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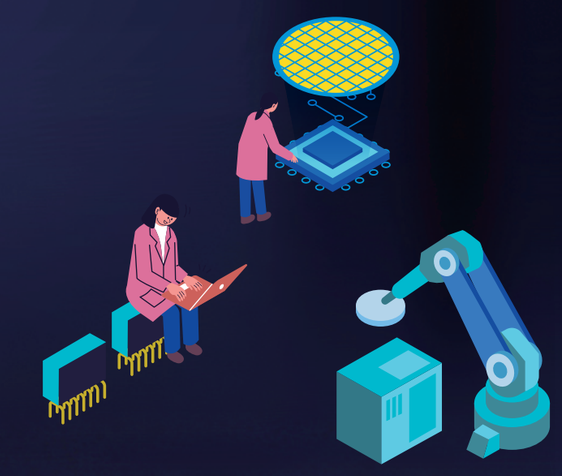
제 32회 한국반도체학술대회

The 32nd Korean Conference on Semiconductors

2025년 2월 12일(수)-14일(금) | 강원도 하이원리조트

Future Normal in Semiconductor

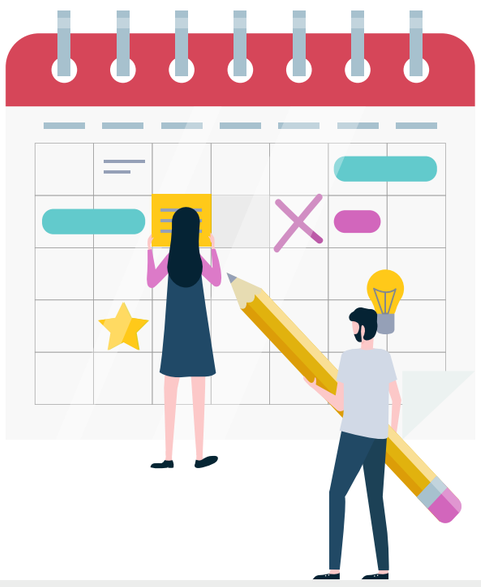


Future Normal(퓨처 노멀) 이란 미래의 표준으로, 10년 후에도 변하지 않을 일상의 트렌드를 의미하며,
반도체에 대한 연구를 통해 우리나라 산업에 영향을 미칠
가장 강력한 트랜드를 제시하며 미래에 대한 강력한 통찰력을 제공하는 것을 말합니다.

이번 학술대회를 통해 여러분이 세계 최고 수준의 반도체 미래를 경험하고, 일상의 트렌드가 될 혁신적인 아이디어를
도출하며, 도전적인 연구개발을 추진할 수 있는 기회를 가지시기를 바라며, 여러분들의 많은 참가와 관심 기다리겠습니다.

주요 일정

* 주최측 사정에 의해 일정은 변동될 수 있으며,
홈페이지를 통해 공지됩니다.



초록 접수 마감일
2024년 11월 1일(금)

- 학부생 포스터 접수 마감 **2024년 11월 15일(금)**

초록 채택 통보일
2024년 12월 13일(금)

사전 등록 마감일
2025년 1월 24일(금)

주요 프로그램

* KCS 2025 학부생 포스터세션은 분과별 접수로
진행되며, 2월 12일(수) 진행될 예정입니다.

- 기조강연
- Short Course
- 구두세션
- 포스터 세션
- 산학연 전시
- 만찬 및 시상식
- 폐회식 및 경품추첨
- 초청강연
- Rump Session
- 학부생 포스터 세션
- 개회식
- 웰컴 이벤트
- Chip Design Contest

모집 분야

A Interconnect & Package
B Patterning (Lithography & Etch Technology)
C Material Growth & Characterization
D Thin Film Process Technology
E Compound Semiconductors
F Silicon and Group-IV Devices and Integration Technology
G Device & Process Modeling, Simulation and Reliability
H Display and Imaging Technologies
I MEMS & Sensors Systems
J Nano-Science & Technology
K Memory (Design & Process Technology)
L Analog Design
M RF and Wireless Design
N VLSI CAD
O System LSI Design
P Device for Energy (Solar Cell, Power Device, Battery, etc.)
Q Metrology, Inspection, Analysis, and Yield Enhancement
R Semiconductor Software
S Chip Design Contest
T AI
U Bio-Medical
V Quantum Technology
* 학부생 포스터 세션

*초록제출 관련 안내는
아래 QR코드를 통해 확인해 주시기 바랍니다.

주관 DB하이텍 KSIA 한국반도체산업협회 COSAR 한국반도체연구조합

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E. Compound Semiconductors 분과

O65_[FM2-E] Optoelectronics

좌장: 이기원 교수(원광대학교), 정용식 박사(KAIST)

FM2-E-1 10:55-11:10	**Quantum Efficiency Enhancement of LWIR Type-II Superlattice Detectors Using Guided-Mode Resonance** SEUNG-YEOP AHN[1], JINHA LIM[1], DAE-MYEONG GEUM[1,2], DONGHO GWAK[1], KANG KO-KU[3], JUN HO EOM[3], YOUNG HO KIM[3], and SANGHYEON KIM[1] [1]School of Electrical Engineering, KAIST, [2]Department of Electronic Engineering, Inha University, [3]i3system, Inc.
FM2-E-2 11:10-11:25	**중적외선 검출을 위한 표면 암전류 저감 T2SL 광검출기 array 제작** 한재훈[1], 김상현[2], 송진동[1], 강준현[3], 한일기[3] [1]한국과학기술연구원, 양자기술연구단, [2]한국과학기술원, [3]한국과학기술연구원, 나노포토닉스연구센터
FM2-E-3 11:25-11:40	**Short-Wave Infrared Detection Using Quantum-Well Photo-HEMTs** Yuna Lee[1,2], DaeHwan Ahn[1], Kyunghwan Kim[1], Kyul Ko[1], SungHan Jeon[1], Juwon Seo[3], JoonHyun Kang[3], Woo-Young Choi[2], and Jae-Hoon Han[1] [1]Center for Quantum Technology, KIST, [2]Department of Electrical and Electronic Engineering, Yonsei University, [3]Nanophotonics Research Center, KIST
FM2-E-4 11:40-11:55	**Demonstration of ~1W High-output Power SWIR Laser Diodes Using an Optimized Sb-Based Laser Structure** Eungbeom Yeon[1,2], Seungwan Woo[1,3] In-Hwan Lee[2], Daehwan Jung[1], and Won Jun Choi[1] [1]Center for Quantum Technology, KIST, [2]Department of Materials Science and Engineering, Korea University, [3]Department of Materials Science and Engineering, Seoul National University
FM2-E-5 11:55-12:10	**Monolithically Integrated SWIR/MWIR Dual-band Infrared Thin-film Photodetector** Seungwan Woo[1,2], Eungbeom Yeon[1], Ho Won Jang[2], Daehwan Jung[1], and Won Jun Choi[1] [1]Center for Quantum Technology, KIST, [2]Department of Materials Science and Engineering, Seoul National University
FM2-E-6 12:10-12:25	**자외선 이중대역내 선택적 검출을 위한 이종접합 GaN/Ga_2O_3 기반 광 검출기 연구** 김선재[1,2], 김형윤[2], 박지현[2], 전대우[2], 황완식[1] [1]한국항공대학교 신소재공학과, [2]한국세라믹기술원 디스플레이소재센터
FM2-E-7 12:25-12:40	**Optoelectronic Logic Operations based on the Poling Effect of CuO/$BaTiO_3$ Heterojunction Photodetectors with Ultra-Low Power Consumption** Junhyung Cho[1], Wangmyung Choi[1], Taehyun Park[1,2], and Hocheon Yoo[1,2] [1]Department of Semiconductor Engineering, Gachon University, [2]Department of Electronic Engineering, Gachon University

Short-Wave Infrared Detection Using Quantum-Well Photo-HEMTs

Yuna Lee[1,2], DaeHwan Ahn[1], Kyunghwan Kim[1], Kyul Ko[1], SungHan Jeon[1], Juwon Seo[3], JoonHyun Kang[3], Woo-Young Choi[2*], Jae-Hoon Han[1**]

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[2]*Department of Electrical and Electronic Engineering, Yonsei University*
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Short-wave infrared (SWIR) photodetectors are used in various fields such as light detection and ranging (LiDAR) sensors, neuromorphic computing, and Si photonics. To enable the practical application of photodetectors, detecting low-intensity light and minimizing power consumption are imperative. In other words, photodetectors with high optical responsivity and low operating voltage are needed. Among different photodetector structures, InGaAs-based high-electron-mobility transistors (HEMTs) have been proven to meet these requirements. Naturally generated two-dimensional electron gas (2DEG) and suppressed ionized impurity scattering in HEMTs enable much higher effective mobility at lower operating voltages, leading to higher photocurrent and improved optical responsivity [1].

In this study, to further enhance the optoelectronic characteristics of HEMTs, InAs quantum-well (QW) channel structures are introduced in InGaAs-based HEMTs. Fig. 1(a) shows the InGaAs-based QW HEMT cross-sectional structure. Because of the quantum confinement effect in the QW channel, higher effective mobility and a broader detection range can be expected [2]. Fig. 1(b) and Fig. 1(c) reveal photocurrent (I_{ph}) and optical responsivity at a 1.55 μm wavelength, demonstrating the feasibility of InGaAs-based QW photo-HEMTs. With future optimization of the device's structural properties, QW photo-HEMTs are expected to be integrated as high-performance photodetectors in Si photonics.

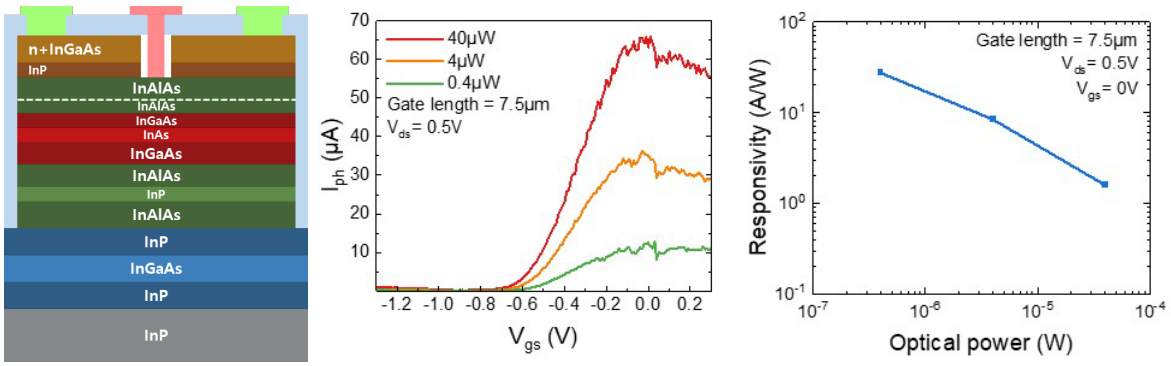

Fig. 1 (a) Schematic of QW photo-HEMT. (b) I_{ph} as a function of V_{gs}. (c) Responsivity with respect to input optical powers.

Acknowledgments This research was partially supported by the KIST institutional project (grant number 2E32942), and the National Research Foundation of Korea (NRF) grant (No. 2022R1C1C1007333 and 2022M3F3A2A01065057).
References [1] Choi, C-S., et al. "High optical responsivity of InAlAs-InGaAs metamorphic high-electron mobility transistor on GaAs substrate with composite channels." IEEE Photonics Technology Letters 15.6 (2003): 846-848. [2] Ahn, DaeHwan, et al. "High-responsivity InAs quantum well photo-FET integrated on Si substrates for extended-range short-wave infrared photodetector applications." Photonics Research 11.8 (2023): 1465-1473.