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2022

제29회
광전자 및 광통신 학술회의

05. 25. ^{WED} — 27. ^{FRI}

한화리조트 해운대

한국광학회(OSK) 광자기술분과
한국통신학회(KICS) 광통신연구회
대한전자공학회(IEIE) 광파 및 양자전자연구회
대한전기학회(KIEE) 광전자 및 전자파연구회



International
Day of Light

16 May

※ The background image is the winning work of the 21st contest of Visit Busan.

5월 25일 (수)					
	포럼1	베르나차1	베르나차2	포럼2	포럼3
13:30~15:00	단기강좌 I	W1E-I	W1C-I		W1B-I
	양자 센싱 기술 원리 연사: 이수용(ADD)	광응용 I	광소자 I		광섬유 및 레이저 I
	좌장: 최병석(ETRI)	좌장: 박형준(ETRI)	좌장: 문효원(KIST)		좌장: 주성민(㈜옵토닉스)
15:00~15:15	Break				
15:15~16:45	단기강좌 II	W2A-I	W2C-II	W2D-I	W2F-I
	Multi-modal Imaging: Photoacoustic Imaging Plus More 연사: 김철홍(포항공대)	광통신 시스템 및 네트워크 I	광소자 II	광정보처리 및 디스플레이 I	나노-바이오포토닉스 /THz I
	좌장: 김철한(서울시립대)	좌장: 김준영(상명대)	좌장: 정대환(KIST)	좌장: 홍기훈(ETRI)	좌장: 양진규(공주대)
16:45~17:00	Break				
17:00~18:30	Poster Session I (장소: 몬테로소)				

5월 26일 (목)					
	포럼1	베르나차1	베르나차2	포럼2	포럼3
09:00~10:30	단기강좌 III	T1E-II	T1C-III	T1D-II	T1B-II
	실리콘 집적 레이저 기술 연사: 정일석(UNIST)	광응용 II	광소자 III	광정보처리 및 디스플레이 II	광섬유 및 레이저 II
	좌장: 김성만(경성대)	좌장: 김영호(KOPTI)	좌장: 권민석(UNIST)	좌장: 이진수(KOPTI)	좌장: 김운현(KOPTI)
10:30~10:45	Break				
10:45~12:15	단기강좌 IV	T2A-II	T2C-IV	T2G-I	T2F-II
	푸리에 광학 구조 디자인 원리 및 제작 방법 연사: 이승우(고려대)	광통신 시스템 및 네트워크 II	광소자 IV	양자정보 I	나노-바이오포토닉스 /THz II
	좌장: 박민식(ETRI)	좌장: 이한협(ETRI)	좌장: 이인호(KIST)	좌장: 정호중(KIST)	좌장: 송봉식(성균관대)
12:15~13:30	Lunch				
13:30~13:50	몬테로소	개회식	개회사: 운영위원장 류우찬(부경대)		사회: 최은서(조선대)
13:50~13:50			개회축사: 한국광학회 회장 고도경(GIST)		
13:50~14:30		[총회강연 II] Liquid Crystals for Display and Photonics Applications 윤태훈(부산대)			좌장: 김학린(경북대)
14:30~15:10		[총회강연 III] 마이크로전자산업용 레이저 응용과 레이저 리플로우 기술 개관 김남성(Laserss Co., Ltd.)			좌장: 김창석(부산대)
15:10~15:40		[총회강연 IIII] 광섬유, 우리 삶에 빛이 들게 하다 이관일(KIST)			좌장: 정환석(ETRI)
15:40~16:10	Break				
16:10~18:10	Poster Session II (장소: 몬테로소)				

5월 27일 (금)					
	포럼1	베르나차1	베르나차2	포럼2	포럼3
09:00~10:30		F1A-III	F1C-V	F1G-II	F1F-III
		광통신 시스템 및 네트워크 II	광소자 V	양자정보 II	나노-바이오포토닉스 /THz III
		좌장: 문상록(ETRI)	좌장: 황도경(KIST)	좌장: 방정호(ETRI)	좌장: 김지수(부산대)
10:30~10:45	Break				
10:45~12:15		F2A-IV	F2C-VI	F2G-III	F2F-IV
		광통신 시스템 및 네트워크 IV	광소자 VI	양자정보 III	나노-바이오포토닉스 /THz IV
		좌장: 전현채(인천대)	좌장: 이한석(KAIST)	좌장: 손영익(KAIST)	좌장: 김규경(부산대)
12:15~12:50	기업홍보 세션, 경품 추천, 폐회식 (장소: 포럼1)				

베르나차2

광소자 II

좌장: 정대환(KIST)

W2C-II.04 : 16:15

Dependence of 40-Gbps PAM-4 Si MRM Eye Characteristics on Input Optical Wavelength

CHOI Woo-Young*, JI Yongjin, JO Youngkwan (연세대)

In this work, the eye characteristics of 40-Gbps PAM-4 modulated Si MRM are investigated as a function of input optical wavelength. The key performance metrics of PAM-4 signals, optical modulation amplitude (OMA) and ratio of level mismatch (RLM) are measured for the different input wavelengths and the trade-off between the two metrics is observed.

W2C-II.05 : 16:30

224 Gb/s PAM-4 transmissions using a single silicon photonics MZM with a soft combined artificial neural network-based equalization

PARK Jongwoo, HAN Seunjun, YU Kyongsik* (KAIST)

We experimentally demonstrate the high-speed optical transmission of 224 Gb/s 4-ary pulse amplitude modulation (PAM-4) using a single silicon photonics MZM with a soft combined artificial neural network (SC-ANN) based equalization. With the SC-ANN based equalization, we achieve a back-to-back(BTB) transmission of 224 Gb/s PAM-4 with a bit error rate (BER) below the 7% hard-decision forward error-correction (HD-FEC) threshold of 3.8×10^{-3} .

포럼2

광정보처리 및 디스플레이 I

좌장: 홍기훈(ETRI)

W2D-I.03 : 16:15

Deep learning-based depth estimation technique for integral imaging microscopy system

IMTIAZ Shariar Md, KHUDERCHULUUN Anar, ERDENEBAT Munkh-Uchral, KWON Ki-Chul, HOSSAIN Md. Biddut (충북대), KANG Hoonjong (원광대), KIM Nam* (충북대)

Convolutional neural networks (CNNs) have recently shown impressive results for estimating depth-map from microscopic images. This study presents a depth estimation network using CNNs and microscopic epipolar plane images (EPIs) based on synthetic light field datasets. Multiple directions of microscopic images are chosen as inputs, and convolutional blocks are implemented according to the disparities in EPI's of different directions.

포럼3

나노-바이오포토닉스/THz I

좌장: 권순홍 (중앙대)

W2F-I.03 : 16:15

초청강연

Super-Resolution Optical Focusing in Complex Media

KIM Donggyu* (KAIST)

I will present spin-based training of optical microscopes for sub-diffraction optical focusing in complex media.

Break

Dependence of 40-Gbps PAM-4 Si MRM Eye Characteristics on Input Optical Wavelength

지용진, 조영관, 최우영

Department of Electrical and Electronic Engineering, Yonsei University

The data traffic is skyrocketing due to ever-increasing demands for online services, contents, and the widening range of applications including machine learning. Silicon photonics is being spotlighted as one of the possible solutions for Tb/s scale interconnects required in cloud computing network [1]. In particular, 4-level pulse amplitude modulation (PAM-4) with the Si micro-ring modulator (MRM) is actively pursued for key data center interconnect applications [2]. The Si MRM can provide large modulation bandwidth with the small power consumption and its footprint is much smaller than the Si Mach-Zehnder modulator which is currently being used in many applications.

In this work, the eye characteristics of 40-Gbps PAM-4 modulated Si MRM are investigated as a function of input optical wavelength. The key performance metrics of PAM-4 signals, optical modulation amplitude (OMA) and ratio of level mismatch (RLM), are measured for the different input wavelengths as shown in Fig. 1(a). The device used in this measurement is an all-pass Si MRM with the radius of 12 μ m and the gap between the ring and the bus waveguide is 220nm. It is fabricated by IHP Si Photonics foundry.

The trade-off between RLM and OMA for the input wavelength can be observed as shown in the figure. Fig. 1(b) and (c) show the measured eye diagrams of when OMA and RLM are the maximum, respectively. These results clearly show that the input wavelength must be carefully selected for the optimal PAM-4 modulation with the Si MRM, and furthermore, an intelligent technique of determining the optimal input wavelength and maintaining this condition even when the external temperature changes is required. We are currently investigating a Si MRM driver that includes such a technique.

Acknowledgement - 이 성과는 정부(과학기술정보통신부)의 재원으로 한국연구재단의 지원을 받아 수행된 연구임 (No. NRF-2020R1A2C2015089)

- [1] S. Lin et al., “Electronic– Photonic Co-Optimization of High Speed Silicon Photonic Transmitters,” *Journal of Lightwave Technology*, vol. 35, no. 21, pp. 4766–4780, Feb.15, 2017.
- [2] Y. Tong et al., “An Experimental Demonstration of 160-Gbit/s PAM-4 Using a Silicon Micro-Ring Modulator” *Photonics Technology Letters*, vol. 32, no. 2, pp. 125–128, Jan.15, 2020.

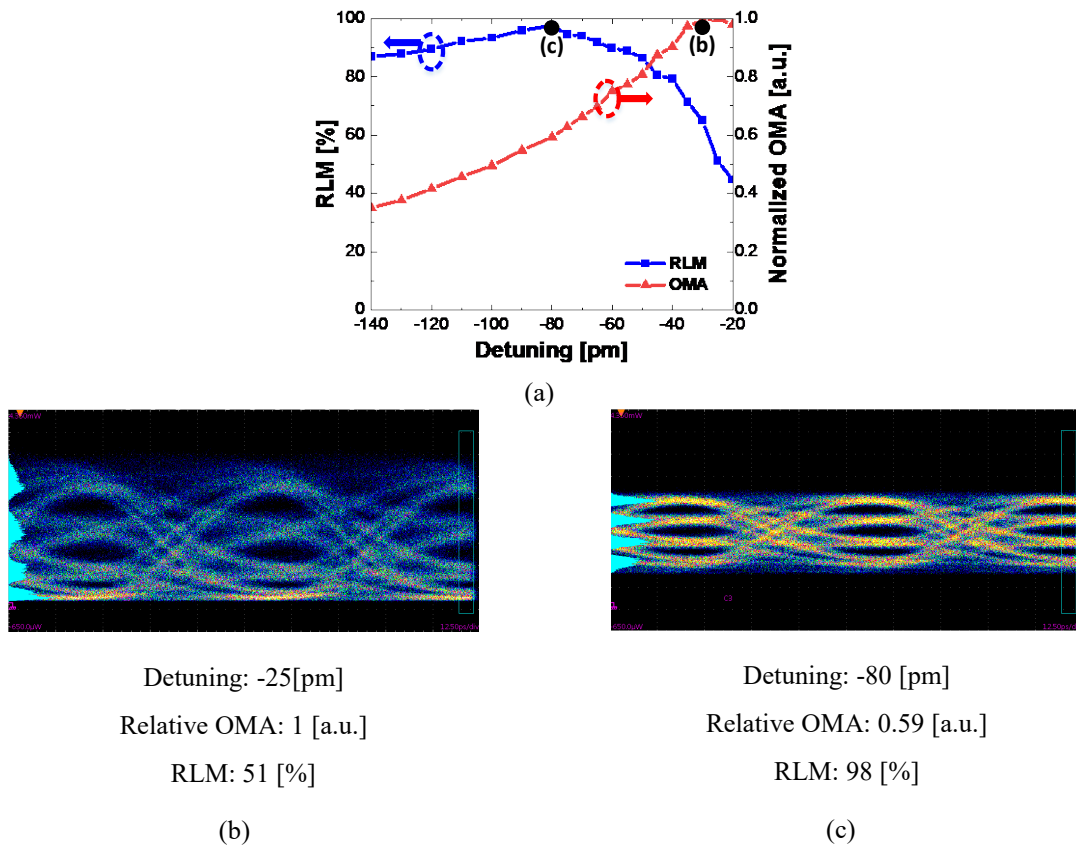


Figure 1. (a) Measured OMA and RLM of Si MRM at different input wavelength, and the eye diagrams at (b) maximum OMA and (c) maximum RLM conditions.

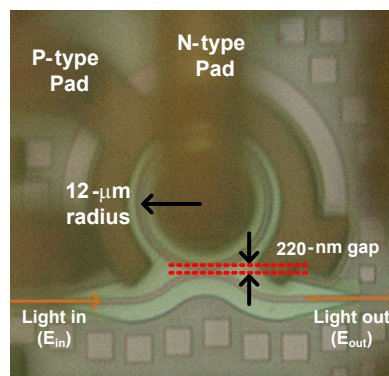


Figure 2. Microphotograph of the Si MRM