Devices
Presider: Minhao Pu, Denmark Technical University, Denmark

16:00-16:30 • ACPPOEM-1009-21 *Invited*
Integrated lithium niobate electro-optic modulation and amplification
Zejie Yu
Zhejiang University, China
Thin film lithium niobate on insulator (LNOI) attracts extensive attention for electro-optic (EO) modulation because of sub-wavelength scale confinement of light. Recent progress on different kinds of EO modulators with different passive structures will be introduced first. Next, some new EO modulation structures will be discussed, including a compact and high-speed electro-optic modulator based on a new 2×2 Fabry–Perot cavity and a high linear electro-optic modulator. Further, multiplexing technology with freedoms of mode and wavelength will be presented to increase the link capacity. At last, perspectives of EO modulators based on LNOI will be discussed.

16:30-17:00 • ACPPOEM-1009-22 *Invited*
High-performance Heterogeneous Integrated Photodiedes
Xiaojun Xie
Southwest Jiaotong University, China
Integrated photonics involves the integration of waveguides, lasers, modulators, and photodiodes on a single chip. This discipline has the potential to significantly impact communication, computing, and sensing due to its ability to transmit and process information rapidly and efficiently. Photodiodes are crucial components in integrated photonics and play a key role in various applications, including analog photonics links, microwave signal generation, and antenna remoting. In this talk, we will discuss the advancements made in the field of high-performance heterogeneous integrated photodiodes for microwave photonics.

17:00-17:15 • ACPPOEM-0719-9
Highly efficient and differentially driven thin-film Lithium Niobate modulators based on reversely-poled arms
Sheng Yu, Quan Cao
Wuhan Fisilink Microelectronics Technology Co.,LTD, China
A novel structure with reversely-poled arms is proposed on the X-cut thin-film Lithium Niobate platform. A differentially driven modulator is demonstrated with 75GHz EO bandwidth, V_π of 2 V, and $V_\pi L$ of 1.37 V•cm.

17:15-17:30 • ACPPOEM-0801-146
Thin-Film Lithium Niobate Mach-Zehnder Modulator Operating at 800nm
Xutong Lu, Xiyao Song, Yanping Li
Peking University, China
We present a modulator chip based on thin film lithium niobate and Mach-Zehnder interferometer that operates around 800nm with a modulation bandwidth to half-wave voltage ratio of over 6GHz/V and good adaptivity for packaging.

17:30-17:45 • ACPPOEM-0730-23
Calibration of $LiNbO_3$-Based Polarization Controller With Simplified Principle and RMSProp Algorithm
Linan Shan, Qingmin Lu, Peng Sun, Xiaoguang Zhang, Lixia Xi, Xiaosheng Xiao
Beijing University of Posts and Telecommunications, China
A concise method using only S_1vector in Stokes space and an adaptive gradient algorithm for calibrating $LiNbO_3$-basedpolarization controller are proposed, which complexity reduces by75% and accuracy up to 93%.

17:45-18:00 • ACPPOEM-0814-69
Tunable Optoelectronic Oscillator based on Thin Film Lithium Niobate
Zijun Huang, Rui Ma, Xinlun Cai
Sun Yat-sen University, China
A tunable optoelectronic oscillator based on the thin film lithium niobate is experimentally demonstrated. The phase noise at the frequency from 20 to 35 GHz is -90dBc/Hz @1 MHz.