

2023년

韓國센서學會 春季學術大會 論文集

제 34 권 제 1-1 호

www.sensors.or.kr

- 날 짜 : 2023년 3월 29일(수)~30일(목)
- 장 소 : 한국과학기술회관 대회의실 및 중소회의실
- 주 최 : (사)한국센서학회
- 주 관 : 2023년 춘계학술대회 조직위원회
- 공동주최 : 한국센서산업협회, 한국반도체연구조합/한국반도체산업협회
- 후 원 : (주)EV첨단소재



사단
법인 한국센서학회
THE KOREAN SENSORS SOCIETY

1. 논문 투고 분야

- ① Theory and Design, Materials and Technology
- ② Mechanical Sensors
- ③ Physical Sensors(non-mechanical)
- ④ Chemical Sensors
- ⑤ Biosensors and Bioanalytic Systems
- ⑥ MEMS and Actuators
- ⑦ Interfaces and System Issues
- ⑧ Multidisciplinary



JSST에 논문제출 의향이 있으신 분들은
위 QR코드 양식을 작성하시어
제출 부탁드립니다.

2. 출판 예정일 : 매 홀수 달 말일 (6회 발행 / 년)

3. 등재 현황 : KCI 등재지

4. JSST 홈페이지 : <http://jsstec.org>

5. 논문 투고 양식 : 영문 또는 국문 논문

*Template 확인 : <http://jsstec.org> > E-Submission > Manuscript 작성양식

6. 논문 제출 방법 : Template에 따라 영문 또는 국문으로 작성하여, On-line 접수

*E-Submission : <https://dbpiaone.com/sensors>

7. 심사료 및 게재료

		일반 투고 논문	긴급 투고 논문
심 사 료		30,000원	60,000원
게재료	기본 게재료 : 6page 까지	30,000원/1page	50,000원/1page
	7page 초과page 게재료	50,000원/1page	60,000원/1page

ISSN 1598-7442

**2023년
한국센서학회 춘계학술대회 논문집**

제 34권 제 1-1 호

- 날짜 : 2023년 3월 29일(수)~30일(목)
- 장소 : 한국과학기술회관 대회의실 및 중소회의실
- 주최 : (사)한국센서학회
- 주관 : 2023년 춘계학술대회 조직위원회
- 공동주최 : 한국센서산업협회, 한국반도체연구조합/한국반도체산업협회
- 후원 : (주)EV첨단소재

Conference Organization

● 주 최 : (사)한국센서학회

● 주 관 : 2023년 춘계학술대회 조직위원회

● 공동주최 : 한국센서산업협회, 한국반도체연구조합 및 한국반도체산업협회

● 대 회 장 : 공 성 호 ((사)한국센서학회장)

● 자문위원회	전국진(한국센서학회 명예회장)	박종욱(한국센서학회 명예회장)
	박효덕(한국센서학회 명예회장)	정완영(한국센서학회 명예회장)
	윤석진(한국센서학회 명예회장)	변형기(한국센서학회 명예회장)
	최지원(한국센서학회 명예회장)	유도준((주)센텍코리아)
	하승철((주)센코)	김태윤(암페놀센싱코리아(유))
	박상익((주)삼영에스앤씨)	유갑상(아이에스테크놀로지(주))
	남용현((주)트루윈)	

● 조직위원회

위 원 장	이동원(전남대학교)	
수석부회장	김희연(나노종합기술원)	
총 무	박홍식(경북대학교),	오승주(고려대학교)
재 무	전민석(한국산업기술시험원)	
국 제 교 류	장수환(단국대학교)	

● 프로그램위원회

위 원 장	박인규(한국과학기술원), 조욱(울산과학기술원)	이대성(한국전자기술연구원),
프로그램위원	김상훈(울산대학교), 김재준(울산과학기술원), 박성규(중앙대학교), 이대식(한국전자통신연구원), 정기훈(한국과학기술원), 최선진(한양대학교), 박종성(경북대학교)	김일두(한국과학기술원), 김현우(한양대학교), 오승주(고려대학교), 이우영(연세대학교), 정창규(전북대학교), 서인태(한국전자기술연구원),

Registration Information

- ★ 발표자는 반드시 본 학회 회원(당해년도 회비 납부)이어야 하므로 2023년도 연회비를 미납하신 분은 비회원 등록비로 납부해주시면 됩니다.
- ★ 발표는 반드시 등록을 하셔야 Proceeding에 논문이 게재되며, 참가하시는 모든 참가자는 등록을 하셔야 온/오프라인 세션 참여가 가능합니다.

● Registration Fee (등록비)

		사전등록	당일 현장등록
비회원 및 미납회원	일반	₩270,000	₩290,000
	학생(석사과정)	₩190,000	₩210,000
회원	정회원	₩220,000	₩240,000
	학생(석사과정)	₩170,000	₩190,000
학술대회 Proceeding 별도 구매시		₩20,000	

- *회원 : 2022년 7월 1일~ 현재까지 연회비 납부 이력이 있는 회원
- *미납회원 : 마지막 연회비를 2022년 7월 1일 이전에 납부한 회원
- *학생 : 석사과정 중인 학생까지 (석사과정 졸업 이상 분들은 일반 또는 정회원)

- 사전등록 신청마감 : 2023년 3월 22일(수)
- 사전등록방법 : 온라인 등록 (<https://www.sensors.or.kr/78>)
- 문의사항 : (e-Mail) ksensors@gmail.com (TEL) 02-554-6616

Note to Presenters

Oral Presentation

- 이번 학술대회의 모든 논문은 오프라인 발표로 진행됩니다.
- 각 발표시간은 프로그램을 확인 부탁드립니다.
- 연속되는 시간을 차질 없이 진행할 수 있도록 발표시간을 엄수해 주시기 바랍니다.
- 각 Room에 랩탑 컴퓨터가 준비될 예정이며 발표자료를 USB에 저장해오시기 바랍니다.
개별 랩탑 교체로 발표가 지연되지 않도록 협조 부탁드립니다.

Poster Presentation

- 이번 학술대회의 포스터 논문은 오프라인 발표로 진행됩니다.
- 포스터 부착물(사이즈 : 가로 90cm*세로120cm 이내)은 직접 준비하여 게재시간 전까지 해당 세션 장소에 부착 완료하시기 바랍니다.
- 포스터 세션 장소 : 한국과학기술회관 지하1층 중회의실1+2
(지정된 게재시간에 해당 논문번호 판넬에 포스터 부착)
- 포스터 게재 장소 및 시간은 각 논문별로 상이하오니 논문별 게재 장소/시간 확인 부탁드립니다.
 - Session 1 : 3월 29일(수) 09:00~10:20
 - Session 2 : 3월 29일(수) 16:00~17:20
 - Session 3 : 3월 30일(목) 09:00~10:20(각 세션이 종료되면 다음 발표준비를 위해 반드시 부착물을 떼어주시기 바랍니다)
- 3분스피치 심사
 - 3분스피치 심사를 신청해주신 분들은 심사시간에 반드시 발표자 1인 이상 상주하시기 바랍니다.
 - 다음 발표자를 위해 발표시간은 3분 이내로 맞춰주시기 바랍니다.
 - 3분스피치 심사를 통하여 본 학술대회 논문상 수상자를 최종 선정하게 됩니다.

< 3분스피치 심사 시간 >

- Session 1 : 3월 29일(수) 09:00~10:20
- Session 2 : 3월 29일(수) 16:00~17:20
- Session 3 : 3월 30일(목) 09:00~10:20

< 평가기준 >

- 1) 연구 motivation의 독창성 및 창의성 (25점)
- 2) 연구 결과의 완성도 및 질적 수준 (25점)
- 3) 연구 결론의 명확성 (25점)
- 4) 포스터 구성의 명료성 (25점)

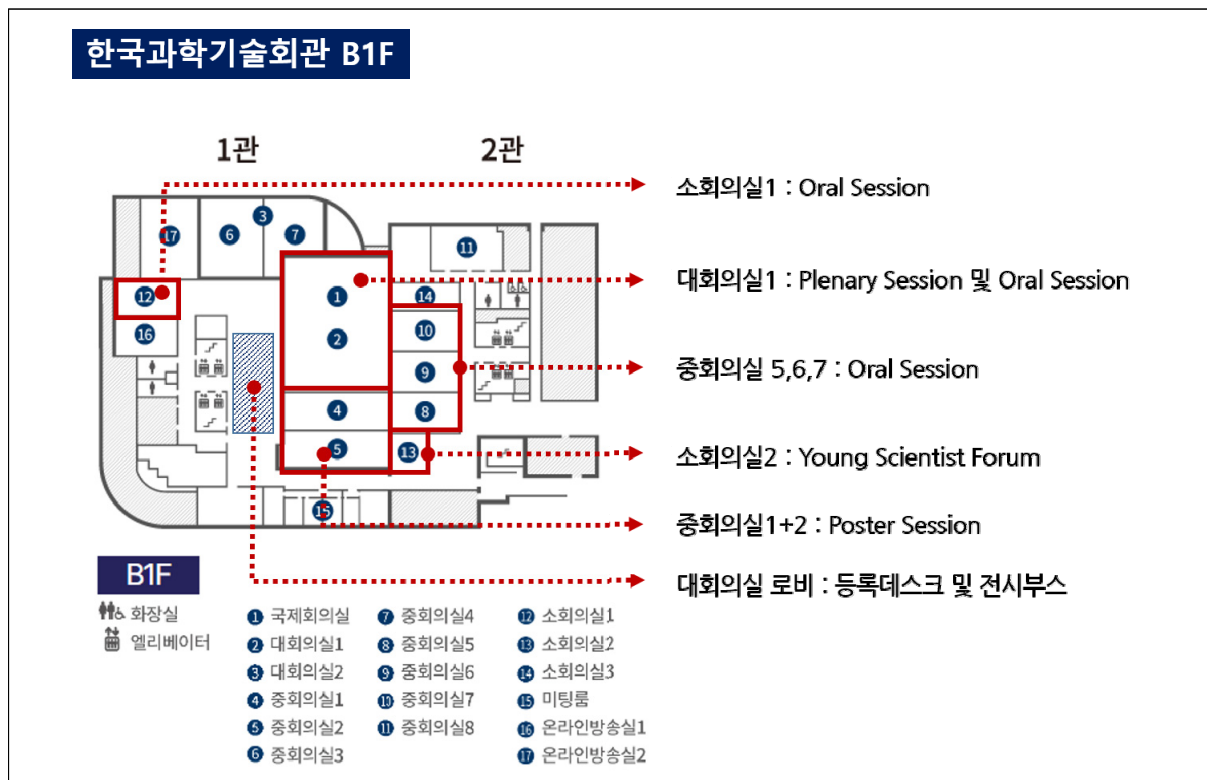
Young Scientist Forum

- 발표 장소 : 한국과학기술회관 지하1층 소회의실2
- 발표 시간
 - Session 1 : 3월 29일(수) 13:30~15:00
 - Session 2 : 3월 30일(목) 10:30~11:45
 - 각 발표자는 프로그램에서 발표시간 확인부탁드립니다.
 - 논문 1편당 발표시간은 질의 응답을 포함하여 15분입니다. 따라서 구두발표는 12분 이내로 끝내주시기 바랍니다.
 - * 연속되는 시간을 차질 없이 진행할 수 있도록 발표시간을 엄수해 주시기 바랍니다.
- 발표언어 : 한국어 또는 영어
- 각 Room에 랩탑 컴퓨터가 준비될 예정이며 발표자료를 USB에 저장해오시기 바랍니다. 개별 랩탑 교체로 발표가 지연되지 않도록 협조 부탁드립니다.

우수논문상 시상식

- 논문상 선정
 - 포스터세션 부문 : 최우수논문상 (상장 및 상금(각50만원) 수여), 우수논문상(상장 수여)
 - Young Scientist Forum 부문 : 최우수논문상 (상장 및 상금(각50만원) 수여), 우수논문상 (상장 수여)
 - * 최우수논문상금은 1년 이내에 센서학회지(JSST)에 논문제출 완료시에만 지급됩니다.
- 논문상 시상식 : 3월 30일(목) 16:10~16:30 (한국과학기술회관 지하1층 대회의실)

회의장 위치



포스터 논문 게재시간 확인

	발표자 성함	발표자 소속	논문번호	논문제목	세션	세션시간	3분 스피치 신청
1	강규민	성균관대학교	P03-18	Green tea extracts based polymeric glue with high strain tolerance under water human-machine interface through densely packed network	Session 1	3월 29일(수) 09:00-10:20	No
2	강상균	충남대학교	P10-08	Low-Noise and Variation-Tolerant Potentiostat Readout Analog Front-End for Three-Electrode Electrochemical Sensor	Session 3	3월 30일(목) 09:00-10:20	No
3	강순규	한국항공대학교	P10-06	Design of Multi-mode Sensor Signal Processor on FPGA Device	Session 3	3월 30일(목) 09:00-10:20	Yes
4	강승조	연세대학교	P09-02	Laser-Induced Zinc Oxide-Based Formaldehyde Gas Sensor	Session 1	3월 29일(수) 09:00-10:20	No
5	강승조	연세대학교	P09-09	Laser-Induced Co ₃ O ₄ Based highly sensitive Glucose Sensors	Session 3	3월 30일(목) 09:00-10:20	No
6	강지윤	경북대학교	P01-14	Microfluidic dielectrophoresis chip and ELISA protocol for isolation and quantification of extracellular vesicle analysis	Session 2	3월 29일(수) 16:00-17:20	Yes
7	강창구	한국원자력연구원	P14-24	Fabrication and characterization of polymer-nanoparticle flexible scintillators	Session 3	3월 30일(목) 09:00-10:20	No
8	고누리	UNIST	P05-05	Method for washing BT template after the topochemical reaction to remove impurities	Session 2	3월 29일(수) 16:00-17:20	No
9	고석현	전북대학교	P05-13	Optogenetic brain neuromodulation by self-powered flexible micro light-emitting diode system	Session 2	3월 29일(수) 16:00-17:20	Yes
10	고재현	KAIST	P06-03	High Loading of Gold Nanoparticles for Electrospinning Synthesis of CuO-CeO ₂ for Highly Sensitive Carbon Monoxide Gas Sensors	Session 2	3월 29일(수) 16:00-17:20	No
11	곽지영	중앙대학교	P12-12	Heterogeneous Structure Omnidirectional Strain Sensor Arrays with Cognitive learning neural network	Session 1	3월 29일(수) 09:00-10:20	No
12	구기원	한국전자기술연구원	P01-02	A study on Individual Identification algorithm using ECG signal	Session 1	3월 29일(수) 09:00-10:20	No
13	국경혜	한국생명공학연구원	P01-10	Hybrid CRISPR/Cas protein for one-pot detection of DNA and RNA	Session 2	3월 29일(수) 16:00-17:20	No
14	김경호	한국생명공학연구원	P01-16	Wireless portable multiplexed bioelectronic nose for food spoilage/freshness discrimination	Session 2	3월 29일(수) 16:00-17:20	No
15	김근희	나노종합기술원	P12-04	Development of Plasma Dicing before Grinding process for manufacturing high-performance Photoplethysmography sensor	Session 3	3월 30일(목) 09:00-10:20	No
16	김기범	고려대학교	P07-02	Highly Selective and Sensitive Detection of Carcinogenic Benzene Using a Raisin Bread-Structured Film Comprising Catalytic Pd-Co ₃ O ₄ and Gas-Sensing SnO ₂ Hollow Spheres	Session 1	3월 29일(수) 09:00-10:20	Yes
17	김기범	KAIST	P11-03	Compact Spectrometer using Aberration Correction Lens Grating for PCR Fluorescence Detection	Session 3	3월 30일(목) 09:00-10:20	Yes
18	김다빈	성균관대학교	P04-22	High-Performance Piezoelectric Yarns with AI-Enabled Sensing and Classification Capabilities for Wearable Devices	Session 1	3월 29일(수) 09:00-10:20	Yes
19	김다예	경북대학교	P01-05	High-Throughput Microfluidic Coulter Counter Device with Multi-Sensing Channel for Micron Detection	Session 2	3월 29일(수) 16:00-17:20	Yes
20	김명우	UNIST	P10-01	Mode Adaptive Frequency Variable Pulse Skipping Modulation Controlled Charge Pump for Multi-Purpose Sensor/Stimulation Application	Session 3	3월 30일(목) 09:00-10:20	No
21	김민서	UNIST	P05-10	Pb(Fe _{0.5} Nb _{0.5})O ₃ thin film derived by sol-gel method	Session 2	3월 29일(수) 16:00-17:20	No
22	김민석	한국과학기술연구원	P05-14	Novel Transfer Technology for Integrating High-Quality Single Crystal Relaxor-Ferroelectric Oxide on Silicon-on-Insulator (SOI)	Session 1	3월 29일(수) 09:00-10:20	No
23	김민현	KAIST	P06-02	Visible-light-activated NO ₂ Gas Sensor with Oxide Solid Solution for Harmful Gas Detection in Industrial and Automotive Environment	Session 2	3월 29일(수) 16:00-17:20	Yes

	발표자 성함	발표자 소속	논문번호	논문제목	세션	세션시간	3분 스피치 신청
24	김보미	경기대학교	P12-13	Efficient Quantum dots light-emitting diodes with a Zn0.85Mg0.15O electron transport layer by RF sputtering	Session 3	3월 30일(목) 09:00-10:20	No
25	김빛나	나노종합기술원	P14-26	Enhancing electrochemical energy storage devices with bicontinuous carbon structure materials	Session 3	3월 30일(목) 09:00-10:20	No
26	김상준	한양대학교	P02-10	Wearable cooling patch system with heatsink without convection	Session 1	3월 29일(수) 09:00-10:20	No
27	김수민	한국생명공학연구원	P01-20	In-situ food spoilage monitoring using a wireless chemical receptor-conjugated graphene electronic nose	Session 2	3월 29일(수) 16:00-17:20	No
28	김수민	연세대학교	P02-07	Liquid Electrodes for Cardiac Recording and Stimulation	Session 1	3월 29일(수) 09:00-10:20	Yes
29	김수진	한국원자력연구원	P14-25	Synthesis and luminescence of phosphors for scintillation applications	Session 3	3월 30일(목) 09:00-10:20	No
30	김승덕	경북대학교	P03-13	Silicon pillar produced via Metal-Assisted Chemical Etching for microparticle detection	Session 2	3월 29일(수) 16:00-17:20	Yes
31	김승수	서울대학교	P07-03	Voltage-Dependent Hydrogen Gas Detection Using Self-Activated Graphene with Pt Decoration	Session 1	3월 29일(수) 09:00-10:20	No
32	김승주	서울대학교	P07-10	Non-toxic transparent halide perovskites for flexible olfactory systems	Session 1	3월 29일(수) 09:00-10:20	No
33	김우식	고려대학교	P03-14	Perovskite Patterning Method with Adjustable Phase for High-Resolution Color Filter and Photodetector Arrays	Session 1	3월 29일(수) 09:00-10:20	No
34	김유경	단국대학교	P08-07	Gasochromic hydrogen sensing characteristics of oxide semiconductor	Session 1	3월 29일(수) 09:00-10:20	Yes
35	김윤경	한국과학기술연구원	P02-24	Skin-Integrated, Wireless Physiological Monitoring Platform with Soft, Holey Architectures for Neonatal Intensive Care	Session 2	3월 29일(수) 16:00-17:20	No
36	김은비	한양대학교	P08-08	Proton-beam irradiated for detecting NO ₂ gas sensitively under humid environments	Session 1	3월 29일(수) 09:00-10:20	No
37	김재성	성균관대학교	P12-17	Photoelectronic Comprehensive detecting system for Structural Safety Monitoring Network	Session 3	3월 30일(목) 09:00-10:20	No
38	김재우	한국과학기술연구원	P02-30	Self-healing, wireless arterial pulse wave monitoring patch	Session 1	3월 29일(수) 09:00-10:20	Yes
39	김정남	과학기술연합대학원대학교, ETRI	P03-12	Noise Endurable Texture Recognition with a Visuo-tactile Sensing Module and Machine Learning	Session 2	3월 29일(수) 16:00-17:20	No
40	김정호	경기대학교	P12-14	Solution-Processed NiO as a Hole Injection Layer for Optimized Quantum Dot Light-Emitting Diodes	Session 3	3월 30일(목) 09:00-10:20	No
41	김주완	동국대학교	P04-09	Improving the Stretchability and Capacity of Battery using Hierarchically Tertiary Coil Structure	Session 3	3월 30일(목) 09:00-10:20	Yes
42	김준수	경북대학교	P01-04	IZO/ZnO Nanowire Heterostructure for Enhanced Biomolecule Detection	Session 2	3월 29일(수) 16:00-17:20	Yes
43	김지관	광주대학교	P01-01	Fabrication of an electrochemical biosensor for detecting proline	Session 2	3월 29일(수) 16:00-17:20	No
44	김지관	광주대학교	P01-07	Fabrication of graphene composite for temperature sensor applications	Session 2	3월 29일(수) 16:00-17:20	No
45	김지수	연세대학교	P09-15	Enhanced Acetone Sensing Properties of Round-Shaped CeO ₂ Nanoparticles Synthesized with Polyvinylpyrrolidone (PVP)	Session 3	3월 30일(목) 09:00-10:20	Yes
46	김지희	연세대학교	P09-07	The surface defect-engineering of SnO/SnO ₂ heterostructures and their enhanced NO ₂ sensing performance	Session 1	3월 29일(수) 09:00-10:20	No
47	김지희	연세대학교	P09-08	High-sensitivity and low-power H ₂ S sensor using MEMS-based sensor on Pd-decorated ZnO porous nanosheets	Session 3	3월 30일(목) 09:00-10:20	No
48	김지희	연세대학교	P09-10	Sensitive detection of isoprene by In ₂ O ₃ nanoparticle-based sensors integrated into miniaturized gas analyzer	Session 3	3월 30일(목) 09:00-10:20	No
49	김진송	연세대학교	P05-07	Development of a Power-Efficient Tribotronic Touch Memory for Highly Sensitive Post-Impact Detection	Session 1	3월 29일(수) 09:00-10:20	No

	발표자 성함	발표자 소속	논문번호	논문제목	세션	세션시간	3분 스피치 신청
50	김진호	DGIST	P02-11	Robust and Conductive Biodegradable Fiber Electrode by Surface-Embedding of Mo microparticles	Session 2	3월 29일(수) 16:00-17:20	Yes
51	김학정	성균관대학교	P04-29	Self-powered real-time monitoring sensor for cooling fan based on triboelectric nanogenerator	Session 2	3월 29일(수) 16:00-17:20	No
52	김한솔	한국재료연구원	P05-18	An optimized hybrid harvester that combines a piezoelectric energy harvester with an electromagnetic induction coil	Session 2	3월 29일(수) 16:00-17:20	Yes
53	김항경	DGIST	P14-16	Highly flexible self-powered tactile sensor based on a PZT/PDMS composite with sedimented liquid metal electrodes	Session 3	3월 30일(목) 09:00-10:20	Yes
54	김해찬	한국항공대학교	P10-05	Design of B/TNN Hardware Accelerator for Sensor Applications	Session 3	3월 30일(목) 09:00-10:20	Yes
55	김혁진	서울대학교	P07-06	Taste sensors using 2D materials decorated with molecular sieves or metal for high selectivity to pH and glucose	Session 1	3월 29일(수) 09:00-10:20	No
56	김현승	전북대학교	P04-01	Conformable flexible adhesive piezoelectric patches for physical energy amplification with bioinspired hierarchically arranged microsuckers	Session 2	3월 29일(수) 16:00-17:20	No
57	김현승	전북대학교	P04-02	Relaxor polymer matrix for piezoelectric nanocomposite generators	Session 2	3월 29일(수) 16:00-17:20	No
58	김현재	한국전자기술연구원, 연세대학교	P12-08	Quantum dot light emitting diode with a strongly correlated insulator as inorganic hole transport layer	Session 3	3월 30일(목) 09:00-10:20	No
59	김현진	KAIST	P02-14	Development of modular optical tactile sensor for array-customizable capability	Session 2	3월 29일(수) 16:00-17:20	No
60	김형민	한양대학교	P08-04	Sonochemical synthesis of PEDOT:PSS intercalated ammonium vanadate nanofiber composite to detect NH ₃ at room temperature	Session 1	3월 29일(수) 09:00-10:20	No
61	김형진	구미전자정보기술원	P01-22	Fabrication of Indium tin oxide (ITO)-based FET Biosensor for Detection of Liver Cancer	Session 2	3월 29일(수) 16:00-17:20	No
62	김혜란	한국생명공학연구원	P01-17	Development of antibody against drug-resistant respiratory syncytial virus: Rapid detection of mutant virus using split superfolder green fluorescent protein-antibody system	Session 2	3월 29일(수) 16:00-17:20	No
63	남기백	서울대학교	P07-05	Visible light-activated NO ₂ sensor at Room Temperature based on 2-dimensional SnS ₂ nanoflowers	Session 1	3월 29일(수) 09:00-10:20	No
64	노동기	나노종합기술원	P01-09	Development of nanostructure-based biosensor platform by using improved gold etching process	Session 2	3월 29일(수) 16:00-17:20	No
65	노준호	동국대학교	P04-12	Integrated Electrochemical Harvesting Fiber and Thermal Artificial Muscle for Self-Powered Temperature-Strain Dual Parameter Sensor	Session 3	3월 30일(목) 09:00-10:20	Yes
66	노효웅	경북대학교	P01-12	Electrode passivation technique for isolation/separation of nanoparticles based on microfluidic dielectrophoresis chip	Session 2	3월 29일(수) 16:00-17:20	Yes
67	류소연	한국과학기술연구원, 고려대학교	P04-23	Electrical properties of Dion-Jacobson layered perovskite oxide nanosheet	Session 1	3월 29일(수) 09:00-10:20	No
68	류혜진	한국화학연구원	P08-11	Facile fabrication of a flexible room-temperature gas sensor based on molybdenum disulfide nanosheets and carbon nanotubes by screen-printing technology	Session 3	3월 30일(목) 09:00-10:20	No
69	문성준	한양대학교	P08-02	Hydrogen sensing characteristics of Pd-decorated ultrathin ZnO nanosheets.	Session 1	3월 29일(수) 09:00-10:20	No
70	박경석	KAIST	P02-27	On skin and tele haptic application of mechanically decoupled tactile sensor array on dynamically moving and soft surfaces	Session 2	3월 29일(수) 16:00-17:20	No
71	박규하	성균관대학교	P03-17	Balanced Coexistence of Reversible and Irreversible Covalent Bonds in a Conductive Triple Polymeric Network Enables Stretchable Hydrogels with High Toughness and Adhesiveness	Session 1	3월 29일(수) 09:00-10:20	No
72	박민수	경북대학교	P01-11	motion-tacking technique for precise evaluation of the multi-physical properties of single nanoparticles	Session 2	3월 29일(수) 16:00-17:20	Yes

	발표자 성함	발표자 소속	논문번호	논문제목	세션	세션시간	3 분 스피치 신청
73	박선주	서울대학교	P07-12	Highly sensitive breath isoprene sensor using Co_3O_4 @Co-incorporated polyoxotungstate yolk shell nanostructure	Session 1	3 월 29 일(수) 09:00-10:20	No
74	박성현	연세대학교	P02-18	Elucidating Sensing Mechanism of Aptamer-Modified Extended-Gate MOSFET Biosensor	Session 1	3 월 29 일(수) 09:00-10:20	No
75	박수현	한동대학교	P10-07	Sensor Array development for Health Monitoring by Gas from Human body	Session 3	3 월 30 일(목) 09:00-10:20	No
76	박시원	한양대학교	P02-06	Development of printable soft silicone for custom tailored wearable devices	Session 1	3 월 29 일(수) 09:00-10:20	No
77	박안진	한국광기술원	P14-22	Two-stage Neural Networks for Real-time Low-light Image Enhancement	Session 3	3 월 30 일(목) 09:00-10:20	No
78	박원정	연세대학교	P02-13	Correlation analysis between blood glucose and tear glucose in animal models using smart contact lenses	Session 1	3 월 29 일(수) 09:00-10:20	Yes
79	박정민	한국원자력연구원	P14-23	Scintillation Properties in the Visible Luminescence of $\text{Lu}_2\text{O}_3:\text{Gd}_2\text{O}_3:\text{Al}_2\text{O}_3$ Scintillators containing Pr_2O_3	Session 3	3 월 30 일(목) 09:00-10:20	No
80	박준혁	고려대학교	P03-10	Chlorine Detection using Perovskite Nanocrystals with High Sensitivity, Intuitivity, and Cost-effective	Session 1	3 월 29 일(수) 09:00-10:20	No
81	박준현	DGIST	P02-15	Multimodal Sensing with a Three-Dimensional Structure	Session 2	3 월 29 일(수) 16:00-17:20	No
82	박지훈	UNIST	P05-01	Enhancing Ferroelectric and Magnetic Properties of $\text{PbFe}_{1/2}\text{Nb}_{1/2}\text{O}_3$ (PFN) through Transition Metal Doping	Session 2	3 월 29 일(수) 16:00-17:20	No
83	박태성	고려대학교	P03-09	Nanoparticle Array with Optimized Thermal Expansion and Transport Engineering to Achieve Highly Sensitive Wearable Strain Sensor Immune to Thermal Noise	Session 1	3 월 29 일(수) 09:00-10:20	No
84	박태준	서울대학교	P02-28	Multi-Material Soft Sensing Glove for Accurate Hand Motion Tracking	Session 1	3 월 29 일(수) 09:00-10:20	No
85	박효식	DGIST	P04-10	Enhancing TENG Output Performance and Output Stability with Plasticizer-Modified PVC Gels	Session 2	3 월 29 일(수) 16:00-17:20	Yes
86	방준성	고려대학교	P03-08	Development of one-step inkjet printing method to manufacture wearable multi-sensor by using nanocrystal ink	Session 1	3 월 29 일(수) 09:00-10:20	No
87	백영준	서울대학교	P02-29	Smart Socks for 3-DOF Motion Analysis of Ankle-Foot Complex	Session 1	3 월 29 일(수) 09:00-10:20	No
88	백종원	KAIST	P06-07	Development of high-performance chemiresistive sensors based on understanding the metal-support modifying effect on selectivity and activity	Session 2	3 월 29 일(수) 16:00-17:20	Yes
89	백주은	단국대학교	P08-09	Hydrogen sulfide sensing characteristics of NiO nanostructure	Session 1	3 월 29 일(수) 09:00-10:20	Yes
90	백지현	서울대학교	P07-09	Two-terminal Lithium-mediated Artificial Synapses with Enhanced Weight Modulation for Feasible Hardware Neural Networks	Session 1	3 월 29 일(수) 09:00-10:20	No
91	변민석	한양대학교	P08-03	Selective CO gas detection using Au-decorated WS_2 - SnO_2 core-shell nanosheets in self-heating mode on flexible substrates	Session 1	3 월 29 일(수) 09:00-10:20	No
92	서보경	KAIST	P14-01	Sensor-Haptic Assisted Human Motion Recognition (HMR) and Transfer for Improvisation and Education of Dance for Visually Disabled Dancers	Session 3	3 월 30 일(목) 09:00-10:20	Yes
93	서성빈	울산대학교	P13-01	Study on Temperature Dependence of Exchange Bias at the NiFe/IrMn interface in MTJ for cryogenic MRAM	Session 3	3 월 30 일(목) 09:00-10:20	Yes
94	서성은	한국생명공학연구원	P01-15	Reusable GFET platform for the development of rapid sensing for pungency based on the reversible TRPV1 activation	Session 2	3 월 29 일(수) 16:00-17:20	No
95	서영석	한국생산기술연구원	P08-01	A Study of NO_2 Gas Sensor Based on Carbon Nanotubes (CNTs) Modified with Metal Oxides	Session 3	3 월 30 일(목) 09:00-10:20	No
96	서윤경	나노종합기술원	P14-11	Phase Identification of Cu_3Sn in Wafer-Level Vacuum Packaging	Session 3	3 월 30 일(목) 09:00-10:20	No
97	선정우	UNIST	P05-02	Synthesis and formation mechanism of BaNiO_3 as a promising catalyst for oxygen evolution reaction	Session 2	3 월 29 일(수) 16:00-17:20	Yes

	발표자 성함	발표자 소속	논문번호	논문제목	세션	세션시간	3 분 스피치 신청
98	성두환	성균관대학교	P03-19	Stable conducting filament formation in self-healable stretchable nanocomposite-based RRAM	Session 1	3 월 29 일(수) 09:00-10:20	Yes
99	손민기	성균관대학교	P12-07	Highly Conductive p-Type Transparent Conducting Electrode with Sulfur-Doped Copper Iodide	Session 3	3 월 30 일(목) 09:00-10:20	No
100	손현우	한양대학교	P14-20	Experimental Characterization of Condensation on Soft Polymer Surfaces	Session 3	3 월 30 일(목) 09:00-10:20	No
101	시민재	고려대학교	P03-16	Intermediate phase transfer enabling universal surface passivation of colloidal quantum dot for infrared optoelectronics	Session 1	3 월 29 일(수) 09:00-10:20	No
102	신가윤	한양대학교	P08-05	CuO/Cu ₂ O nanoparticles decorated multi-walled carbon nanotubes with high selectivity for H ₂ S gas	Session 1	3 월 29 일(수) 09:00-10:20	No
103	신승범	성균관대학교	P12-06	Silver Nanowire-based Strain Sensors with High Sensitivity and Stability for Wearable Electronics	Session 3	3 월 30 일(목) 09:00-10:20	No
104	신의철	KAIST	P06-06	Ambient-air photothermal shock-based synthesis in milliseconds for superior NO ₂ sensing materials : molybdenum carbide/sulfide heterostructures on reduced graphene oxide sheets	Session 2	3 월 29 일(수) 16:00-17:20	Yes
105	신준철	한국과학기술연구원	P04-15	Significant increase in the internal temperature difference and maximum power output using porous filler	Session 1	3 월 29 일(수) 09:00-10:20	No
106	심현준	동국대학교	P04-16	Soft and stretchable mechano-electrochemical harvester for self-powered organ monitoring system	Session 3	3 월 30 일(목) 09:00-10:20	No
107	안상권	연세대학교	P09-04	Prediction of Cluster of metabolic disease using Lactulose breath test and machine learning algorithms	Session 1	3 월 29 일(수) 09:00-10:20	No
108	안재완	KAIST	P06-01	Metal aerogels heterogeneously supported on nanofiber yarn scaffold as a freestanding H ₂ sensor device	Session 2	3 월 29 일(수) 16:00-17:20	Yes
109	안준혁	고려대학교	P03-02	Designing the Metal Halide Perovskite-Bridged PbSe Quantum Dots for Fabrication of UV/VIS/NIR Photodetectors Using Surface Chemistry	Session 1	3 월 29 일(수) 09:00-10:20	No
110	안진우	부산대학교	P04-25	Fabrication of Zinc Oxide-Embedded Laser-Induced Graphene with One-Step Direct Laser Irradiation	Session 2	3 월 29 일(수) 16:00-17:20	Yes
111	양정빈	한양대학교	P14-17	Study on Anti-Fouling Characteristics of Different Wettability-Controlled Surfaces	Session 3	3 월 30 일(목) 09:00-10:20	No
112	염완식	한양대학교	P08-06	SnO ₂ nanowires using synergistic effects of Pt decoration and Bi ₂ O ₃ Branched to implement selective NO ₂ sensing at low temperatures	Session 1	3 월 29 일(수) 09:00-10:20	No
113	염태훈	서울대학교	P07-07	Ultrasensitive and selective NO ₂ detection in sulfur doped SnO ₂ nanoparticles enabled by visible light illumination	Session 1	3 월 29 일(수) 09:00-10:20	No
114	여순목	한국원자력연구원	P08-10	Sensitivity comparison for hydrogen detection between H ⁺ and Kr ⁺ irradiated graphene gas sensor	Session 3	3 월 30 일(목) 09:00-10:20	No
115	여태수	UNIST	P05-04	The change of K _{1-x} Li _x NbO ₃ (KLN)'s XRD pattern as a function of the amount of lithium and the synthesis procedure to decrease the secondary phase of KLN	Session 2	3 월 29 일(수) 16:00-17:20	No
116	염준영	UNIST	P10-02	Multi-Channel Current to Digital Read-out Integrated Interface for Electrochemical Sensor and FET Type Sensor	Session 3	3 월 30 일(목) 09:00-10:20	No
117	오관영	한국과학기술연구원	P04-19	Electrochromic all-solid-state lithium-ion battery for next generation electronic devices by L ₄ T ₅ O ₁₂ and NiO electrode	Session 1	3 월 29 일(수) 09:00-10:20	No
118	오명은	동국대학교	P04-11	Soft-stretchy Harvesters for Self-Powered Tiny Motion Strain Sensors	Session 3	3 월 30 일(목) 09:00-10:20	Yes
119	오성근	고려대학교	P03-07	Effect of Doping on ZnO Nanoparticles for Quantum dots Photodiode	Session 1	3 월 29 일(수) 09:00-10:20	No

	발표자 성함	발표자 소속	논문번호	논문제목	세션	세션시간	3 분 스피치 신청
120	오승윤	충남대학교	P01-03	Porphyrin based Metal Organic Frameworks in the Colorimetric Sensor Array for the diagnosis of Lung Cancer	Session 2	3 월 29 일(수) 16:00-17:20	No
121	오인우	KU-KIST 융합대학원	P04-13	Design a wheel type piezoelectric energy harvester for direct current (DC) generation	Session 1	3 월 29 일(수) 09:00-10:20	No
122	우성윤	KAIST	P06-05	Dual Ligand-Assisted Stabilization of Single-Atom Catalyst on Metal Oxide Derived by Metal Hydroxide-Organic Frameworks	Session 2	3 월 29 일(수) 16:00-17:20	Yes
123	우유미	국립금오공과대학교	P04-05	Highly Conductive and Stretchable Cu Electrodes with Wrinkled Structures by Flashlight Irradiation	Session 2	3 월 29 일(수) 16:00-17:20	No
124	위지향	충남대학교	P10-09	A Low Noise Chopper Stabilized Multipath Amplifier with Dual-channel Ripple Averaging Technique	Session 3	3 월 30 일(목) 09:00-10:20	No
125	유주형	부산대학교	P04-20	Montmorillonite/Graphene composite based Resistive Humidity Sensor	Session 2	3 월 29 일(수) 16:00-17:20	Yes
126	유혜림	UNIST	P05-08	High-end transparent piezoceramics with high piezoelectricity and transparency at the same time	Session 2	3 월 29 일(수) 16:00-17:20	Yes
127	윤성도	한국생산기술연구원	P08-12	MOF-Derived Mesoporous and Hollow Microtube-Structured PdO-In ₂ O ₃ Composites for Enhanced Trimethylamine Sensing	Session 3	3 월 30 일(목) 09:00-10:20	No
128	이건주	UNIST	P05-11	poling-free relaxor-PT piezoelectric single crystals	Session 2	3 월 29 일(수) 16:00-17:20	No
129	이기철	KAIST	P11-05	Development of Ultra-Low-Power E-Nose System Based on Micro-LED Gas Sensors and Deep Learning Algorithm	Session 3	3 월 30 일(목) 09:00-10:20	No
130	이다은	서울대학교	P07-13	All inorganic Perovskite Quantum Dot based Devices with High Endurance	Session 1	3 월 29 일(수) 09:00-10:20	No
131	이도형	한국화학연구원	P12-03	Optoelectric performance enhancement of two-dimensional tin monoselenide-based photodetectors <i>via</i> tellurium doping	Session 3	3 월 30 일(목) 09:00-10:20	No
132	이동규	국립금오공과대학교	P04-07	Elongated Plasmonic Welding Induced by Laser For Flexible Touch Screen Panel Applications	Session 2	3 월 29 일(수) 16:00-17:20	No
133	이동민	한국과학기술연구원	P02-25	Miniaturized, skin-integrated wireless monitoring system for identifying full-body motions and vital signs in infants	Session 2	3 월 29 일(수) 16:00-17:20	No
134	이동수	성균관대학교	P04-28	Effect of suspension concentration on 3D printed lead-free piezoelectric ceramics for energy harvesting and sensing applications	Session 2	3 월 29 일(수) 16:00-17:20	Yes
135	이동욱	연세대학교	P02-09	Liquid metal core-shell particle-based stretchable electrochemical biosensors	Session 1	3 월 29 일(수) 09:00-10:20	No
136	이미선	DGIST	P02-21	Post-Assembly of 3D Electronic Systems with Mechanical Guidance	Session 2	3 월 29 일(수) 16:00-17:20	No
137	이민혁	한국과학기술연구원	P04-14	Flexible Magnetostrictive Film-based Triboelectric Nanogenerator for Stray Magnetic Field Energy Harvesting	Session 1	3 월 29 일(수) 09:00-10:20	No
138	이상경	국방과학연구소	P13-04	Portable all-optical atomic magnetometer with 300-fT/√Hz sensitivity in an earth-scale magnetic field	Session 3	3 월 30 일(목) 09:00-10:20	No
139	이상엽	고려대학교	P03-01	Designing a self-classifying smart device with UV light detecting sensor, display, and radiative cooling functions via spectrum-selective response	Session 1	3 월 29 일(수) 09:00-10:20	No
140	이성준	성균관대학교	P03-20	A vacuum-deposited sub-micron polymer dielectric compatible with microfabrication for wafer-scale stretchable electronics	Session 1	3 월 29 일(수) 09:00-10:20	Yes
141	이세진	KAIST	P11-04	Characterization of TEOS-coated SERS substrate for artificial breath aerosol biomarker detection.	Session 3	3 월 30 일(목) 09:00-10:20	No
142	이수민	서울대학교	P07-11	Tailoring the sensor electrodes of In ₂ O ₃ nanopatterns toward extremely sensitive and selective xylene detection	Session 1	3 월 29 일(수) 09:00-10:20	No
143	이승규	KAIST	P02-26	Stretchable electronics with serpentine electrodes showing high stress reduction effects	Session 2	3 월 29 일(수) 16:00-17:20	No

	발표자 성함	발표자 소속	논문번호	논문제목	세션	세션시간	3 분 스피치 신청
144	이승용	연세대학교	P09-14	Emerging H ₂ S sensing in strongly correlated insulator NiWO ₄ by simultaneous modulation of band structure and polaron hopping path	Session 3	3 월 30 일(목) 09:00-10:20	Yes
145	이영진	UNIST	P05-09	Effect of A-site deficiency on the Structural, electrical properties of BNT-BT lead-free piezoceramics	Session 2	3 월 29 일(수) 16:00-17:20	No
146	이용민	고려대학교	P03-04	Surface-Doping strategy for CdSe Nanocrystals: Enabling Fabrication of Flexible Devices at Lower Temperature	Session 1	3 월 29 일(수) 09:00-10:20	No
147	이은지	한국화학연구원	P07-01	Oxygen mediated surface customization of three-dimensional porous graphene for humidity sensors	Session 3	3 월 30 일(목) 09:00-10:20	No
148	이재상	중앙대학교	P12-05	Effect of Sidewall Angle on a Bend structure in S-bend Resonator	Session 1	3 월 29 일(수) 09:00-10:20	No
149	이재웅	연세대학교	P09-01	Highly sensitive and reversible Pd-SnO ₂ Nanorod hydrogen sensor based on parallel resistance circuit model	Session 1	3 월 29 일(수) 09:00-10:20	No
150	이재웅	연세대학교	P09-11	A Study on Highly sensitive and selective acetone sensing performances of SnO ₂ nanorod arrays decorated with metal catalysts for breath-analyzer applications	Session 3	3 월 30 일(목) 09:00-10:20	No
151	이종민	중앙대학교	P12-10	Quantum dot-based heterojunction transistors for color sensing	Session 1	3 월 29 일(수) 09:00-10:20	No
152	이종훈	한양대학교	P14-19	Study on Ultra-soft Conductive Polymer as Sensing Platform	Session 3	3 월 30 일(목) 09:00-10:20	No
153	이주영	한국광기술원	P11-01	Industrial-IoT Sensor Platform Application of FBG-based Optical Temperature and Vibration Sensors	Session 3	3 월 30 일(목) 09:00-10:20	No
154	이주영	한국광기술원	P11-02	Simultaneous Measurement of Vibration and Temperature for Conveyor Belt using Distributed Fiber-Optic Sensor	Session 3	3 월 30 일(목) 09:00-10:20	No
155	이주현	UNIST	P05-03	Inducing High Thermal Stability by Forming a Binary System with CaZrO ₃ in Bi _{1/2} Na _{1/2} TiO ₃ System for Capacitor Applications	Session 2	3 월 29 일(수) 16:00-17:20	No
156	이준영	한국전자통신연구원	P01-08	Smart Non-Invasive Platform for Monitoring Fat Burning Based on Exhaled Breath Measurement	Session 2	3 월 29 일(수) 16:00-17:20	No
157	이지현	연세대학교	P09-03	Extremely high acetone sensing response from precisely controlled oxygen vacancy in ZnO nanoparticles	Session 1	3 월 29 일(수) 09:00-10:20	No
158	이지현	연세대학교	P09-12	Selective detection of sub-1-ppb level formaldehyde using Au-coated SnO ₂ nanorod arrays gas sensor for diagnostic application of breath lung cancer	Session 3	3 월 30 일(목) 09:00-10:20	No
159	이진호	KAIST	P06-04	3D Hierarchical ZnO/ZIF-8 Nanostructures for Sensitive and Selective Room Temperature Gas Sensing with Light-activation	Session 2	3 월 29 일(수) 16:00-17:20	Yes
160	이해연	한양대학교	P14-21	Porous Patch for Wearable Sensing Applications	Session 3	3 월 30 일(목) 09:00-10:20	No
161	이혁준	DGIST	P02-17	Development of implantable drug delivery module using thermo-pneumatic peristaltic micropump	Session 2	3 월 29 일(수) 16:00-17:20	No
162	이현숙	연세대학교	P09-05	High performance of Pd-coated SnO ₂ nanorod arrays sensor integrated into miniaturized gas chromatography for breath hydrogen analysis	Session 1	3 월 29 일(수) 09:00-10:20	No
163	이현숙	연세대학교	P09-06	Improvement of acetone sensing performance of Ag-decorated ZnO porous nanosheets by surface nanocrack formation through Li-ion implantation process	Session 1	3 월 29 일(수) 09:00-10:20	No
164	이현주	고려대학교	P02-02	Soft, implantable, and biocompatible reduced graphene oxide strain sensor for continuous cardiac activity measurement and drug assessment	Session 1	3 월 29 일(수) 09:00-10:20	No
165	이현호	한양대학교	P14-18	Study on the wettability changes of temperature-responsive surfaces using microstructures	Session 3	3 월 30 일(목) 09:00-10:20	No
166	임성균	전남대학교	P02-03	Non-invasive type glucose measurement sensor with Arrayed Waveguide Grating and Artificial Intelligence technology	Session 2	3 월 29 일(수) 16:00-17:20	Yes

	발표자 성함	발표자 소속	논문번호	논문제목	세션	세션시간	3 분 스피치 신청
167	임인혁	서울대학교	P07-08	Enhancement of Resistive Switching Characteristics of FACsPbI ₃ -based ReRAM by Phase Stabilization of Cubic Halide Perovskites	Session 1	3 월 29 일(수) 09:00-10:20	No
168	임정	DGIST	P02-22	Binodal wireless epidermal systems with sensor analytics for neonatal care	Session 2	3 월 29 일(수) 16:00-17:20	No
169	임해나	한국과학기술연구원	P04-18	Artificial synapse based on oxygen vacancies controlled perovskite nanosheets	Session 1	3 월 29 일(수) 09:00-10:20	No
170	장영우	중앙대학교	P12-15	Ion-Gated Metal-Oxide Transistors: A Highly Sensitive and Low-Voltage Solution for Bioelectronics Applications	Session 1	3 월 29 일(수) 09:00-10:20	No
171	장우진	국민대학교	P03-21	Prevention of electric kickboard safety accidents by manufacturing kickboard footrest using conductive film and developing inertial sensor module	Session 1	3 월 29 일(수) 09:00-10:20	No
172	장준호	나노종합기술원	P01-19	Sensitive Detection of Acute Cardiac Disease Using Polypyrrole-Based Surface Coating Technique to Stably and Densely Immobilize the Receptor	Session 2	3 월 29 일(수) 16:00-17:20	No
173	장태민	고려대학교 KU-KIST 융합대학원	P14-15	Fully implantable Expandable Bioelectronics for Wireless Monitoring and Electrostimulation of the urinary bladder	Session 3	3 월 30 일(목) 09:00-10:20	Yes
174	전민석	한국산업기술시험원	P14-13	Properties of KCl-based expendable salt-core with conditions of sampling of molten salt	Session 3	3 월 30 일(목) 09:00-10:20	No
175	전진영	연세대학교	P05-06	Touch Sensor with Triboelectric Charges Operating as a Gate Bias	Session 1	3 월 29 일(수) 09:00-10:20	No
176	전혜윤	한국화학연구원	P12-02	Large-scale synthesis of two-dimensional ternary semiconductors using single-source precursor	Session 3	3 월 30 일(목) 09:00-10:20	No
177	정대경	나노종합기술원	P01-06	Cuvette-based LSPR Measurement Platform for Signal Amplification and Multi-sensing	Session 2	3 월 29 일(수) 16:00-17:20	Yes
178	정동찬	울산대학교	P13-02	Investigation on magnetic properties of [NiCo] Multilayers with He ion irradiation	Session 3	3 월 30 일(목) 09:00-10:20	Yes
179	정민지	DGIST	P02-19	Potentiometric pH sensing sutures	Session 2	3 월 29 일(수) 16:00-17:20	Yes
180	정병구	고려대학교	P03-06	Investigation of carrier statistics in Quantum Dot Infrared Photodetectors	Session 1	3 월 29 일(수) 09:00-10:20	No
181	정부석	KAIST	P01-21	Robust sulfur polymer chain-grafted functional surfaces for biofouling-resistant property	Session 2	3 월 29 일(수) 16:00-17:20	No
182	정성우	중앙대학교	P12-16	Photonic neuromorphic transistor based on deep spike heterostructure with low power consumption	Session 1	3 월 29 일(수) 09:00-10:20	No
183	정성훈	광운대학교	P01-13	Reduced Graphene Oxide-based Flexible Polymer Microneedle Sensor for Continuous Lactate Sensor	Session 1	3 월 29 일(수) 09:00-10:20	No
184	정소령	한국전자기술연구원, 연세대학교	P12-11	Purification process of inorganic nanoparticle electron transport layer for quantum dot light emitting diode	Session 3	3 월 30 일(목) 09:00-10:20	No
185	정윤진	전남대학교	P14-02	3D printed biodegradable stents with enhanced radiopacity for improved cardiovascular care	Session 3	3 월 30 일(목) 09:00-10:20	No
186	정지성	한국전자기술연구원	P14-08	A Study on Two-factor Authentication Algorithm Adaptive to Illumination Based on Fingerprint and Face Identification	Session 1	3 월 29 일(수) 09:00-10:20	No
187	정한희	DGIST	P02-16	Enzyme-based double-sided electrochemical sensor for real-time measurement of dopamine for Parkinson's Disease	Session 2	3 월 29 일(수) 16:00-17:20	No
188	정휘권	한국광기술원	P12-01	Development of vibration sensor based on laser optical interference and techniques for condition diagnosis of large-scale engine	Session 3	3 월 30 일(목) 09:00-10:20	No
189	조상현	UNIST	P10-03	A I-V Converter Based Photoplethysmogram Readout IC And Measurement System	Session 3	3 월 30 일(목) 09:00-10:20	No
190	조석주	KAIST	P02-12	Wireless, Multimodal Sensors for Continuous Measurement of Pressure, Temperature, and Hydration of Skin-interfaces	Session 2	3 월 29 일(수) 16:00-17:20	Yes
191	조성재	한국생명공학연구원	P01-18	Ultrasensitive cadaverine gas detection using graphene-covered gold nanorod sensor	Session 2	3 월 29 일(수) 16:00-17:20	No

	발표자 성함	발표자 소속	논문번호	논문제목	세션	세션시간	3 분 스피치 신청
192	조성환	서울대학교	P07-04	Ultrafast and Highly Reversible Gasochromic H ₂ Sensor using Pd-decorated Amorphous WO ₃ Nanorods Structure	Session 1	3 월 29 일(수) 09:00-10:20	No
193	조성훈	KAIST	P02-20	Wearable AI-enabled thermal comfort sensor for human-in-the-loop control of the HVAC system for energy-efficient building	Session 2	3 월 29 일(수) 16:00-17:20	No
194	조용인	성균관대학교	P12-18	Highly Photoresponsivity Large-Area Flexible Phototransistor Array Utilizing Dual-Channel TeNWs/Te Hybrid Structure	Session 2	3 월 29 일(수) 16:00-17:20	No
195	조재혁	성균관대학교	P12-09	Anion Vacancy Defect Passivation of 2D-layered Tin-based Perovskite Thin-Film Transistor with Sulfur Doping	Session 3	3 월 30 일(목) 09:00-10:20	No
196	조정훈	UNIST	P10-04	Improved Gas Pattern Recognition with GAN-Enhanced Edge Platform for Gas Sensors Monitoring System	Session 3	3 월 30 일(목) 09:00-10:20	Yes
197	좌하은	연세대학교	P09-16	Boosted Toluene gas sensing properties in Pd-decorated ZnO nanosheet	Session 3	3 월 30 일(목) 09:00-10:20	No
198	진호준	DGIST	P02-23	Transforming Planar Devices into 3D Architectures using Flexible Printed Circuit Boards and Controlled Forces	Session 2	3 월 29 일(수) 16:00-17:20	No
199	최규준	연세대학교	P05-16	Implantable Artificial Bladder With Wireless Urine Volume Sensor Using RFID technology	Session 1	3 월 29 일(수) 09:00-10:20	Yes
200	최영균	고려대학교	P03-03	Efficient Ionic Solution Treatment of Electron Transport Layer for Self-Powered Infrared Quantum Dot Photodetector	Session 1	3 월 29 일(수) 09:00-10:20	No
201	최우진	UNIST	P05-12	Effect of the Starting Particle Size on the Grain Growth Behavior and Piezoelectric Properties of Pb(Mg _{1/3} Nb _{2/3})O ₃ -Pb(In _{1/2} Nb _{1/2})O ₃ -PbTiO ₃ Ceramics	Session 2	3 월 29 일(수) 16:00-17:20	No
202	최옥삼	UNIST	P13-05	Materialization of Kitaev Quantum Spin Liquid on Cu ₃ Co ₂ SbO ₆ Delafossite using Lattice Engineering	Session 3	3 월 30 일(목) 09:00-10:20	No
203	최유빈	한국과학기술연구원	P01-23	OECT multi gate aptasensor for ovarian cancer biomarker detection	Session 1	3 월 29 일(수) 09:00-10:20	Yes
204	최준용	UNIST	P04-04	Surface-Engineered BaNiO ₃ Perovskite as a Promising Electrocatalyst for Oxygen Evolution Reaction	Session 2	3 월 29 일(수) 16:00-17:20	No
205	최종락	KAIST	P02-05	Modulus-tunable 3D Electronics toward Customizable and High-performance Tactile Sensor	Session 2	3 월 29 일(수) 16:00-17:20	Yes
206	최진형	동국대학교	P04-08	Highly Elastically Deformable Coiled CNT/Polymer Fibers for Wearable Strain Sensors and Stretchable Supercapacitors	Session 3	3 월 30 일(목) 09:00-10:20	Yes
207	최현민	서울대학교	P03-15	Defect passivation effects in 2-D lead-free perovskite field-effect transistor	Session 1	3 월 29 일(수) 09:00-10:20	Yes
208	최형진	고려대학교	P03-05	Detection of Multiaxial Strain and Voice Recognition by Ink-lithographic Fabricated Silver Nanocrystal Thin Films	Session 1	3 월 29 일(수) 09:00-10:20	No
209	한동훈	한국과학기술연구원	P05-17	Ferroelectricity in epitaxial Zn _{1-x} Mg _x O thin films	Session 1	3 월 29 일(수) 09:00-10:20	No
210	한상욱	충남대학교	P03-11	Effect of porosity change according to deposition rate in titanium film	Session 2	3 월 29 일(수) 16:00-17:20	No
211	한승훈	고려대학교	P02-08	Wireless Communication Platform for Implantable/Wearable Healthcare Devices	Session 1	3 월 29 일(수) 09:00-10:20	No
212	한재현	코닝정밀소재	P04-24	Dual-Structured Flexible Piezoelectric Film Energy Harvesters for Effectively Integrated Performance	Session 2	3 월 29 일(수) 16:00-17:20	No
213	허재찬	국립금오공과대학교	P04-06	Flash-induced Plasmonic Nanowelding of AgNW Networks for Transparent Piezoelectric Energy Harvester	Session 2	3 월 29 일(수) 16:00-17:20	No
214	홍민기	고려대학교	P02-04	Eco-friendly hinge-based substrate for sustainable wearable sensors	Session 1	3 월 29 일(수) 09:00-10:20	No
215	황예림	한국과학기술연구원	P04-17	Transparent Thin Film Lithium-Ion Batteries with all transparent components	Session 1	3 월 29 일(수) 09:00-10:20	No
216	황윤식	국립금오공과대학교	P04-03	High-Performance Electrode via Laser-Induced Plasmonic Sintering	Session 2	3 월 29 일(수) 16:00-17:20	No

	발표자 성함	발표자 소속	논문번호	논문제목	세션	세션시간	3분 스피치 신청
217	황정윤	연세대학교	P09-13	Improved H ₂ S Gas Sensing using Ag-Decorated TiO ₂ Nanosheets at Room Temperature	Session 3	3월 30일(목) 09:00-10:20	Yes
218	Abdulazeed Mustapha	경북대학교	P04-26	Growth Engineering of CH ₃ NH ₃ PbI ₃ Single Crystals for High-Efficiency Solar Cells	Session 2	3월 29일(수) 16:00-17:20	No
219	Arindam Bala	성균관대학교	P12-19	Low-Temperature Plasma-Assisted Growth of Large-Area MoS ₂ for Transparent Phototransistors	Session 2	3월 29일(수) 16:00-17:20	No
220	Asokan Poorani Sathya Prasanna	제주대학교	P14-14	Edible flours derived green triboelectric nanogenerator for rehabilitation monitoring sensors	Session 3	3월 30일(목) 09:00-10:20	Yes
221	BISWAJIT MAHANTY	전남대학교	P14-07	Enhanced Energy Harvesting Performance in lead-free Multi-layer Piezoelectric Electrospun Nanofiber Mats for Self-Powered Wearable Sensors	Session 3	3월 30일(목) 09:00-10:20	No
222	HAOLAN SUN	전남대학교	P14-09	SU-8 Cantilever Integrated with Silicon Piezoresistive Sensor for Highly Sensitive Detection of Cardiomyocytes Contractility	Session 3	3월 30일(목) 09:00-10:20	No
223	Karthikeyan Munirathinam	전남대학교	P14-04	A high-performance tubular nanogenerator for self-powered water level monitoring systems	Session 3	3월 30일(목) 09:00-10:20	No
224	LI LONGLONG	전남대학교	P14-03	The hybrid cantilever of conductive graphene and SU-8 for improving the electrical coupling of cardiomyocytes	Session 3	3월 30일(목) 09:00-10:20	No
225	Mohammad Awwal Adeshina	경북대학교	P04-27	Low temperature rapid growth of CsPbBr ₃ bulk perovskite single crystal driven by photoionization	Session 2	3월 29일(수) 16:00-17:20	No
226	Monunith Anithkumar	제주대학교	P14-10	Sustainable Self-Powered Smart Touchpad using Intrinsic Piezo – Tribo Hybrid Nanogenerator	Session 3	3월 30일(목) 09:00-10:20	Yes
227	Muhammad Ali Shah	한국기계연구원	P14-05	Simulation study of a piezoelectric tube-based inkjet printhead	Session 3	3월 30일(목) 09:00-10:20	No
228	Muhammad Naqi	성균관대학교	P12-20	Nanonet: Scalable Fabrication of High-Performance p-type Field-Effect Transistors and Phototransistor Arrays using Low-Temperature-Processed Tellurium Nanowire Networks	Session 2	3월 29일(수) 16:00-17:20	No
229	Nghia Dinh Huynh	성균관대학교	P04-21	Self-powered wireless sensors by microdome-patterned polyimide-based TENG at high-temperature conditions operating	Session 1	3월 29일(수) 09:00-10:20	No
230	SEN ANAMIKA	성균관대학교	P12-21	Active Pixel Image Sensor Matrix with High Uniformity, High Sensitivity, and Rapid Switching Enabled by Large area Nanoporous MoS ₂	Session 2	3월 29일(수) 16:00-17:20	Yes
231	Siha Lee	울산대학교	P13-03	Dependence of Spin Orbit Torque on Layer Repetition in Ni/Co Multilayers	Session 3	3월 30일(목) 09:00-10:20	Yes
232	Temesgen Tadeyos Zate	UNIST, 한국재료연구원	P05-15	Multilayer Actuator Fabricated using Thickness Controlled Ultrahigh Strain Textured Pb(Mg _{1/3} Nb _{2/3})O ₃ -PbZrO ₃ -PbTiO ₃ Ceramics	Session 2	3월 29일(수) 16:00-17:20	Yes
233	Vigneshwaran Mohan	제주대학교	P14-12	Enhanced Self-Powered Humidity Sensing Using Graphene Oxide/PDMS Nanocomposite Film	Session 3	3월 30일(목) 09:00-10:20	Yes
234	Vo Van Khoe	경북대학교	P08-13	Gas sensing of halide perovskite Cs ₂ SnI ₆ thin film produced by chemical vapor deposition technique at ambient temperature.	Session 3	3월 30일(목) 09:00-10:20	No
235	Vo Van Khoe	경북대학교	P08-14	Cs ₂ Tel ₆ thin film synthesis and NO ₂ gas sensing capabilities under the illumination of blue light	Session 3	3월 30일(목) 09:00-10:20	No
236	wanglei	전남대학교	P14-06	Metal-Polymer Sandwich Hybrid Stent integrated with PI based wireless pressure sensor	Session 3	3월 30일(목) 09:00-10:20	No
237	Zaidi Syed Turab Haider	한국기계연구원	P02-01	Study of acoustic simulations for an AIN-based PMUT wearable device for blood pressure monitoring	Session 2	3월 29일(수) 16:00-17:20	No

Notice

포스터세션 논문 초록집

2023년 춘계학술대회 포스터세션의 논문 초록은 웹파일로 제공됩니다.

- 포스터세션 논문 초록 확인



- 포스터세션 논문 초록 웹파일 다운로드 : 한국센서학회 홈페이지(www.sensors.or.kr) 학술대회 게시판에 게재

점심 시간 안내

- 춘계학술대회 기간 점심시간
 - 3월 29일(수) 12:00 ~ 13:30
 - 3월 30일(목) 12:30 ~ 14:00
- 이번 학술대회의 점심식사는 참가자 분들께 점심식사를 일괄로 제공해드리는데 어려움이 있어 모든 참가자 분들께 **스타벅스 2만원 상품권**으로 지급할 예정입니다.

경품 이벤트 안내

- 센서기업의 전시부스 방문 후 각 전시부스 담당자에게 등록시 수령한 **Stamp Coupon에 인증 받으세요!**
- 2023년 춘계학술대회 센서기업부스 **6개 기업 모두 방문**하고 Stamp를 모두 모은 참가자에게는 **경품 추천 참가 혜택**이 주어집니다.
- 경품추첨
 - 일시 : 3월 30일(목) 16시 10분~16시 30분(우수논문상 시상식)
 - 장소 : 한국과학기술회관 지하1층 대회의실1
- Stamp 6개를 모두 모은 참가자는 3월 30일(목) 16:10부터 대회의실1에서 진행하는 우수논문상 시상식에 Stamp Coupon 뒷면의 경품 응모권을 작성하시어 제출하시면 시상식 후 진행되는 경품추첨 이벤트에 참여 가능합니다.
- 경품추첨 이벤트에 참가하실 분들께서는 우수논문시상식에 반드시 참가하셔야 합니다.
- 경품은 시상식 현장에서 즉시 제공되며 수령시 본인확인을 위해 학술대회 네임택과 신분증 확인을 할 예정입니다.
(대리자 수령 불가 - 본인이 확인되지 않으면 경품 지급 불가능 합니다.)
- 체제공과금은 학회에서 부담할 예정이며 세금신고를 위해 수령자분의 경품수령확인증(개인정보 제공) 동의가 필요합니다.

2023년 한국센서학회 춘계학술대회를 개최하면서



2023년 한국센서학회 춘계학술대회에 참여해주신 회원 여러분, 안녕하십니까?

한국센서학회 학술대회는 센서 분야에서 최신 연구 동향과 기술적 발전을 공유하고, 센서 분야의 전문가들이 모여 적극적인 의견교환과 네트워킹을 할 수 있는 소중한 자리입니다. 특히, 코로나19로 인해 그 동안 많은 모임이 제한되어 학술대회와 같은 행사의 본질이 많이 퇴색되기도 하였으나 이제는 방역수칙이 완화된 상태에서 오프라인으로 학술대회를 진행하게 되어 이번 학술대회는 더욱 의미 있는 자리가 될 것입니다. 그동안 매우 어려운 환경 속에서도 연구, 교육, 사업에 최선을 다하고 계시는 회원 여러분들의 노고를 치하하고 여러분의 건강과 안전을 기원합니다.

한국센서학회는 지난 30여 년간 센서 분야의 연구와 발전을 주도적으로 이끌어 온 학회입니다. 저희 학회는 더욱 발전하는 센서 분야의 요구에 부응하여 센서 분야에서의 새로운 기술과 연구를 지속적으로 발전시키고 있습니다. 이번 학술대회를 통해 다양한 분야에서 활발한 논의와 정보교류가 이루어져, 센서 분야의 발전을 더욱 가속화할 수 있기를 기대합니다. 학술대회에 참여하시는 모든 분들께 적극적인 참여와 토론, 활발한 네트워킹이 이루어지길 바랍니다.

이번 학술대회에서는 특별히 University of Texas at Dallas의 이정봉 교수님과 조선비즈의 이영완 과학전문 기자님 두 분을 모시고 기조 강연을 꾸렸고 각 분야에서 저명한 연구자분들의 초청발표, 한국반도체연구조합 및 한국센서산업협회가 주관하는 산업화 세션, 포스터발표, Young Scientist Forum 등 다양한 세션으로 구성하였습니다. 본 학술대회 기간 동안 총 312편의 논문이 발표될 예정입니다. 그 어느 때보다 왕성한 학술교류가 예상되어 무척 기대가 큼니다. 발표된 논문 중 우수논문 선정위원회를 통해 최우수논문을 선정하여, 기업 회원사로부터 지원받은 상금과 상장을 수여할 예정입니다.

이번 학술대회가 성황리에 개최될 수 있도록 조직위원장을 맡아주신 전남대학교 이동원 교수님과 프로그램위원장이신 KAIST 박인규 교수님, UNIST 조욱 교수님, 한국전자기술연구원의 이대성 박사님, 그 외 여러 조직위원님들께 마음속으로부터 고마움을 전합니다. 또한, 우리 학회의 가장 큰 행사인 춘계학술대회는 10월에 여수에서 개최될 예정인데, 춘계학술대회에는 춘계학술대회를 개최하면서 알게 된 문제점들을 보완하고 전임 회장님들께서 구축하신 전문연구회 중심의 체계화되고 더욱더 완성도 높은 학회로 거듭날 것을 약속드립니다.

해가 갈수록 발전해 나가는 한국센서학회 학술대회가 한국을 비롯한 세계의 센서기술 산업을 더욱 발전시키는 촉매자로서 자리매김하기를 바라며, 학술대회를 빛내주신 모든 분들에게 다시 한 번 감사드립니다.

2023. 3. 29.

사단법인 한국센서학회장 공 영 호

2023년 한국센서학회 춘계학술대회

한국과학기술회관 지하1층 대회의실 1 및 중소회의실

3월 29일(수)								
08:20-09:00	등록							
장소	중회의실 1+2							
09:00-10:20	Poster Session I - 좌장 : 서인태 선임연구원(KETI), 박종성 교수 (경북대)							
10:20-10:30	Break Time							
장소	대회의실 1							
프로그램	개회식 및 Plenary Session - 사회 : 박종성 교수 (경북대), 좌장 : 이동원 교수 (전남대)							
10:30-10:40	개회사 - 한국센서학회 공성호 회장							
10:40-11:20	Plenary Talk I_Liquid Metal : Emerging Material for Soft Electronics and Sensing - 이정봉 교수 (미국 텍사스대학교)							
11:20-12:00	Plenary Talk II 동물의 후각에서 영감을 받은 질병 진단 - 이영란 과학전문기자 (조선비즈)							
12:00-12:30	점심시간 * 점심식사는 별도로 제공하지 않습니다.							
장소	대회의실 1	장소	중회의실 5	중회의실 6	중회의실 7	소회의실 1	장소	소회의실 2
프로그램	산업과 세션 - 주관 : 한국반도체연구조합 & 한국센서산업협회 - 좌장 : 이대성 수석연구원(KETI)	프로그램	압전/정전센서 - 좌장 : 조욱 교수 (UNIST)	후각센서 - 좌장 : 최진진 교수 (한양대)	바이오센서 - 좌장 : 이대식 책임연구원(ETRI)	광전디스플레이센서 - 좌장 : 박성규 교수 (중앙대)	프로그램	Young Scientist Forum I - 좌장 : 박종성 교수 (경북대)
13:30-13:50	능동 음파 센서를 이용한 노면 감지 시스템 - 김민현 대표 ((주)모바일)	13:30-14:00	초음파 펄스 트랜스듀서를 위한 압전 박막 백승엽 책임연구원 (한국과학기술연구원)	2D 물질의 안정적인 표면반응을 위한 거품체 멤브레인 개발 - 장지수 선임연구원 (한국과학기술연구원)	식품안전 및 진단용 현장검출 바이오센서 - 이태우 교수 (성균관대)	무표지 3차원 혈관조영 광센서 - 최우준 교수 (중앙대)	13:30-13:45	Three-Dimensional MoS ₂ /MXene Heterostructure Aerogel for Chemical Gas Sensors with Superior Sensitivity and Stability - 신하민 (KAIST)
13:50-14:10	시니어 안전 건강 관리 서비스 - 김태평 대표 (메디코텍스)						13:45-14:00	Resonance frequency characteristics of wireless pressure sensors in different operating environments - 김동수 (전남대)
14:10-14:30	지진·화산해대대책에 준한 지진계측시스템의 활용 - 조성철 대표 ((주)아이에스)	14:00-14:30	자가 전원 IoT 센서 시스템을 위한 고출력과 높은 신뢰도의 자기-기계-전기 발전기 - 장종문 선임연구원 (한국재료연구원)	3차원 정렬 나노셀 구조화된 이산화티타늄 기반 고감도 가스 센서 기술 - 조동휘 선임연구원 (한국화학연구원)	기상증착 기능성 고분자 박막의 바이오센서 응용 - 임성갑 교수 (KAIST)	2D 광전자 재료 및 장치 - 김선국 교수 (성균관대)	14:00-14:15	Selective Colorimetric Detection of Ammonia by Paper-based Analytical Device using Modified Berthelot reagent - 조영범 (한양대)
14:30-14:50	Break Time						14:30-14:45	Enhancing the Intrinsic Piezoelectric Properties of Metal-Doped Monolayer MoS ₂ for Potential Device Applications - 엄한엽 (성균관대)
14:50-15:10	변위 센서를 활용한 스마트 사면 붕괴 예경보 시스템 - 김용성 부사장 (스마트지오텍)	14:30-15:00	Roll-to-roll 기반 적층형 유연 압전 소자의 제작 및 전극 패턴 형성 연구 - 서인태 선임연구원 (한국전자기술연구원)	자가활성 그래핀 채널의 구동전압에 따른 가스 분류법 - 김연우 선임연구원 (한국표준과학연구원)	고투과/고결합 바이오리셀터 개발 및 감염병 센싱 플랫폼 적용 - 정주연 센터장 (한국생명공학연구원)	프리폼 디스플레이를 위한 포아송비 제어 오그제틱 탄성 복합기판 - 정승준 책임연구원 (한국과학기술연구원)	14:45-15:00	Zebra-inspired stretchable, biodegradable radiation modulator for all-day sustainable energy harvesters - 한원배 (고려대 KU-KIST 융합대학원)
15:10-15:30	설비 부하 가동이 전기화재 위험에 미치는 영향: i-FireSens를 활용하여 - 김우진 차장 ((주)에프에스)	15:00-15:30	기계적 응력의 실시간 측정을 위한 자가발전형 웨어러블 센서 - 이한열 교수 (전북대학교)	금속산화물 나노와이어의 구조제어 효과와 가스센서 특성의 영향 - 한현진 교수 (성신여대)	스마트 의료 및 헬스케어 웨어러블 IoT 적용을 위한 바이오센서 패치 기술 - 박재영 교수 (광운대)	불소화 그물 도입을 통한 유기 포토다이오드의 양전류 감소 - 이지열 교수 (부경대)		
15:30-15:50	센서 특화 인재양성을 위한 학부 교육과정 개발 - 윤석수 대표 (국립안동대)	15:30-16:00						
장소	중회의실 1+2							
16:00-17:20	Poster Session II - 좌장 : 정창규 교수(전북대), 서인태 선임연구원(KETI)							

센서기업 전시회
(지하 1층 대회의실 로비)

3 월 30 일(목)							
08:20-09:00	등록						
장소	중회의실 1+2						
09:00-10:20	Poster Session III - 좌장 : 정장규 교수(전북대), 서인태 선임연구원(KETI)						
10:20-10:30	Break Time						
장소	대회의실 1	중회의실 5	중회의실 6	중회의실 7	소회의실 1	장소	소회의실 2
프로그램	웨어러블 및 헬스케어 센서 - 좌장 : 박인규 교수(KAIST)	에너지융복합센서(자가 발전센서 포함) - 좌장 : 정장규 교수 (전북대)	날숨 분석 헬스케어 모니터링 - 좌장 : 이우영 교수 (연세대)	신물질 가스센서 - 좌장 : 김현우 교수 (한양대)	나노바이오광학센서 - 좌장 : 정기훈 교수 (KAIST)	프로그램	Young Scientist Forum II - 좌장 : 조옥 교수(UNIST)
10:30-11:00	육창 예방을 위한 배터리-프리, 무선 센서와 시스템 개발 오용석 교수 (창원대)	레이저 유도 그래핀의 표면 구조에 따른 마찰대전 특성 - 이승기 교수 (부산대)	장간장 및 비만 관리를 위한 날숨 분석 연구 - 이우영 교수 (연세대)	멤리스터 기반의 가스센서 소자 및 이를 이용한 실시간 모니터링 시스템 연구 - 김희동 교수 (세종대)	신호 증폭용 나노재를 융합한 바이오센서 개발 및 바이오메디컬 분야에 응용 - 이혜진 교수 (경북대)	10:30-10:45	Unveiling the irreproducibility of the triboelectric effect based on interfacial mechanochemistry - Giulio Fatti (한국세라믹기술원)
						10:45-11:00	Piezoelectric MEMS Resonant Sensor for in-situ Monitoring of PECVD Deposition Process - 장일류 (DGIST)
11:00-11:30	웨어러블 전자기기를 이용한 심폐 및 연하 활동을 위한 건강 모니터링 시스템 - 강윤정 교수 (제주대)	다공성 탄소 수분자가발전 시스템의 원리 - 고현석 선임연구원 (한국세라믹기술원)	키토제닉 다이어트시 호기 아세톤 측정을 이용한 비만관리 효과 : 무작위 배정 임상연구 - 전용관 교수 (연세대)	마이크로 나노 구조를 이용한 저항방식 및 질량측정 방식의 가스 센서 - 윤광석 교수 (서강대)	대형반응기내 생물전환반응의 실시간 영상화 - 강태훈 교수 (서강대)	11:00-11:15	A Soft Microneedle-Integrated Microfluidic Biosensor Patch for Biofluid Sampling and Biosensing with Smartphone-Based Self-Test for Personalized and Precise Diagnosis - M. V. CHINNAMANI (성균관대)
						11:15-11:30	Designing a self-classifying smart device with UV light detecting sensor, display, and radiative cooling functions via spectrum-selective response - 이상엽 (고려대)
11:30-12:00	전기이중층의 점진적 발생을 이용한 넓은 압력범위의 고성능 고안정성 압력센서 문한열 교수 (동아대)	자가 구동 웨어러블 센서 - 최창순 교수 (동국대)	소화기질환에서 이용되는 호기가스검사 - 정현수 교수 (서울대)	2차원 금속 산화물의 합성 및 센서 응용 - 최명식 교수 (경북대)	플라즈몬 나노구조를 이용한 비표지 분자 지문 센싱 - 최인희 교수 (서울시립대)	11:30-11:45	Efficient ionic solution treatment of electron transport layer for self-powered infrared quantum dot photodetector - 최영균 (고려대)
12:00-12:30	전자피부 센서를 위한 연신 고분자 반도체 연구 - 오진영 교수 (경희대)	자가발전 웨어러블 전자 시스템을 위한 광-물질 상호작용 기술 - 박정환 교수 (국립금오공대)	휴대용 가스 분석기를 이용한 호흡분석: 감지 소재 및 샘플링 장치 설계 - 윤지옥 교수 (전북대)	수직 배열 3차원 그래핀 흡착 센서 기반 마이크로 GC 시스템 - 서정환 교수 (홍익대)	유전자기위를 이용한 나노바이오센서 - 강태준 책임연구원 (한국생명공학연구원)		
점심시간 * 점심식사는 별도로 제공하지 않습니다.							
장소	대회의실 1	중회의실 5	중회의실 6	중회의실 7	소회의실 1		
프로그램	센서회로 및 시스템 - 좌장 : 김재준 교수(UNIST)	MEMS/물리/이미지센서 - 좌장 : 오승주 교수 (고려대)	위험물/오염/부패 이온 감지 센서 - 좌장 : 장호원 교수 (서울대)	융복합 센서 - 좌장 : 이동원 교수(전남대)	양자자성 센서를 위한 소재 및 측정 연구회 - 좌장 : 김상훈 교수(울산대)		
14:00-14:30	셀프-캐패시터스 근접 센싱 시스템 설계 - 김수환 교수 (서울대)	플로이드 양자점 포토다이오드를 활용한 단파적외선 이미지센서의 구현 - 이지원 교수 (한양대)	고성능 가스센서를 위한 경사각 증착법으로 제작된 산화물 나노구조체 - 심영석 교수 (한국기술교육대)	CNT 복합재료 센서를 이용한 인체 측정 - 박우태 교수 (서울과학기술대)	자기방울 솔리톤의 제어 (고정과 해제) - 정선재 교수 (한국교원대)		
14:30-15:00	고속 터치스크린 인터페이스 설계 - 박준은 교수 (성균관대)	신속성 광전자 바이오집적 시스템 - 손동희 교수 (성균관대)	방향족 유기화합물의 고강도 고선택적 검지를 위한 이중층구조의 산화물반도체형 가스센서 설계 - 문영국 선임연구원 (한국재료연구원)	3 차원 이온반도체 - 박정열 교수 (서강대)	홀 효과의 전하분포 위상 시각화 - 박병철 교수 (성균관대)		
15:00-15:30	고속신호처리용 ADC 설계 - 조강일 선임연구원 (한국전자기술연구원)	차세대 반도체 소재의 분자전하 이전 도핑 전략 개발 - 강기훈 교수 (서울대)	이차원 재료를 이용한 가스 부패, 오염 및 이온 감지 센서 기술 - 장호원 교수 (서울대)	다공성 유연소재 제조와 응용 - 김동립 교수 (한양대)	이중구조를 통한 벌집구조 양자자성의 제어 - 손창희 교수 (UNIST)		
15:30-16:00	다중생체 신호처리인터페이스 설계 - 김재준 교수 (UNIST)	친환경 플로이드 양자점 기반 적외선 광전소자 - 백세웅 교수 (고려대)	식품 신선도 판별을 위한 실온조건하에서 고강도 암모니아 검출 연구 - 허윤석 교수 (인하대)	소변중만도 감지용 무선 센서가 포함된 인공 방광 시스템 - 김중백 교수 (연세대)	스핀 의존 현상의 다양한 측정 방법 - 김상훈 교수 (울산대)		
16:00-16:10	Break Time						
장소	대회의실 1						
16:10-16:30	우수논문상 시상식, 이중훈 논문상 시상식, 경품이벤트 및 폐회식 - 사회 : 오승주 교수(고려대)						

센서기업 전시회
(지하 1 층
대회의실 로비)

센서기업 전시회 (지하 1 층 대회의실 로비)

2023 Spring Conference of the Korean Sensors Society

Science and Technology Convention Center, B1F

Mar. 29 (Wed)								
08:20-09:00	Registration							
Venue	Auditorium 1+2							
09:00-10:20	Poster Session I Session Chair : Intae Seo,Senior Researcher (KETI), Prof. Jongsung Park (Kyungpook Nat'l Univ.)							
10:20-10:30	Break Time							
Venue	Main Auditorium 1							
Session / Session Chair	Opening & Plenary Session Moderator : Prof. Hongsik Park (Kyungpook Nat'l Univ.), Session Chair : Prof. Dong-Weon Lee (Chonnam National Univ.)							
10:30-10:40	Opening Remarks Seong Ho Kong, Chariman (The Korean Sensors Society)							
10:40-11:20	Plenary Talk I_Liquid Metal : Emerging Material for Soft Electronics and Sensing Prof. Jeong Bong (JB) Lee (University of Texas at Dallas, USA)							
11:20-12:00	Plenary Talk II_Disease diagnosis inspired by animal sense of smell Young Wan Lee, Senior Staff Writer (Chosunbiz)							
12:00-13:30	Lunch Time							
Venue	Main Auditorium 1	Venue	Auditorium 5	Auditorium 6	Auditorium 7	Conference Room 1	Venue	Conference Room 2
Session / Session Chair	Industrial Session I Organizer : KSIS, KSIA & COSAR : Dae-Sung Lee, Chief Researcher (KETI)	Session / Session Chair	Piezoelectric/triboelectric sensors : Prof. Wook Jo (UNIST)	Electronic Noses & Sensors : Prof. Seon-Jin Choi (Hanyang Univ.)	Biosensors : Dae-Sik Lee, Principal Researcher (ETRI)	Optoelectronic Devices & Display Sensor System : Prof. Sung Kyu Park (Chung-Ang Univ.)	Session / Session Chair	Young Scientist Forum I : Prof. Jongsung Park (Kyungpook Nat'l Univ.)
13:30-13:50	Road Surface Detection System Using Active Ultrasonic Sensors Min-Hyun Kim, CEO (MoveAWheel, Inc.)	13:30-14:00	Piezoelectric thin films for ultrasound MEMS transducers Seung-Hyub Baek, Principal Research Scientist (KIST)	Breathable sieving layer on conductive 2D materials for stable and selective surface activation Ji-Soo Jang, Senior Research Scientist (KIST)	Biosensors towards on-site testing for food safety and diagnostics Prof. Nae-Eung Lee (Sungkyunkwan Univ.)	Label-free 3D optical angiography Prof. Woo June Choi (Chung-Ang Univ.)	13:30-13:45	Three-Dimensional MoS2/MXene Heterostructure Aerogel for Chemical Gas Sensors with Superior Sensitivity and Stability - Hamin Shin (KAIST)
13:50-14:10	Solution for the elderly person's safety and health Tae Pyeong Kim, CEO (MediConex)						13:45-14:00	Resonance frequency characteristics of wireless pressure sensors in different operating environments - Dong-Su Kim (Chonnam Nat'l Univ.)
14:10-14:30	Application of Seismic Measurement System in accordance with the Earthquake Volcanic Disaster Countermeasures Act Sung-Cheoul Cho, CEO (EIS)	14:00-14:30	High-power and Reliable Magneto-Mechano-Electric Generators for Powering Internet of Things Sensor System Jongmoon Jang, Senior Researcher (KIMS)	Highly Periodic 3D Thin-shell TiO2 for Ultrasensitive Gas Sensors Donghwi Cho, Senior Researcher (KRICT)	Vapor-phase deposited functional polymer films for biosensor applications Prof. Sung Gap Im (KAIST)	2D Optoelectronic Materials and Devices Prof. Sunkook Kim (Sungkyunkwan Univ.)	14:00-14:15	Selective Colorimetric Detection of Ammonia by Paper-based Analytical Device using Modified Berthelot reagent - Yeong Beom Cho (Hanyang Univ.)
14:30-14:50	Break Time	14:30-15:00	Roll-to-roll based flexible piezoelectric device and its electrode patterning Intae Seo, Senior Research Scientist (KETI)	Voltage-dependent gas discrimination using self-activated graphene microchannels Yeonhoo Kim, Senior Research Scientist (KRISS)	Highly sensitive bioreceptor development and integration for enhanced infectious disease biosensing platform Juyeon Jung, Director (KRIBB)	Auxetic elastomer composite with bi-axially near-zero Poisson's ratio for free-from displays Seungjun Chung, Principal Research Scientist (KIST)	14:30-14:45	Ion Dynamic-based Tactile Perception for Electronic Skins - Inah Hyun (Yonsei Univ.)
14:50-15:10	Slope Failure Monitoring of a Model Slope by the Application of a Displacement Sensor Yongseong Kim, Vice president (Smartgeotech)						14:45-15:00	Zebra-inspired stretchable, biodegradable radiation modulator for all-day sustainable energy harvesters - Won Bae Han (Korea Univ. KU-KIST Graduate School of Converging Sci. Technol.)
15:10-15:30	The Effect of Operating Equipment under Full-Load on Electrical Fire Hazard Utilizing i-FireSens Woo Jin Kim, Deputy General Manager (F.S Co., LTD)	15:00-15:30	Self-Powered Wearable Sensors for Real-Time Measurement of Mechanical Stresses Han Eol Lee, Assistant Professor (Jeonbuk Nat'l Univ.)	Structure Controlled Effect on Metal Oxide Nanowires for Gas Sensor Performance Prof. Hyeuk Jin Han (Sungshin Women's Univ.)	Biosensor Patch Technology for Smart Medical and Healthcare IoT Wearables Prof. Jae Yeong Park (Kwang Woon Univ.)	Dark current reduction of organic photodiodes through the introduction of fluorinated groups Prof. Jiyoul Lee (Pukyong Nat'l Univ.)		
15:30-15:50	Development of an undergraduate curriculum to human resource cultivation specialized in sensors Prof. Seok Soo Yoon (Andong Nat'l Univ.)	15:30-16:00	Break Time					
Venue	Auditorium 1+2							
16:00-17:20	Poster Session II Session Chair: Prof. Chang Kyu Jeong (Jeonbuk Nat'l Univ.), Intae Seo,Senior Researcher (KETI)							

Exhibition (Main Auditorium Lobby)

Exhibition
(Main Auditorium Lobby)

Mar. 30 (Thu)							
08:20-09:00	Registration						
Venue	Auditorium 1+2						
09:00-10:20	Poster Session Ⅱ Session Chair: Prof. Chang Kyu Jeong (Jeonbuk Nat'l Univ.), Intae Seo,Senior Researcher (KETI)						
10:20-10:30	Break Time						
Venue	Main Auditorium 1	Auditorium 5	Auditorium 6	Auditorium 7	Conference Room 1	Venue	Conference Room 2
Session / Session Chair	Wearable & Healthcare Sensors : Prof. Inkyu Park (KAIST)	Emerging Energy Device-Based Sensors (including Self-Powered Sensors) : Prof. Chang Kyu Jeong (Jeonbuk Nat'l Univ.)	Breath Analysis for Healthcare Monitoring : Prof. Wooyoung Lee (Yonsei Univ.)	New Materials Gas Sensors : Prof. Hyoun Woo Kim (Hanyang Univ.)	Nano-bio Optical Sensors : Prof. Ki-Hun Jeong (KAIST)	Session / Session Chair	Young Scientist Forum Ⅱ : Prof. Wook Jo (UNIST)
10:30-11:00	Development of battery-free, wireless sensor and system for prevention of pressure injuries Prof. Yongsuk Oh (Changwon Nat'l Univ.)	Triboelectric effects of surface morphology controlled laser induced graphene Prof. Seoung-Ki Lee (Pusan Nat'l Univ.)	Research on Exhaled Breath Analysis for Intestinal Health and Obesity Management Prof. Wooyoung Lee (Yonsei Univ.)	Study of Memristor Based Gas Sensor Devices and Real-time Monitoring System Prof. Hee-Dong Kim (Sejong Univ.)	Creating Nanomaterial-amplified Biosensing Platforms for Biomedical Applications Prof. Hye Jin Lee (Kyungpook Nat'l Univ.)	10:30-10:45	Unveiling the irreproducibility of the triboelectric effect based on interfacial mechanochemistry - Giulio Fatti (KICET)
						10:45-11:00	Piezoelectric MEMS Resonant Sensor for in-situ Monitoring of PECVD Deposition Process - Il Ryu Jang (DGIST)
11:00-11:30	Health Monitoring System for Cardiopulmonary and Swallowing Activities with a Wearable Electronic Device Prof. Youn Joong Kang (Jeju Nat'l Univ.)	Principles of moisture-driven porous carbon hydrovoltaic system Hyunseok Ko, Senior Researcher (KICET)	Effectiveness of breath acetone monitoring in reducing body fat and improving body composition: a randomized controlled study Prof. Justin Jeon (Yonsei Univ.)	Micro and nano-structured resistive and gravimetric gas sensors Prof. Kwang-Seok Yun (Sogang Univ.)	Visualizing Large-scale Biological Conversion Processes in Real-time Prof. Taewook Kang (Sogang Univ.)	11:00-11:15	A Soft Microneedle-Integrated Microfluidic Biosensor Patch for Biofluid Sampling and Biosensing with Smartphone-Based Self-Test for Personalized and Precise Diagnosis - M. V. CHINNAMANI (Sungkyunkwan Univ.)
						11:15-11:30	Designing a self-classifying smart device with UV light detecting sensor, display, and radiative cooling functions via spectrum-selective response - Sang Yeop Lee (Korea Univ.)
11:30-12:00	Flexible Pressure Sensor with High Performance and Stability to Wide Range by Gradual Electrical-Double-Layer Modulation Prof. Hanul Moon (Dong-A Univ.)	Micro-buckled CNT/elastomer fibers for self-powered strain sensors Prof. Changsoo Choi (Dongguk Univ.)	Breath Tests for Gastrointestinal Disease Prof. Hyunsoo Chung (Seoul Nat'l Univ.)	Synthesis and sensor applications of two-dimensional metal oxides Prof. Myung Sik Choi (Kyungpook Nat'l Univ.)	Label-free Molecular Fingerprint Sensing Using Plasmonic Nanostructures Prof. Inhee Choi (Univ. of Seoul)	11:30-11:45	Efficient ionic solution treatment of electron transport layer for self-powered infrared quantum dot photodetector - Young Kyun Choi (Korea Univ.)
12:00-12:30	Intrinsically stretchable self-healable semiconducting polymer film for Electronic skin sensors Prof. Jin Young Oh (Kyung Hee Univ.)	Light-material interaction technology for self-powered wearable electronic systems Prof. Jung Hwan Park (Kumoh Nat'l Institute of Technol.)	Toward breath analysis using a protable gas analyzer: Design of sensing materials and sampling apparatus Prof. Ji-Wook Yoon (Jeonbuk National Univ.)	Vertically aligned 3D graphene sensor compatible with a micro gas chromatography Prof. Jung Hwan Seo (Hongik Univ.)	NanoBio Sensor using CRISPR/Cas system Taejoon Kang, Principal Researcher (KRIBB)	Exhibition (Main Auditorium Lobby)	
12:30-14:00	Lunch Time						
Venue	Main Auditorium 1	Auditorium 5	Auditorium 6	Auditorium 7	Conference Room 1		
Session / Session Chair	Sensor Circuits & Systems : Prof. Jae Joon Kim (UNIST)	Physics/MEMS/Image Sensors : Prof. Soong Ju Oh (Korea Univ.)	Sensors for hazardous materials, pollution, spoilage and ions : Prof. Ho Won Jang (Seoul Nat'l Univ.)	Multidisciplinary : Prof. Dong-Weon Lee (Chonnam Nat'l Univ.)	Materials and measurements for the quantum/magnetic devices : Prof. Sanghoon Kim (Univ. of Ulsan)		
14:00-14:30	Design of Self-Capacitance Proximity Sensing System Prof. Suhwan Kim (Seoul Nat'l Univ.)	Colloidal Quantum Dot based Short Wave Infrared Imager Prof. Jiwon Lee (Hanyang Univ.)	Metal Oxide Nanostructures deposited by Glancing Angle Deposition for High-performance Gas Sensor Prof. Young-Seok Shim (KOREATECH)	CNT composite sensors for human body measurement Prof. Woo-Tae Park (Seoul Nat'l Univ. of Sci. and Technol.)	Freezing and thawing magnetic droplet solitons Prof. Sunjae Chung (Korea Nat'l Univ. of Education)		
14:30-15:00	Design of High Frame Rate Touch-Screen Sensor Interfaces Prof. Jun-Eun Park (Sungkyunkwan Univ.)	Intrinsically stretchable optoelectronic bio-integrated system Prof. Donghee Son (Sungkyunkwan Univ.)	Designing bilayer oxide chemiresistors for highly selective and sensitive detection of volatile aromatic compounds Young Kook Moon, Senior Researcher (KIMS)	3D ionic semiconductors Prof. Jungyul Park (Sogang Univ.)	Visualizing charge topologies of Hall effect Prof. Byung Cheol Park (Sungkyunkwan Univ.)		
15:00-15:30	Design of High-Speed Analog-to-Digital Converter Kangil Cho, Senior Researcher (KETI)	Molecular charge-transfer doping in emerging semiconductors Prof. Keehoon Kang (Seoul Nat'l Univ.)	Gas, spoilage, contamination, and ion detection sensor technology using two-dimensional materials Prof. Ho Won Jang (Seoul Nat'l Univ.)	Fabrication of porous soft materials for new functionalities Prof. Dong Rip Kim (Hanyang Univ.)	Towards topological qubits: Heterostructure Engineering of Honeycomb Quantum Magnetism Prof. Changhee Sohn (UNIST)		
15:30-16:00	Design of Multi-Biosignal Integrated Interfaces Prof. Jae Joon Kim (UNIST)	Non-toxic colloidal quantum dot-based infrared optoelectronics Prof. Se-Woong Baek (Korea Univ.)	Highly Sensitive Ammonia Gas Sensing Under Room Temperature Conditions for Monitoring Food Freshness Prof. Yunsuk Heo (Inha Univ.)	Implantable Artificial Bladder With Wireless Urine Volume Sensor Prof. Jongbaeg Kim (Yonsei Univ.)	Crystallographic Dependence of Unidirectional Spin Hall Magnetoresistances Prof. Sanghoon Kim (Univ. of Ulsan)		
16:00-16:10	Break Time						
Venue	Main Auditorium 1						
16:10-16:30	Best Paper Awards & Lucky Draw Event & Closing - Moderator : Prof. Soong Ju Oh (Korea Univ.)						

Contents

Day1. Mar 29 (Wed), 2023

◀ Plenary Session ▶

Session Chair : Prof. Dong-Weon Lee (Chonnam National University)

10:40-11:20	Plenary Talk I : Liquid Metal: Emerging Material for Soft Electronics and Sensing Prof. Jeong Bong(JB) Lee <i>University of Texas at Dallas, USA</i> 13
11:20-12:00	Plenary Talk II : Disease diagnosis inspired by animal sense of smell Young Wan Lee, Senior Staff Writer <i>Chosunbiz</i> 14

◀ Industrial Session ▶

Organizer : COSAR & KSIS

Session Chair : Prof. Dae-Sung Lee (Korea Electronics Technology Institute)

13:30-13:50	Road Surface Detection System Using Active Ultrasonic Sensors Min-Hyun Kim, CEO <i>MoveAWheel, Inc</i> 17
13:50-14:10	Solution for the elderly person's safety and health Tae Pyeong Kim, CEO <i>MediConex</i> 18
14:10-14:30	Application of Seismic Measurement System in accordance with the Earthquake Volcanic Disaster Countermeasures Act Sung-Cheoul Cho, CEO <i>EIS</i> 19
14:50-15:10	Slope Failure Monitoring of a Model Slope by the Application of a Displacement Sensor Yongseong Kim, Vice president <i>Smartgeotech</i> 20
15:10-15:30	The Effect of Operating Equipment under Full-Load on Electrical Fire Hazard Utilizing i-FireSens. Woo Jin Kim, Deputy General Manager <i>F.S Co., LTD</i> 21

15:30–15:50	Development of an undergraduate curriculum to human resource cultivation specialized in sensors Prof. Seok Soo Yoon <i>Andong National University</i>	22
-------------	---	----

◀ Invited Oral Session : Piezoelectric/triboelectric sensors ▶

Session Chair : Prof. Wook Jo(Ulsan National Institute of Science and Technology)

13:30–14:00	Piezoelectric thin films for ultrasound MEMS transducers Seung-Hyub Baek, Principal Research Scientist <i>Korea Institute of Science and Technology</i>	25
14:00–14:30	High-power and Reliable Magneto-Mechano-Electric Generators for Powering Internet of Things Sensor System Jongmoon Jang, Senior Researcher <i>Korea Institute of Materials Science</i>	26
14:30–15:00	Roll-to-roll based flexible piezoelectric device and its electrode patterning Intae Seo, Senior Researcher <i>Korea Electronics Technology Institute</i>	27
15:00–15:30	Self-Powered Wearable Sensors for Real-Time Measurement of Mechanical Stresses Prof. Han Eol Lee <i>Jeonbuk National University</i>	28

◀ Invited Oral Session : Electronic Noses & Sensors ▶

Session Chair : Prof. Seon-Jin Choi (Hanyang University)

13:30–14:00	Breathable sieving layer on conductive 2D materials for stable and selective surface activation Ji-Soo Jang, Senior Research Scientist <i>Korea Institute of Science and Technology</i>	31
14:00–14:30	Highly Periodic 3D Thin-shell TiO ₂ for Ultrasensitive Gas Sensors Donghwi Cho, Senior Researcher <i>Korea Research Institute of Chemical Technology</i>	32
14:30–15:00	Voltage-dependent gas discrimination using self-activated graphene microchannels Yeonhoo Kim, Senior Research Scientist <i>Korea Research Institute of Standards and Science</i>	33
15:00–15:30	Structure Controlled Effect on Metal Oxide Nanowires for Gas Sensor Performance Prof. Hyeuk Jin Han <i>Sungshin Women's University</i>	34

◀ Invited Oral Session : Biosensor ▶

Session Chair : Dae-Sik Lee, Principal Researcher/PL
(Electronics and Telecommunications Research Institute)

13:30-14:00	Biosensors towards on-site testing for food safety and diagnostics Prof. Nae-Eung Lee <i>Sungkyunkwan University</i> 37
14:00-14:30	Vapor-phase deposited functional polymer films for biosensor applications Prof. Sung Gap Im <i>Korea Advanced Institute of Science and Technology</i> 38
14:30-15:00	Highly sensitive bioreceptor development and integration for enhanced infectious disease biosensing platform Juyeon Jung, Director <i>Korea Research Institute of Bioscience & Biotechnology</i> 39
15:00-15:30	Biosensor Patch Technology for Smart Medical and Healthcare IoT Wearables Prof. Jae Yeong Park <i>Kwang Woon University</i> 41

◀ Invited Oral Session : Optoelectronic Devices & Display Sensor System ▶

Session Chair : Prof. Sung Kyu Park (Chung-Ang University)

13:30-14:00	Label-free 3D optical angiography Prof. Woo June Choi <i>Chung-Ang University</i> 45
14:00-14:30	2D Optoelectronic Materials and Devices Prof. Sunkook Kim <i>Sungkyunkwan University</i> 46
14:30-15:00	Auxetic elastomer composite with bi-axially near-zero Poisson's ratio for free-from displays Seungjun Chung, Principal Research Scientist <i>Korea Institute of Science and Technology</i> 47
15:00-15:30	Dark current reduction of organic photodiodes through the introduction of fluorinated groups Prof. Jiyoul Lee <i>Pukyong National University</i> 48

◀ Young Scientist Forum | ▶

Session Chair : Prof. Jongsung Park (Kyungpook Nat'l Univ.)

13:30-13:45	Three-Dimensional MoS ₂ /MXene Heterostructure Aerogel for Chemical Gas Sensors with Superior Sensitivity and Stability Hamin Shin <i>Korea Advanced Institute of Science and Technology</i> 51
13:45-14:00	Resonance frequency characteristics of wireless pressure sensors in different operating environments Dong-Su Kim <i>Chonnam National University</i> 52
14:00-14:15	Selective Colorimetric Detection of Ammonia by Paper-based Analytical Device using Modified Berthelot reagent Yeong Beom Cho <i>Hanyang University</i> 53
14:15-14:30	Enhancing the Intrinsic Piezoelectric Properties of Metal-Doped Monolayer MoS ₂ for Potential Device Applications Han-Yup Yum <i>Sungkyunkwan University</i> 54
14:30-14:45	Ion Dynamic-based Tactile Perception for Electronic Skins Inah Hyun <i>Yonsei University</i> 55
14:45-15:00	Zebra-inspired stretchable, biodegradable radiation modulator for all-day sustainable energy harvesters Won Bae Han <i>KU-KIST Graduate School of Converging Science and Technology, Korea University</i> 56

Day2. Mar 30 (Thu), 2023

◀ Invited Oral Session : Wearable & Healthcare Sensors ▶

Session Chair : Prof. Inkyu Park
(Korea Advanced Institute of Science and Technology)

10:30-11:00	Development of battery-free, wireless sensor and system for prevention of pressure injuries Prof. Yongsuk Oh <i>Changwon National University</i> 59
-------------	---

11:00–11:30	Health Monitoring System for Cardiopulmonary and Swallowing Activities with a Wearable Electronic Device Prof. Youn Joung Kang <i>Jeju National University</i>	60
11:30–12:00	Flexible Pressure Sensor with High Performance and Stability to Wide Range by Gradual Electrical–Double–Layer Modulation Prof. Hanul Moon <i>Dong-A University</i>	62
12:00–12:30	Intrinsically stretchable self-healable semiconducting polymer film for Electronic skin sensors Prof. Jin Young Oh <i>Kyung Hee University</i>	64

◀ Invited Oral Session :

Emerging Energy Device-Based Sensors (including Self-Powered Sensors) ▶

Session Chair : Prof. Chang Kyu Jeong (Jeonbuk National University)

10:30–11:00	Triboelectric effects of surface morphology controlled laser induced graphene Prof. Seoung-Ki Lee <i>Pusan National University</i>	67
11:00–11:30	Principles of moisture-driven porous carbon hydrovoltaic system Hyunseok Ko, Senior Researcher <i>Korea Institute of Ceramic Engineering and Technology</i>	68
11:30–12:00	Micro-buckled CNT/elastomer fibers for self-powered strain sensors Prof. Changsoon Choi <i>Dongguk University</i>	69
12:00–12:30	Light-material interaction technology for self-powered wearable electronic systems Prof. Jung Hwan Park <i>Kumoh National Institute of Technology</i>	70

◀ Invited Oral Session : Breath Analysis for Healthcare Monitoring ▶

Session Chair : Prof. Wooyoung Lee (Yonsei University)

10:30–11:00	Research on Exhaled Breath Analysis for Intestinal Health and Obesity Management Prof. Wooyoung Lee <i>Yonsei University</i>	73
-------------	--	----

11:00–11:30	Effectiveness of breath acetone monitoring in reducing body fat and improving body composition: a randomized controlled study Prof. Justin Jeon <i>Yonsei University</i>	74
11:30–12:00	Breath Tests for Gastrointestinal Disease Prof. Hyunsoo Chung <i>Seoul National University College of Medicine</i>	75
12:00–12:30	Toward breath analysis using a portable gas analyzer: Design of sensing materials and sampling apparatus Prof. Ji-Wook Yoon <i>Jeonbuk National University</i>	76

◀ Invited Oral Session : New Materials Gas Sensors ▶

Session Chair : Prof. Hyoun Woo Kim (Hanyang University)

10:30–11:00	Study of Memristor Based Gas Sensor Devices and Real-time Monitoring System Prof. Hee-Dong Kim <i>Sejong University</i>	79
11:00–11:30	Micro and nano-structured resistive and gravimetric gas sensors Prof. Kwang-Seok Yun <i>Sogang University</i>	80
11:30–12:00	Synthesis and sensor applications of two-dimensional metal oxides Prof. Myung Sik Choi <i>Kyungpook National University</i>	81
12:00–12:30	Vertically aligned 3D graphene sensor compatible with a micro gas chromatography Prof. Jung Hwan Seo <i>Hongik University</i>	82

◀ Invited Oral Session : Nano-bio Optical Sensors ▶

Session Chair : Prof. Ki-Hun Jeong
(Korea Advanced Institute of Science and Technology)

10:30–11:00	Creating Nanomaterial-amplified Biosensing Platforms for Biomedical Applications Prof. Hye Jin Lee <i>Kyungpook National University</i>	85
11:00–11:30	Visualizing Large-scale Biological Conversion Processes in Real-time Prof. Taewook Kang <i>Sogang University</i>	86

11:30–12:00	Label-free Molecular Fingerprint Sensing Using Plasmonic Nanostructures Prof. Inhee Choi <i>University of Seoul</i> 87
12:00–12:30	NanoBio Sensor using CRISPR/Cas system Prof. Taejoon Kang <i>Korea Research Institute of Bioscience & Biotechnology</i> 88

◀ Young Scientist Forum II ▶

Session Chair : Prof. Wook Jo
(Ulsan National Institute of Science and Technology)

10:30–10:45	Unveiling the irreproducibility of the triboelectric effect based on interfacial mechanochemistry Giulio Fatti <i>Korea Institute of Ceramic Engineering and Technology</i> 91
10:45–11:00	Piezoelectric MEMS Resonant Sensor for in-situ Monitoring of PECVD Deposition Process Il Ryu Jang <i>DGIST</i> 93
11:00–11:15	A Soft Microneedle-Integrated Microfluidic Biosensor Patch for Biofluid Sampling and Biosensing with Smartphone-Based Self-Test for Personalized and Precise Diagnosis Mottour Vinayagam Chinnamani <i>Sungkyunkwan University</i> 94
11:15–11:30	Designing a self-classifying smart device with UV light detecting sensor, display, and radiative cooling functions via spectrum-selective response Sang Yeop Lee <i>Korea University</i> 96
11:30–11:45	Efficient Ionic Solution Treatment of Electron Transport Layer for Self-Powered Infrared Quantum Dot Photodetector Young Kyun Choi <i>Korea University</i> 97

◀ Invited Oral Session : Sensor Circuits & Systems ▶

Session Chair : Prof. Jae Joon Kim
(Ulsan National Institute of Science and Technology)

14:00–14:30	Self-Capacitance Proximity Sensing System Prof. Suhwan Kim <i>Seoul National University</i> 101
-------------	---

14:30-15:00	Design of High Frame Rate Touch-Screen Sensor Interfaces Prof. Jun-Eun Park <i>Sungkyunkwan University</i> 102	102
15:00-15:30	Design of High-Speed Analog-to-Digital Converter Kangil Cho, Senior Researcher <i>Korea Electronics Technology Institute</i> 103	103
15:30-16:00	Design of Multi-Biosignal Integrated Interfaces Prof. Jae Joon Kim <i>Ulsan National Institute of Science and Technology</i> 104	104

◀ **Invited Oral Session : Physics/MEMS/Image Sensors** ▶

Session Chair : Prof. Soong Ju Oh (Korea University)

14:00-14:30	Colloidal Quantum Dot based Short Wave Infrared Imager Prof. Jiwon Lee <i>Hongik University</i> 107	107
14:30-15:00	Intrinsically stretchable optoelectronic bio-integrated system Prof. Donghee Son <i>Sungkyunkwan University</i> 109	109
15:00-15:30	Molecular charge-transfer doping in emerging semiconductors Prof. Keehoon Kang <i>Seoul National University</i> 111	111
15:30-16:00	Non-toxic colloidal quantum dot-based infrared optoelectronics Prof. Se-Woong Baek <i>Korea University</i> 112	112

◀ **Invited Oral Session :**

Sensors for hazardous materials, pollution, spoilage and ions ▶

Session Chair : Prof. Ho Won Jang (Seoul National University)

14:00-14:30	Metal Oxide Nanostructures deposited by Glancing Angle Deposition for High-performance Gas Sensor Prof. Young-Seok Shim <i>KOREATECH</i> 115	115
14:30-15:00	Designing bilayer oxide chemiresistors for highly selective and sensitive detection of volatile aromatic compounds Young Kook Moon <i>Korea Institute of Materials Science</i> 116	116

15:00–15:30	Gas, spoilage, contamination, and ion detection sensor technology using two-dimensional materials Prof. Ho Won Jang <i>Seoul National University</i>	117
15:30–16:00	Highly Sensitive Ammonia Gas Sensing Under Room Temperature Conditions for Monitoring Food Freshness Prof. Yunsuk Heo <i>Inha University</i>	118

◀ Invited Oral Session : Multidisciplinary ▶

Session Chair : Prof. Dong-Weon Lee (Chonnam National University)

14:00–14:30	CNT composite sensors for human body measurement Prof. Woo-Tae Park <i>Seoul National University of Science and Technology</i>	123
14:30–15:00	3D ionic semiconductors Prof. Jungyul Park <i>Sogang University</i>	124
15:00–15:30	Fabrication of porous soft materials for new functionalities Prof. Dong Rip Kim <i>Hanyang University</i>	125
15:30–16:00	Implantable Artificial Bladder With Wireless Urine Volume Sensor Prof. Jongbaeg Kim <i>Yonsei University</i>	126

◀ Invited Oral Session :

Materials and measurements for the quantum/magnetic devices ▶

Session Chair : Prof. Sanghoon Kim (University of Ulsan)

14:00–14:30	Study on freezing and thawing magnetic droplet solitons Prof. Sunjae Chung <i>Korea National University of Education</i>	129
14:30–15:00	Visualizing charge topologies of Hall effect Prof. Byung Cheol Park <i>Sungkyunkwan University (SKKU), Institute for Basic Science</i>	131
15:00–15:30	Towards topological qubits: Heterostructure Engineering of Honeycomb Quantum Magnetism Prof. Changhee Sohn <i>Ulsan National Institute of Science and Technology</i>	132
15:30–16:00	Crystallographic Dependence of Unidirectional Spin Hall Magnetoresistances Prof. Sanghoon Kim <i>University of Ulsan</i>	133



Day1 : Mar. 29(Wed), 2023

[Plenary Session]

**Session Chair : Prof. Dong-Weon Lee
(Chonnam National University)**

Liquid Metal: Emerging Material for Soft Electronics and Sensing

Jeong Bong(JB) Lee^{1),†}, Jinwon Jeong²⁾, and Daeyoung Kim²⁾

¹⁾*Department of Electrical & Computer Engineering, The University of Texas at Dallas, Richardson, TX, USA*

²⁾*Information & Communication Engineering, Korea Army Academy, Yeongcheon, Korea*

[†]jblee@utdallas.edu

Abstract

Gallium-based liquid metals, including EGaln (a binary alloy of gallium and indium) and Galinstan (a ternary alloy of gallium, indium, and tin) exhibit low melting points (liquid phase at around room temperature), limitless deformability, extremely low vapor pressure, high boiling point (1300 °C), and high electrical (3.4×10^6 S/m at 20 °C) and thermal conductivity (16.5 W/m-K at 20 °C). Moreover, in comparison to mercury, gallium-based liquid metal is non-toxic and biocompatible. Gallium-based liquid metal when used in combination with soft polymers such as polydimethylsiloxane (PDMS) finds applications in soft/flexible and wearable electronics. Due to its flexibility and deformability, liquid metal encapsulated in soft polymer has recently shown self-healing characteristics after damage on the device. Gallium-based liquid metal has been explored in various applications ranging from electrocardiogram, flexible electrodes, flexible interconnection, strain sensors, pressure sensors, energy harvesting, tunable antenna, meta surfaces, among others. This presentation will give an overview about recent study of liquid metals and their applications in sensing.

Keywords: Liquid metal, Galinstan, Flexible, Sensor

Disease diagnosis inspired by animal sense of smell

Young Wan Lee^{1),†}

¹⁾Senior staff writer, *The ChosunBiz*

[†]ywlee@chosunbiz.com

Abstract

From Cancer to COVID-19

Each patient releases volatile organic compounds(VOCs) unique to the disease. Recently medical detection dogs are successfully diagnose disease by detecting unique volatile organic compounds(VOCs) using excellent sense of smell. Dogs have successfully diagnosed prostate and breast cancer, malaria, and recently COVID-19 patients.

Keywords: VOCs, Medical detection Dog, Electronic nose



Fig. 1. Medical detection dog/ Queen's University Belfast

References

- [1] C. Wilson, K. Campbell, Z. Petzel, and C. Reeve, "Dogs can discriminate between human baseline and psychological stress condition odours", *PLoS ONE*, Vol. 17, No. 9, p. e0274143, 2022.
- [2] W. Fu, L. Xu, Q. Yu, J. Fang, G. Zhao, Y. Li, C. Pan, H. Dong, D. Wang, H. Ren, Y. Guo, Q. Liu, J. Liu, and X. Chen, "Artificial Intelligent Olfactory System for the Diagnosis of Parkinson's Disease", *ACS Omega* Vol. 7, No. 5, pp. 4001–4010, 2022.
- [3] J. L. Essler, S. A. Kane, P. Nolan, E. H. Akaho, A. Z. Berna, A. DeAngelo, et al., "Discrimination of SARS-CoV-2 infected patient samples by detection dogs: A proof of concept study", *PLoS ONE* Vol. 16, No. 4, p. e0250158, 2021.



Day1 : Mar. 29(Wed), 2023

[Special Session]

Industrial Session

Organizer : COSAR & KSIS

Session Chair : Dae-Sung Lee, Chief Researcher
(Korea Electronics Technology Institute)

Road Surface Detection System Using Active Acoustic Sensors

Min-Hyun Kim^{1),†}, Joongeun Jung¹⁾, Hyeon-Jin Jeong¹⁾, and Jihoon Kang¹⁾

¹⁾MoveAWheel, Inc.

[†]mhkim@mv-w.com

Abstract

This paper discusses a device that utilizes signals from acoustic sensors to estimate the type of road surface and a method for classifying and managing the road based on the device. By processing the reflected acoustic signals from the road surface and classifying them using a frequency analysis and artificial neural network, it is possible to detect even the invisible materials. Ultimately, a device can be developed to control the de-icing devices or vehicle acceleration control based on the classified surface type, and road management can make the roads safer and be comfortable with this device.

Keywords: Road surface sensor, Material sensor, Touchless sensor, Artificial neural network



Fig. 1. The proposed sensor is installed on the roadside.

Acknowledgement

This research was supported by the TIPS Program(S3307440) funded by the Ministry of SMEs and Startups (MSS, Korea).

References

- [1] M.-H. Kim, J. Park, and S. Choi, "Road type identification ahead of the tire using D-CNN and reflected ultrasonic signals. International journal of automotive technology", Vol. 22, pp.47-54, 2021.
- [2] <http://www.mv-w.com>

Solution for the elderly person's safety and health

: The world's first LTE CAT.M1, Global roaming e-sim, Beacon Interworking

Tae Pyeong Kim^{1),†}

¹⁾MediConex

[†]james@mediconex.co.kr

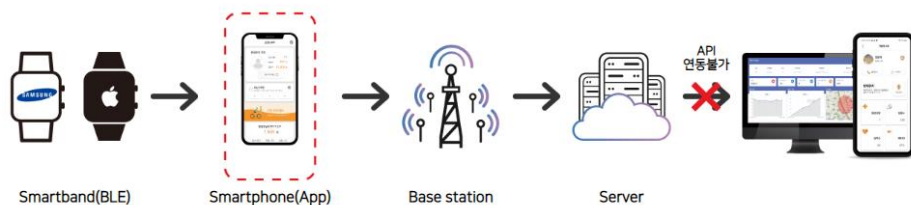
Abstract

- In 2023, the population of the elderly person over 65 years old will be reached 10 million people and entered the old age society. We need to build up the safety and health management system for the elderly person.
- The elderly person and patients are not good to use the ICT devices.
- We supply the Orange service, which can help to improve the emergency care, by 'real time bio data collection' for the elderly person and Patients.
- We use the orange platform and Orange watch to complete the orange service.

Keyword: Elderly person, Realtime untact health monitoring, Safety, Serious accidents, Orange service

Orange service organization

Existing smartband service



* Existing Smartband use the designated app by Bluetooth (lack of expandability, impossible in using data by API connection)

Mediconex orange service

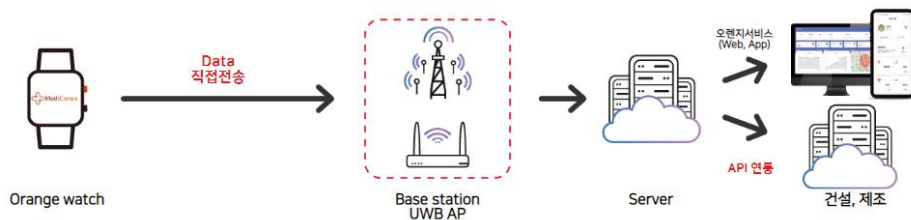


Fig 1. Orange service organization

Application of Seismic Measurement System in accordance with the Earthquake Volcanic Disaster Countermeasures Act

Sung-cheoul Cho^{1),†}, Seok-won Yoon¹⁾, and Min-jun Kim¹⁾

¹⁾*Earthquake Intelligence Services*

[†]sc2587@eiss.co.kr

Abstract

According to the earthquake statistics of the Korea Meteorological Administration's, an annual average of 70.6 earthquakes with a magnitude of 2.0 or higher and 10.8 earthquakes with a magnitude of 3.0 or higher occur [1]. Since the Kobe earthquake in Japan (2007), South Korea has also mandated installing and operating seismometers for large structures [2]. Installing a seismic accelerometer can provide criteria for determining the emergency safety and response level of a facility in the event of an earthquake, estimating earthquake damage, and revising the seismic design standards. The seismic accelerometer consists of a measurement sensor that detects vibration, a recorder that converts the measured data of the sensor into a digital signal, and a data processing system (server and program) that stores and manages the measured data. Measurement sensors include a three-axis sensor that simultaneously detects vibrations in three directions (up-down, south-north, and east-west) and a sensor that detects vibrations in one or two directions depending on the installation location and purpose. The measured items and installation criteria must follow the Ministry of Public Administration and Security's notice, "Standards for Installation and Operation of Earthquake Acceleration Measuring Instruments." In general buildings, a total of four sensors are installed including the free field, the lowest floor, and two on the top floor. In the free field, the sensor is installed on the ground surface representing the ground motion around the building, and the remaining three sensors are installed on the building. The measured data is stored as a QSCD20 file and transmitted in real time to the integrated management system of seismic acceleration measurement data of the Ministry of Public Administration and Security (MPAS). In the event of an earthquake, Mini-Seed data, which is section data on the time the earthquake occurred after the earthquake, is also separately reported to the MPAS. Its integrated software for seismic accelerometer includes a building safety evaluation system, ensuring that users can promptly respond to earthquake disasters. Currently, the seismic accelerometers are installed only in government-designated buildings to measure the risk of buildings only in large-scale and national facilities. However, since 2,896,839 old buildings account for 39.6% of the total buildings [3] as of 2021, most of the public may be exposed to the facilities with safety yet to be evaluated. Therefore, it is necessary to minimize public exposure to the risk of earthquakes by expanding the targets for measuring seismic acceleration.

Keywords: Earthquakes and volcanic explosions, Application of the seismic measurement system,
Application of seismic accelerometer system

References

- [1] <https://www.kma.go.kr/> (retrieved on Feb. 27. 2023).
- [2] M. J. Lee, et al. "Analysis on the Amplification Characteristics of Reservoir Seismic Response using Seismic Measurements Data" *Journal of the Korean Geosynthetic Society*, Vol.19, No.4, pp. 51-63, 2020.
- [3] <http://www.aurum.re.kr/research/> (retrieved on Feb. 27, 2023).

Slope Failure Monitoring of a Model Slope by the Application of a Displacement Sensor

Sungyong Park¹⁾, Yongjin Kim²⁾, Sukhyun Chang³⁾, and Yongseong Kim^{2),†}

¹⁾*Citizens Safety Division, Yongin City Hall, Gyeonggi 17019, Republic of Korea*

²⁾*Smart Geotech Co. Ltd., 7, Beopwon-ro 6 gil, Songpa-gu, Seoul 05855, Republic of Korea*

³⁾*Kangwon National University, Chuncheon, 24341, Republic of Korea*

[†]yskim@smartgeotech.co.kr

Abstract

Natural disasters, like landslide, have caused loss of a lot of human life and physical properties. This suggests that there is essence of an early warning system to mitigate casualties and economic losses. Most of the studies on early warning system have been carried out by prediction of landslide-prone areas. But studies related to the prediction of landslide occurrence time point by real-time monitoring of slope displacement are still insufficient. In this study, a displacement sensor and IoT monitoring system were designed, a model slope was constructed, displacement data were obtained by slope cutting experiment, and real-time monitoring of slope movement was done simultaneously via a low-cost, efficient and easy to use IoT system. Based on the obtained displacement data, the inverse displacement analysis was performed. Finally, the slope instrumentation standard was proposed based on slope of the inverse displacement.

Keywords: Smart sensor, Slope, Displacement sensor, Early warning, Landslide

The Effect of Operating Equipment under Full-Load on Electrical Fire Hazard

Woo-Jin Kim¹⁾, Hyun Kim^{1),†}, Young-Jin Kim¹⁾, and Gyu-Hyurk Min¹⁾

¹⁾*F.S Co., LTD*

[†]nannayeo@fsc.com.kr

Abstract

While analyzing the impact of full-load on electric facilities on variables related to electric fires, such as leakage current and insulation resistance, may be an important research topic, there is a dearth of empirical and quantitative research in this area. Moreover, the load of electrical equipment can vary depending on the time zone in which electricity is utilized, and ignoring these differences by using average load information may lead to inaccurate results. With regard to the data utilized, leakage current, an essential factor in electric fires, can be classified into resistive leakage current and capacitive leakage current. Despite the significance of resistive leakage current, existing studies have limitations in measuring and analyzing it effectively. The purpose of this study is to investigate the impact of the operation of electrical facilities on the risk of electrical fires or safety accidents by utilizing time-specific data collected through IoT electrical sensors (i-FireSens) installed in traditional markets in Daejeon. This study involves a detailed analysis of the characteristics and movements of electrical variables according to the facility's load operation status during daytime and nighttime periods. Furthermore, dynamic regression analysis was used to quantify IGR that occurs when the facility load is operated, compared to when it is not. The analysis results reveal that the effect of facility load on IGR was significant during both daytime and nighttime, irrespective of whether the auto-correlation of IGR was considered or not. Lastly, the effect of facility load on IGR was found to be significant at the same time, regardless of whether the auto-correlation was taken into account or not.

Keywords: i-FireSens, IGR, Electrical fire hazard, Full-load on electric facilities, Auto-correlation

Development of an undergraduate curriculum to human resource cultivation specialized in sensors

Seok Soo Yoon^{1),†}, Dong Hee Shin¹⁾, and Dong Young Kim¹⁾

¹⁾*Department of Smart Sensors Engineering, Andong National University, Korea*

[†]yoons@anu.ac.kr

Abstract

Entering the 4th industrial era, the role of sensors is growing, and related industries are also growing rapidly. Accordingly, there is a need to cultivate sensor professionals. Although sensor are a field that converges various technologies such as physics, materials, processes, electric circuits, software and firmware, only one or two courses are operated in most undergraduate curricula of the departments of electric engineering or control and measurement. Therefore, it is difficult to expect to cultivate sensor professionals with the current undergraduate curriculum and it is necessary to develop specialized undergraduate courses for sensors. Andong National University newly established this year the department of smart sensors engineering in undergraduate course to cultivate sensor professionals. In this presentation, we would like to introduce the vision, mission, and educational goals of the department, and then introduce teaching and learning methods. Lastly, we would like to discuss how to connect the curriculum with sensor related industries and institutes.

Keywords: Human resource cultivation, Sensor professionals, Undergraduate course



Day1 : Mar. 29(Wed), 2023

[Invited Oral Session]

Piezoelectric / triboelectric sensors

Session Chair : Prof. Wook Jo

(Ulsan National Institute of Science and Technology)

Piezoelectric Thin Films for Ultrasound MEMS Transducers

Seung-Hyub Baek^{1),†}

¹⁾*Center for Electronic Materials, Korea Institute of Science and Technology, Seoul 02792, Republic of Korea*

[†]shbaek77@kist.re.kr

Abstract

Secure authentication of one's identity is a major challenge in a modern society due to the increasing popularity of mobile devices (such as smart phones) that can not only store the owner's personal information but also allow banking transactions. A biometrics-based authentication system has attracted a great attention owing to its relatively high-security level and convenience. Current fingerprint recognition systems do not meet the required security level: optical sensors are hard to miniaturize and easily deceived, and capacitive detectors often fail to recognize the patterns by contamination. The ultrasound technology with pMUT (piezoelectric micromachined ultrasound transducer) is one of the most promising technologies to realize such a highly-secure biometrics-based authentication system for mobile electronics. The performance of pMUT is directly determined with the electromechanical property of the piezoelectric layer. However, using conventional piezoelectric materials such as AlN, ZnO, and PZT, it is difficult to generate high power ultrasound that can penetrate into the skin to see veins. Therefore, it is highly desirable to integrate single crystalline relaxor-ferroelectrics, so-called giant piezoelectric materials, on Si substrate. In this talk, I will discuss the recent progress on the epitaxial integration of $\text{Pb}(\text{Mg,Nb})\text{O}_3\text{-Pb}(\text{Zr,Ti})\text{O}_3$ thin films on Si.

Keywords: piezoelectric, epitaxial thin films, ultrasound transducer, MEMS

High-power and Reliable Magneto-Mechano-Electric Generators for Powering Internet of Things Sensor System

Mahesh Peddigari¹⁾, Jong-Jin Choi¹⁾, Woon-Ha Yoon¹⁾, and Jongmoon Jang^{1),†}

¹⁾Department of Functional Ceramics, Korea Institute of Materials Science (KIMS)

†jongmoon@kims.re.kr

Abstract

Reliability is essential for magneto-mechano-electric (MME) energy harvesters that convert low-frequency magnetic noise into useful electrical energy to be considered a practical power source for implementing real-life Internet of Things (IoT) sensor networks. In this talk, we discuss the reliable MME generators based on a piezoelectric lead magnesium niobate-lead zirconate titanate ($\text{Pb}(\text{Mn}_{1/3}\text{Nb}_{2/3})\text{O}_3\text{-Pb}(\text{Zr,Ti})\text{O}_3$, PMN-PZT) single-crystal macro fiber composite (SFC) cantilever. The MME harvester generates over 10mW output power from a low-amplitude stray magnetic field of 2.5Oe and exhibits a long-term usable lifetime of 2.5×10^9 estimated by accelerated life test method. This study paves the way for lifetime assessment and prediction of sustainable MME generators to increase the practicability of self-powered IoT devices in smart infrastructures.

Keywords: Piezoelectric, IoT sensor, Energy harvesting, Magento-mechano-electric

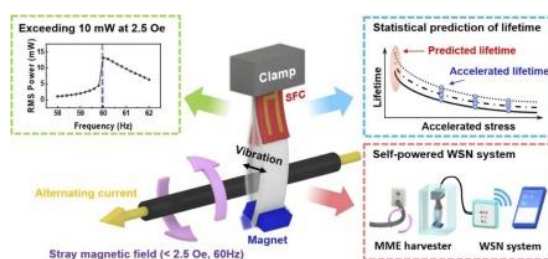


Fig. 1. Schematics of the high-power and reliable MME generator.

Acknowledgement

This work is funded by a Korea Institute of Materials Science (PNK8910), a National Research Council of Science & Technology (NST) grant by the Korean government (MSIP) (No. CPS22181-100), and a Korea Medical Device Development Fund grant funded by the Korea Government (No. KMDF_PR_20210527_0007).

References

- [1] M. S. Kwak, M. Peddigari, Y. Min, J.-J. Choi, J.-H. Kim, M. A. Listyawan, J. Ryu, G.-T. Hwang, W.-H. Yoon, J. Jang, "Boosting the lifespan of magneto-mechano-electric generator via vertical installation for sustainable powering of Internet of Things sensor ", *Nano Energy*, Vol. 10, p. 107567, 2022.
- [2] M. S. Kwak, M. Peddigari, H. Y. Lee, Y. Min, K.-I. Park, J.-H. Kim, W.-H. Yoon, J. Ryu, S. N. Yi, J. Jang, G.-T. Hwang, "Exceeding 50 mW RMS-Output Magneto-Mechano-Electric Generator by Hybridizing Piezoelectric and Electromagnetic Induction Effects", *Advanced Functional. Materials*, Vol. 32, p. 2112028, 2022.
- [3] M. Peddigari, M. S. Kwak, Y. Min, C.-W. Ahn, J.-J. Choi, B. D. Hahn, C. Choi, G.-T. Hwang, W.-H. Yoon, J. Jang, "Lifetime estimation of single crystal macro-fiber composite-based piezoelectric energy harvesters using accelerated life testing", *Nano Energy*, Vol. 88, p. 106279, 2021.

Roll-to-roll based flexible piezoelectric device and its electrode patterning

Hyunseung Yang¹⁾, Jiae Seo²⁾, Seung-Ho Han¹⁾, Hyung-Won Kang¹⁾, Yongsu Choi¹⁾, Jein Yu¹⁾, and Intae Seo^{1),†}

¹⁾*Electronic Convergence Materials & Device Research Center, Korea Electronics Technology Institute,*

Saenari-ro 25, Seongnam 13509, Korea

²⁾*Department of Materials Science and Engineering, Korea University, Anam-dong 5-ga, Seongbuk-gu, Seoul*

02841, Korea

†itseo@keti.re.kr

Abstract

A multilayer piezoelectric composite and its mass production technique to solve the problems in applying flexible piezoelectric devices in industry was proposed. A roll-to-roll process is used to manufacture a large-area composite sheet with high mechanical strength. The sheet is used to create a multilayer composite that demonstrates considerably higher ferroelectric and piezoelectric properties than single-layer composites, with these properties improving as the number of layers increases. A flexible device based on the multilayer composite is developed, which has a high output short-circuit current signal. Therefore, the proposed multilayer composite and fabrication technique are well-suited for flexible piezoelectric device applications. Furthermore, based on a roll-to-roll process, a newly simple and economical method for the selective metallization of piezoelectric composites has been suggested. Using this method, high-adhesion copper patterns were successfully formed on piezoelectric composites by combining laser-induced surface modification and electroless copper plating (ECP). For sensor applications, complex electrode patterns with high resolution and narrow pitch can be easily formed depending on the laser condition. These results demonstrate the possibility of fabricating low-cost copper electrode patterns on piezoelectric composites without requiring high-temperature heat treatment.

Keywords: Piezoelectric, Composite, Multilayer, Selective metallization, roll-to-roll

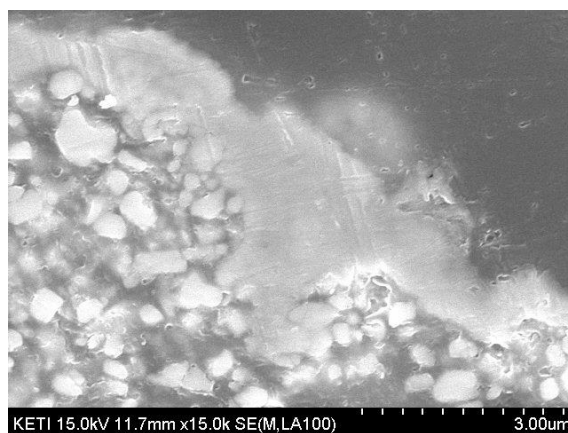


Fig. 1. SEM image of selective Cu metallized piezoelectric composite

Self-Powered Wearable Sensors for Real-Time Measurement of Mechanical Stresses

Han Eol Lee^{1),†}

¹⁾*Division of Advanced Materials Engineering, Jeonbuk National University*

[†]haneol@jbnu.ac.kr

Abstract

In upcoming IoT era, wearable and self-powered smart devices have attracted a lot of attentions as a potential info-communication medium for emerging human-machine interfaces (HMIs). Self-powered technologies for sensors are considered key technologies for the continuous operation of large-scale integrated devices because they do not need to receive electricity from external power source. To realize such self-powered sensors, since it is most common to use piezoelectric materials or triboelectric effects, several research groups have actively developed sensors using those methods. In this talk, I will introduce recent progress of self-powered and wearable sensors. The first part will discuss triboelectric effect-based display and sensors. The second part will introduce wearable electronic skin for real-time healthcare monitoring through piezoelectric materials.

Keywords: Self-powered sensors, Wearable devices, Triboelectric effect, Piezoelectric materials, ZnO, GaN

Acknowledgement

This work was supported by the National Research Foundation of Korea (NRF) grants funded by the Ministry of Science, ICT and Future Planning (MSIT) (NRF-2022R1F1A1066064, and 2022R1A4A3033320), and Nano-Material Technology Development Program through the NRF funded by MSIT. (2009-0082580).



Day1 : Mar. 29(Wed), 2023

[Invited Oral Session]

Electronic Noses & Sensors

Session Chair : Prof. Seon-Jin Choi
(Hanyang University)

Breathable sieving layer on conductive 2D materials for stable and selective surface activation

Ji-Soo Jang^{1),†}

¹⁾*Korea Institute of Science and Technology*

[†]wkdwln92@kist.re.kr

Abstract

2D transition metal dichalcogenides (TMDs) have significant research interests in various novel applications due to their intriguing physicochemical properties. Notably, one of the two-dimensional TMDs, SnS₂, has superior chemiresistive sensing properties, including a planar crystal structure, a large surface-to-volume ratio, and a low electronic noise. However, the long-term stability of SnS₂ in humid conditions remains a critical shortcoming towards a significant degradation of sensitivity. Herein, we demonstrated that the subsequent self-assembly of Zeolite Imidazolate Framework (ZIF-8) can be achieved in situ growing on SnS₂ nanoflakes as the homogeneous porous materials. ZIF-8 layer on SnS₂ allows the selective diffusion of target gas species, while effectively prevents the SnS₂ from severe oxidative degradation. Molecular modeling such as molecular dynamic simulation and DFT calculation, further supports the mechanism of sensing stability and selectivity. From the results, the in-situ grown ZIF-8 porous membrane on 2D materials corroborates the generalizable strategy for durable and reliable high-performance applications of 2D materials.

Highly Periodic 3D Thin-shell TiO₂ for Ultrasensitive Gas Sensors

Donghwi Cho^{1),†}

¹⁾*Thin Film Materials Research Center, Advanced Materials Division,
Korea Research Institute of Chemical Technology (KRICT), Daejeon 34114, South Korea*

[†]roy.cho@kRICT.re.kr

Abstract

In this era of the Internet of Things, the development of innovative chemo-resistive-type gas sensors has rapidly accelerated with that of nanotechnology to accommodate various demands for smart applications. The practical use of three-dimensional (3D) nanostructured materials breaks several limitations of the existing sensory material technologies, including the large surface-to-volume ratio, precisely tunable pore size and porosity, and efficient signal transduction of 3D geometries. This talk introduces highly porous and periodic 3D thin-shell TiO₂ nanostructures. By controlling key structural parameters of 3D TiO₂: total film thickness (6 μ m) and the thin-shell thickness (30 nm), an active gas channel for extremely high gas molecule accessibility is designed to achieve exceptional fast-responding (< 1 s) gas sensors. In addition, the 3D TiO₂ serves as a new class of UV-activated sensing nanoarchitecture, which facilitates 55 times enhanced light absorption by confining the incident light in the nanostructure. This optically activated 3D TiO₂ achieves an ultrahigh chemo-resistive response to NO₂ with a theoretical detection limit of \approx 200 ppt. An additional demonstration of high responses with visible light illumination proposes a future perspective for light-activated gas sensors based on semiconducting oxides that greatly reduce the power consumption issue of the existing sensor technologies.

Keywords: 3D nanopatterning, Thin-shell, TiO₂, Light-activated

References

- [1] D. Cho, J. M. Suh, S.-H. Nam, S. Y. Park, M. Park, T. H. Lee, K. S. Choi, J. Lee, C. Ahn, H. W. Jang, Y.-S. Shim, S. Jeon, "Optically Activated 3D Thin-Shell TiO₂ for Super-Sensitive Chemoresistive Responses: Toward Visible Light Activation", *Adv. Sci.*, Vol. 8, p. 2001883, 2021.
- [2] J. M. Suh, D. Cho, S. Lee, T. H. Lee, J.-W. Jung, J. Lee, S. H. Cho, T. H. Eom, J.-W. Hong, Y.-S. Shim, S. Jeon, H. W. Jang, "Rationally Designed TiO₂ Nanostructures of Continuous Pore Network for Fast-Responding and Highly Sensitive Acetone Sensor", *Small Methods*, Vol. 5, p. 2100941, 2021.
- [3] J. Lee, D. Cho, H. Chen, Y.-S. Shim, J. Park, S. Jeon, "Proximity-field Nanopatterning for High-performance Chemical and Mechanical Sensor Applications based on 3D Nanostructures", *Appl. Phys. Rev.*, Vol. 9, p. 011322, 2022.

Voltage-dependent gas discrimination using self-activated graphene microchannels

Yeonhoo Kim^{1),†}

¹⁾Korea Research Institute of Standards and Science

[†]yeonhoo@kriss.re.kr

Abstract

Gas discrimination using a chemoresistive sensor without heater is still a challenging research topic. Designing sensor arrays composed of various types of individual sensors have been considered as a common strategy to obtain abundant data for the classification. However, fabrication process and integration of various sensors on a small substrate are complex and challenging. Here, we report voltage-dependent gas discrimination using a single sensor with varied sensing properties induced by different levels of self-activation. The sensor can be employed for a hydrogen sensor with an ultralow detection limit down to 0.219 ppt, owing to the catalytic effect of the Pt nanoparticles. In addition, abundant data can be accumulated from the single sensor using different self-activation states. The switching time of about 2 s for each activation state enables fast data acquisition for principal component analysis. This work is not only a proof-of-concept study for gas discrimination using a single sensor, but also broadens potential of graphene gas sensors decorated with noble metal nanoparticles for practical applications.

Keywords: Gas sensors, Sensor arrays, Self-heating, Graphene, Noble-metal decoration

References

- [1] Y. Kim et al., "Voltage-dependent gas discrimination using self-activated graphene with Pt decoration", *Sens. Actuators B*, Vol. 349, p. 130696, 2021.
- [2] T. Kim et al., "Drastic Gas Sensing Selectivity in 2-Dimensional MoS₂ Nanoflakes by Noble Metal Decoration", *ACS Nano*, Accepted, 2023.

Structure Controlled Effect on Metal Oxide Nanowires for Gas Sensor

Performance

Hyeuk Jin Han^{1),†}

¹⁾*Department of Environment and Energy Engineering, Sungshin Women's University, Seoul, 01133 Korea*

[†]hyeukjin.han@sungshin.ac.kr

Abstract

Small grains in metal oxide materials are important for applications that utilize surface reactions, such as catalyst and gas sensor; yet, nanoscale grains are thermodynamically unstable and tend to coarsen at elevated temperatures. Here, we report suppression of grain growth in metal oxide nanoribbons annealed at high temperature (900°C) by tuning the metal to oxygen ratio and confining them at the nanoscale. We find that excess oxygen in amorphous tin oxide nanoribbons prevents merging of small grains during crystallization, leading to the suppressed growth of the grains. Our findings were verified by in-situ transmission electron microscopy experiments, which showed that grain coarsening is the primary mechanism for grain growth and crystallization can be induced by removing excess oxygen. As a result, despite high annealing temperatures, the average grain size was ~ 6 nm while the nanoribbons retained their structural integrity. Using these tin oxide nanoribbons with nanoscale grains, we demonstrate a gas sensor with much improved stability and high sensitivity toward ethanol gas. Our findings provide new insights into thermally stable nanoscale grains in metal oxides and suggest a material design useful for various applications.

Keywords: Gas sensors, Grain growth, Oxide semiconductors, SnO₂



Day1 : Mar. 29(Wed), 2023

[Invited Oral Session]

Biosensors

Session Chair : Dae-Sik Lee, Principal Researcher/PL
(Electronics and Telecommunications Research
Institute)

Biosensors towards on-site testing for food safety and diagnostics

Nae-Eung Lee ^{1),†}

¹⁾*School of Advanced Materials Science & Engineering, SKKU Advanced Institute of Nanotechnology (SAINT), Biomedical Institute for Convergence at SKKU (BICS), and Samsung Advanced Institute for Health Sciences and Technology (SAIHST), Sungkyunkwan University, Suwon, Gyeonggi-do 16419, Korea*

[†]nelee@skku.edu

Abstract

On-site testing is promising for food safety and healthcare in near future due to necessity of quick response and fast turn-around time. For the purpose, a seamless integration of sample collection, sample treatment and detection is required to minimize user intervention while the assay accuracy is secured. Recently, a variety of biosensor-integrated mobile or wearable systems have been extensively investigated but there have been still many challenging hurdles in meeting the requirements (Figure 1). Here, we will discuss digital fluorescence imaging techniques integrated with fluorescence-enhancing nanomaterials for highly sensitive on-site testing of chemicals and pathogenic bacteria for food safety and for disease diagnostics which can be integrated with smartphone or portable IOT systems. Furthermore, we will present our recent works on wearable biosensor patches integrated with fully stretchable components of microfluidic device for sweat collection, transport and electrochemical biosensors based on nanomaterials for label-free immunodetection of stress biomarkers as well as enzymeless sensing of glucose in human sweat. The wearable electrochemical biosensor patches with a seamless integration of sampling and detection functions are promising for on-site testing by users under untact environment.

Keywords: Biosensor, Biomarker, Glucose, Portable POCT, Wearable patch, Microfluidics

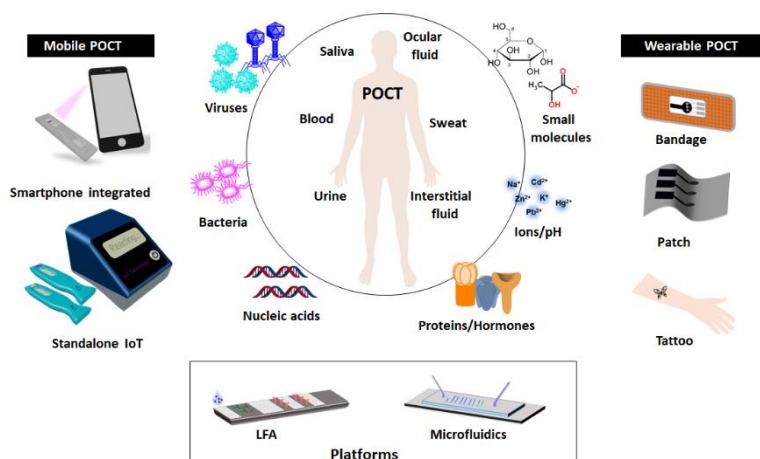


Fig. 1. Concept of mobile and wearable POCT technologies for on-the-spot testing and self-testing. Reproduced from Chemical Society Reviews (2020, S. Shrivatava, T.Q. Trung and N.-E. Lee).

Vapor-phase deposited functional polymer films for biosensor applications

Sung Gap Im^{1),†}

¹⁾Department of Chemical and Biomolecular Engineering, Korea Advanced Institute of Science and Technology
291 Daehak-Ro, Yuseong-Gu, Daejeon, Republic of Korea 34141

†sgim@kaist.ac.kr

Abstract

iCVD (initiated chemical vapor deposition) process can deposit various kinds of functional polymer films in vapor phase. Since the solvent-free deposition process is performed at ambient temperature, the iCVD polymers are easily applicable to various vulnerable substrates without damaging them. The functionality of polymeric coatings can be easily incorporated by introducing various kinds of monomers. There is a wide room for further device applications using this chemical vapor deposited polymers. The iCVD coatings can act as an essential building block for various device applications including flexible electronics, membranes, tissue scaffolds, stimuli-responsive drug delivery systems, and diverse biosensors. In this seminar, the application of iCVD polymer films to various biosensors will be reviewed.

Keywords: Biosensors, iCVD(Initiated Chemical Vapor Deposition), Functional polymer films

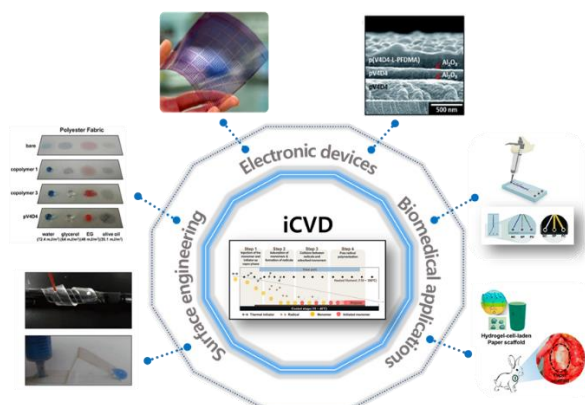


Fig. 1. Schematic illustration of the iCVD process.

Acknowledgement

This work was supported by the Samsung Science and Technology Foundation under project no. SRFC-IT2102-04, and by the National Research Foundation of Korea (NRF) grant funded by the Korea government (MSIT) (No. 2021R1A2B5B03001416).

References

- [1] J. H. Koo, J. Kang, S. Lee, J. Choi, J. Yoon, H. J. Park, S.-H. Sunwoo, D. C. Kim, W. Nam, D.-H. Kim, S. G. Im, and D. Son, "A vacuum-deposited polymer dielectric for wafer-scale stretchable electronics", *Nature Electronics*, pp. 1-9, 2023.
- [2] J. Song, Y. Song, H. Jang, J. Moon, H. Kang, Y.-M. Huh, H. Y. Son, H. W. Rho, M. Park, E.-K. Lim, J. Jung, Y. Jung, H. G. Park, K. G. Lee, S. G. Im, and T. Kang, "Elution-Free DNA Detection using CRISPR/Cas9-mediated Light-up Aptamer Transcription: Toward All-in-One DNA Purification and Detection Tube", *Biosensors and Bioelectronics*, Vol. 225, p. 115085, 2023.

Highly sensitive bioreceptor development and integration for enhanced infectious disease biosensing platform

H. Kim¹⁾, K. Guk¹⁾, D. Yong²⁾, E. Lim^{1,3)}, T. Kang¹⁾, and J. Jung^{1,3),†}

¹⁾Bionanotechnology Research Center, Korea Research Institute of Bioscience & Biotechnology

²⁾Department of Laboratory Medicine and Research Institute of Bacterial Resistance, Yonsei University College of Medicine

³⁾Department of Nanobiotechnology, KRIBB School of Biotechnology, University of Science and Technology

†jjung@kribb.re.kr

Abstract

The emergence and spread of antiviral drug-resistant viruses have become a significant challenge in patient care worldwide. In this study, we developed a series of antibodies with high specificity and affinity for various mutant viruses, including Tamiflu-Relenza-resistant IFV, synagis-resistant RSV, and MRS. These antibodies were applied in various biosensing platforms, such as naked-eye detection, surface-enhanced Raman scattering-based immunoassay, split superfolder GFP, and lateral flow system, to detect antiviral multidrug-resistant viruses. The development of these drug-resistant specific antibodies provides a rapid, simple, and reliable point-of-care assay for detecting antiviral multidrug-resistant influenza viruses. Diagnostic tests for antiviral-resistant viruses will improve clinical decision-making in the treatment of virus infections, preventing the unnecessary prescription of ineffective drugs and improving current therapies. Our findings offer a potential solution to the challenges posed by antiviral drug-resistant viruses and provide new insights into the development of rapid and reliable diagnostics for infectious diseases. The results of this study may pave the way for the development of novel therapeutic strategies to combat multidrug-resistant viral infections.

Keywords: Bioreceptor, Diagnostics, Receptor engineering, Bio-interfacing

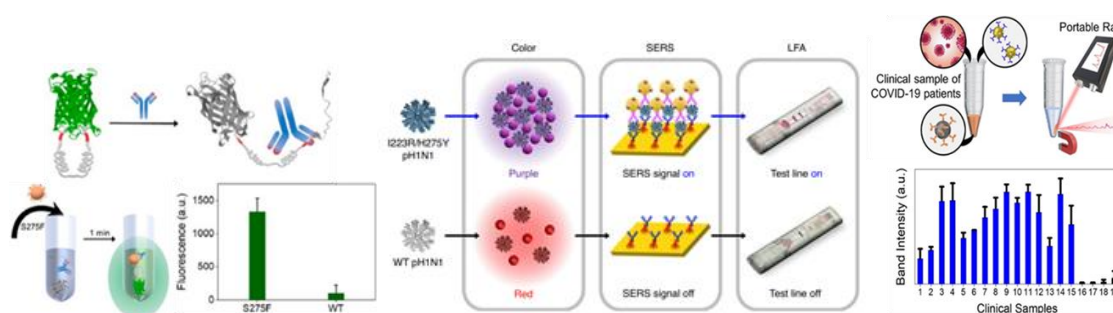


Fig. 1. Development and Applications of Bioreceptors in Sensing Platforms.

References

- [1] K. Guk, H. Kim, M. Lee, Y. Choi, S. Hwang, G. Han, H. Kim, H. Kim, H. Park, D. Yong, T. Kang, Lee, E. Lim, and J. Jung, "Development of A4 antibody for detection of neuraminidase I223R/H275Y-associated antiviral multidrug-resistant influenza virus", Nat. Commun., Vol. 11, No. 6, pp. 3418-3429, 2020.
- [2] H. Kim, S. Hwang, K. Guk, Y. Bae, H. Park, E. Lim, T. Kang, and J. Jung, "Development of antibody against drug-resistant respiratory syncytial virus: Rapid detection of mutant virus using split superfolder green fluorescent protein-antibody system", Biosen. & Bioelectron., Vol. 194, pp. 113593-113600, 2021.

- [3] H. Kim, H. Kang, H. Kim, H. Kim, J. Moon, K. Guk, D. Yong, H. Park, P. Bae, H. Park, E. Lim, T. Kang, and J. Jung, "Development of 6E3 antibody-mediated SERS immunoassay for drug-resistant influenza virus", *Biosen. & Bioelectron.*, Vol. 187, pp. 113324-113333, 2021.
- [4] H. Cha, H. Kim, Y. Joung, H. Kang, J. Moon, H. Jang, S. Park, H. Kwon, I. Lee, S. Kim, D. Yong, S. Yoon, S. Park, K. Guk, E. Lim, H. Park, J. Choi, J. Jung, and T. Kang, "Surface-enhanced Raman scattering-based immunoassay for severe acute respiratory syndrome coronavirus 2 ", *Biosen. & Bioelectron.*, Vol. 202, pp. 114008-114017, 2022.
- [5] S. Son, S. Seo, S. Jang, J. Choi, J. Lim, D. Lee, H. Kim, S. Seo, T. Kang, J. Jung, and E. Lim, "Naked-eye detection of pandemic influenza a (pH1N1) virus by polydiacetylene (PDA)-based paper sensor as a point-of-care diagnostic platform", *Sens. Actuators B Chem.*, Vol. 291, pp. 257-265, 2019.
- [6] G. Eom, A. Hwang, D. Lee, K. Guk, J. Moon, J. Jeong, J. Jung, B. Kim, E. Lim, and T. Kang, "Superb specific, ultrasensitive, and rapid identification of the oseltamivir-resistant H1N1 virus: naked-eye and SERS dual-mode assay using functional gold nanoparticles", *ACS. Appl. Bio. Materials*, Vol. 2, pp. 1233-1240, 2019.

Biosensor Patch Technology for Smart Medical and Healthcare IoT Wearables

Jae Yeong Park^{1),2),†}

¹⁾Department of Electronic Engineering, Kwangju University, Seoul, REPUBLIC OF KOREA

²⁾SnE Solutions Co., Ltd., Seoul, REPUBLIC OF KOREA

†jaepark@kw.ac.kr

Abstract

In this paper, biosensor patches for the real-time and continuous monitoring of various bio-signals (biochemical substances and physiological signals) of the human body for implementing smart wearable medical and healthcare IoTs are introduced. Various patch sensors are presented such as polymer microneedle-based biosensors for continuous blood glucose monitoring in interstitial fluids, non-invasive electrochemical and physiological hybridized patch sensors which can simultaneously monitor sweat glucose, electrocardiogram, pH, and body temperature, flexible physical patch sensors which can monitor pressure, strain, and body temperature, and breathable patch sensors which can real-time monitor electrocardiogram, electromyogram, brainwave. In addition, ultra-sensitive biomarker detection and self-powered tactile sensor patch platforms are also introduced.

Keywords: Biosensor, Patch, Medical and healthcare, Wearables, IoTs, Sweat, Interstitial fluids

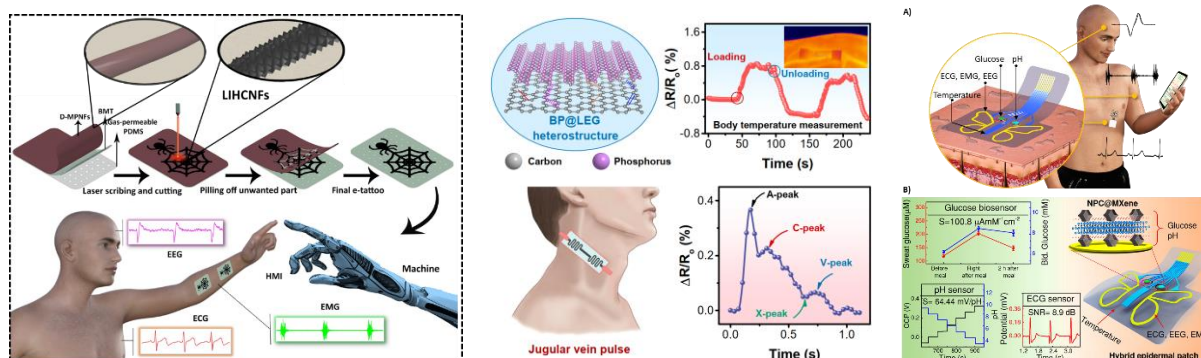


Fig. 1. LIG-based breathable ECG patch (left), flexible physical sensor patch (center), and hybrid multi-sensing patch (right).

Acknowledgement

This work was supported by the Technology Innovation Program (RS-2022-00154983, Development of Low-Power Sensors and Self-Charging Power Sources for Self-Sustainable Wireless Sensor Platforms) funded by the Ministry of Trade, Industry & Energy (MI, Korea).

References

- [1] M. Sharifuzzaman, J. Park, et al., "β-Phase-Rich Laser-Induced Hierarchically Interactive MXene Reinforced Carbon Nanofibers for Multifunctional Breathable Bioelectronics", *Advanced Functional Materials*, Vol. 32, No. 5, p. 2107969, 2021.

- [2] K. Shrestha, J. Park, et al., "A Siloxene/Ecoflex Nanocomposite-Based Triboelectric Nanogenerator with Enhanced Charge Retention by MoS₂/LIG for Self-Powered Touchless Sensor Applications", *Advanced Functional Materials*, Vol. 32, No. 27, p. 2113005, 2022.
- [3] M. A. Zahed, J. Park, et al., "A Nanoporous Carbon-MXene Heterostructured Nanocomposite-Based Epidermal Patch for Real-Time Biopotentials and Sweat Glucose Monitoring", *Advanced Functional Materials*, Vol. 32, No. 49, p. 2208344, 2022.



Day1 : Mar. 29(Wed), 2023

[Invited Oral Session]

Optoelectronic Devices & Display Sensor System

Session Chair : Prof. Sung Kyu Park
(Chung-Ang University)

Label-free 3D optical angiography

Woo June Choi^{1),†}

¹⁾*School of Electrical and Electronics Engineering, Chung-Ang University*

[†]cecc78@cau.ac.kr

Abstract

Optical coherence tomography (OCT) is a three-dimensional (3-D) optical imaging technology that provides noninvasive, micrometer resolution ($<7\mu\text{m}$) images of structural interiors within biological samples with an approximately 1~2 mm penetration depth. Over the last decades, advances in OCT have revolutionized in biomedical imaging by demonstrating a potential of optical biopsy in preclinical and clinical settings. Recently, functional OCT imaging has shown a promise as angiography to visualize cell-perfused vasculatures in the tissue bed *in vivo* without requiring any exogenous contrast agents. This new technology termed OCT angiography (OCTA) possesses a unique imaging capability of delineating tissue morphology and blood or lymphatic vessels down to capillaries at a fast acquisition rate (>180 frames/s). For the past few years, OCTA has been proven being a useful tool to identify disorder or dysfunction in tissue microcirculation from experimental animal studies and clinical researches in ophthalmology and dermatology. In this work, we introduce OCTA and our OCTA works; a mechanism of OCTA is explained with simple optical physics, and its scan protocols and post-processing algorithms for angiography are introduced. Then, *in vivo* small animal studies aimed for investigating the changes in vessel networks under pathological challenges in several organs such as brain are presented with interesting findings measured. Furthermore, potential and challenge of OCTA for clinical settings are shown with outcomes of our human studies.

Keywords: Optical coherence tomography, Label-free angiography, Scattering dynamics, Three-dimensional imaging

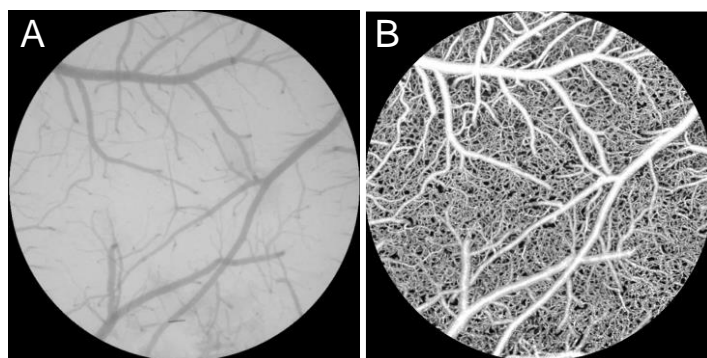


Fig. 1. A microphotograph (A) and corresponding OCTA image (B) of a live mouse brain.

Acknowledgement

National Research Foundation (NRF) (2020R1A5A1018052), Technology Innovation Program (20021979).

References

- [1] W. J. Choi, Y. Li, and R. K. Wang, "Monitoring acute stroke progression: multiparametric OCT imaging of cortical perfusion, flow, and tissue scattering in a mouse model of permanent focal ischemia", *IEEE Trans. Med. Imaging.*, Vol. 38, No. 6, pp. 1427-1437, 2019.

2D Optoelectronic Materials and Devices

Sunkook Kim^{1),†}

¹⁾*Department of Advanced Materials Science and Engineering, Sungkyunkwan University (SKKU), Suwon,
16419, Republic of Korea*

[†]seonkuk@skku.edu

Abstract

2D Materials have been significantly developed for next-generation optoelectronic materials and devices owing to their excellent electrical and optical characteristics. However, active-matrix image sensors based on 2D materials are limited by the difficulties to fabricate wafer-scale integrated circuitry and achieving excellent optical sensitivity. In my talk, I present a large-area, uniform, and highly sensitive image sensor matrix with active pixels consisting of thin-film or nanoporous 2D phototransistors. Large-area, uniform, 4-inch wafer-scale bilayer MoS₂ films were synthesized by 2 step-method using radio-frequency magnetron sputtering and sulfurization processes, and patterned into a nanoporous structure consisting of an array of periodic nanopores on the MoS₂ surface via block copolymer lithography. I successively achieve 4-inch-wafer-scale image mapping using our active-matrix image sensor by controlling the device sensing and switching states. Our high-performance active-matrix image sensor is state-of-the-art in 2D material-based integrated circuitry and pixel image sensor applications.

Auxetic elastomer composite with bi-axially near-zero Poisson's ratio for free-from displays

Jun-Chan Choi¹⁾, Hoon Yeob Jeong¹⁾, and Seungjun Chung^{1,2),†}

¹⁾Soft Hybrid Materials Research Center, Korea Institute of Science and Technology (KIST), Seoul, Korea

²⁾KU-KIST Graduate School of Converging Science and Technology, Korea University, Seoul, Korea

[†]seungjun@kist.re.kr

Abstract

Stretchable displays have attracted attention as the next-generation free-from display technology. From an actual application perspective, it is desirable to use transparent elastomeric polymers with relatively low Young's modulus as substrate materials. However, elastomeric materials have a Poisson's ratio of ~ 0.5 inherently. When the substrate deformation by the Poisson's effect occurs in stretchable displays, undesirable image distortion, so it has to be addressed to provide accurate information.¹ Here, we propose a strain-engineered transparent elastomer composite as a substrate of stretchable displays. To control the Poisson's ratio of the stretchable substrate, a relatively rigid mechanical metamaterial frame was embedded into the elastomeric matrix material. As a result of quantitatively evaluating the tensile axis-dependent Poisson's ratio according to the Young's modulus ratio of the frame and the matrix materials, when Young's modulus deviation was about 20 times, the Poisson's ratio (< 0.1 irrespective of the tensile axis) was significantly reduced compared to that of the pristine elastomer substrates (~ 0.4).

Keywords: Mechanical metamaterials, Stretchable displays, Transparent composites, Elastomer composites, Poisson's ratio

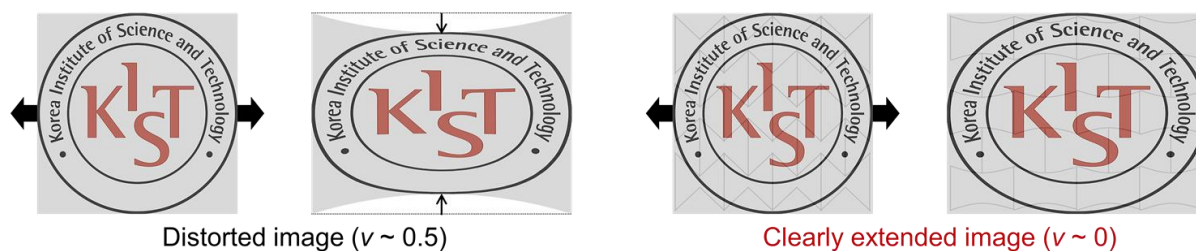


Fig. 1. Schematic of elastomeric substrates (left) without and (right) with auxetic elastomer composite with bi-axially near-zero Poisson's ratio.

Acknowledgement

This work was supported by National R&D Program through the National Research Foundation of Korea (NRF) funded by the Ministry of Science and ICT (NRF-2020M3D1A2101799), the Korea Institute of Science and Technology (KIST) Future Resource Research Program (Grant No. 2E32501), and KU-KIST School Project.

References

- [1] B. Jang, S. Won, J. Kim, J. Kim, M. Oh, H.-J. Lee, and J.-H. Kim, "Auxetic Meta-Display: Stretchable Display without Image Distortion", *Adv. Funct. Mater.* Vol. 32, p. 2113299, 2022.

Dark current reduction of organic photodiodes through the introduction of fluorinated groups

Yongqi Bai¹⁾, Sungwoo Seo²⁾, Jong-Woon Ha¹⁾, Minho Yoon²⁾, Do-Hoon Hwang¹⁾, and Jiyoul Lee^{2),†}

¹⁾Department of Chemistry, Pusan National University, Busan 46241, Republic of Korea

²⁾Department of Smart Green Technology Engineering, Pukyong National University, Busan 48513, Republic of Korea

†jiyoul_lee@pknu.ac.kr

Abstract

In this study, we present a strategy to obtain low dark current density (J_d) in OPDs from a material point of view, by investigating the optoelectric properties of OPDs based on donor-acceptor (D-A) type conjugated copolymers. To this end, two D-A type copolymers were prepared with thieno[3,4-*c*]pyrrole-4,6(5*H*)-dione (TPD) as a common electron-withdrawing unit and 4,8-di(thiophen-2-yl)benzo[1,2-*b*:4,5-*b'*]dithiophene (BDT) or fluorinated BDT (FBDT) as electron-donating units. We then examined OPDs with an active layer formed by blending the fullerene derivative [6,6]-phenylC₇₁butyricacidmethylester (PC₇₁BM) and the newly synthesized D-A type copolymers (PBDT-biTPD or PFBDT-biTPD). Under the reverse bias of -2 V, a low J_d of 6.09×10^{-10} A cm⁻² was observed for the PFBDT-biTPD-based OPD, which showed a maximum responsivity of $R = 0.30$ A W⁻¹ and $D^* = 2.13 \times 10^{13}$ Jones at 500–650 nm, while the PBDT-biTPD-based OPD possessed a relatively higher J_d (1.43×10^{-9} A cm⁻²). Systematic analyses based on structural characterization of the active thin-film layers and the density of states (DOS) measured using the OPDs and organic field-effect transistors revealed that the fluorination of the donor unit in the D-A type conjugated polymer is an effective way to reduce the J_d of OPDs by suppressing trap DOS in the blended active layer.

Keywords: Organic photodiode, Conjugated polymer, Dark current density, Trap density of states, Fluorinated electron donor

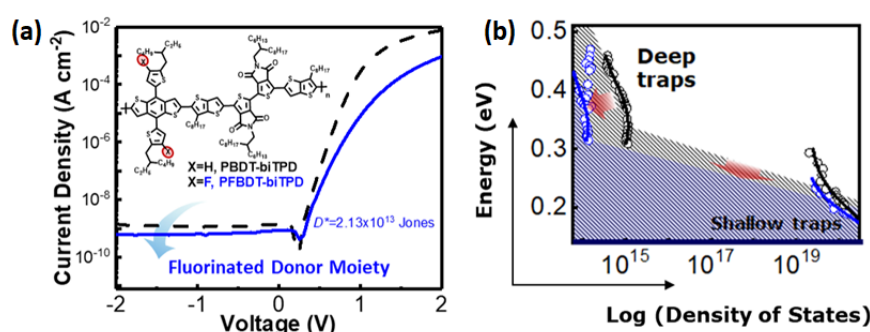


Fig. 1. (a) J–V curves of the OPDs based on PBDT-biTPD:PC₇₁BM or PFBDT-biTPD:PC₇₁BM blended layers, (b) Sub-gap trap DOS profiles of two synthesized D–A type conjugated copolymer films from the mobile edge to the mid-gap region near the HOMO level, by superimposing the deep and shallow trap state profiles

Acknowledgement

The authors acknowledge financial support provided by the Basic Science Research Program through the National Research Foundation of Korea (NRF), funded by the Ministry of Science, ICT & Future Planning (2020R1A2C2008757, 2021R1A2C1007212).



Day1 : Mar. 29(Wed), 2023

[Young Scientist Forum I]

**Session Chair : Prof. Jongsung Park
(Kyungpook National University)**

Three-Dimensional MoS₂/MXene Heterostructure Aerogel for Chemical Gas Sensors with Superior Sensitivity and Stability

Hamin Shin¹⁾, Seulgi Kim²⁾, Jaewoong Lee¹⁾, Jihan Kim^{1),†}, Dongju Lee^{2),†}, and Il-Doo Kim^{1),†}

¹⁾Korea Advanced Institute of Science and Technology (KAIST),

²⁾Chungbuk National University,

†jihankim@kaist.ac.kr, dongjulee@chungbuk.ac.kr, idkim@kaist.ac.kr

Abstract

The integration of dissimilar functional 2D materials into a single heterostructure provides an effective platform for exploring nanoscale physics not accessible in a single 2D material. Herein, two 2D materials, MXene and MoS₂, are physically mixed followed by freeze drying to successfully fabricate a 3D MoS₂/MXene van der Waals heterostructure aerogel. This low-temperature synthetic approach produces a hierarchical and freestanding 3D heterostructure composed of high-quality MoS₂ and MXene nanosheets while largely suppressing the oxidation of the Ti₃C₂T_x MXene. The effective functionalization of the MXene with MoS₂ as the catalytic layer substantially improves its sensitivity and long-term stability toward the chemiresistive sensing of NO₂ gas. Computational studies of the 3D heterostructure, coupled with experimental results, elucidated that the mechanism behind the enhancements in its gas sensing properties is the effective inhibition of HNO₂ formation on the MXene surface due to the presence of MoS₂. Overall, the synthetic principles uncovered in this study could be expanded to other classes of two-dimensional materials toward a general method to obtain functional 3D heterostructure, providing a foundation for the designed synthesis of future catalysts and electronic gas sensors.

Keywords: MoS₂, Ti₃C₂T_x MXene, Heterostructures, Aerogel, Gas sensors

Resonance frequency characteristics of wireless pressure sensors in different operating environments

Dong-Su Kim^{1),2)}, and Dong-Weon Lee^{1),2),3)} †

¹⁾*MEMS and Nanotechnology Laboratory, School of Mechanical Engineering, Chonnam National University,*

²⁾*Advanced Medical Device Research Center for Cardiovascular Disease, Chonnam National University*

³⁾*Center for Next-generation Sensor Research and Development, Chonnam National University*

†mems@jnu.ac.kr

Abstract

Till date, wireless pressure sensors integrated with smart stents have been proposed to monitor in-stent restenosis in real-time. However, wireless communication of the inductive coupling method exhibits different characteristics depending on the environment where the sensor is located. In this study, a wireless pressure sensor integrated with a smart stent was fabricated using MEMS technology and the resonance frequency shift and sensitivity according to the environment were analyzed. The final application of the wireless pressure sensor integrated with the smart stent is inside the human body, in which the average conductivity of human blood is between 10-20 mS cm⁻¹. Therefore, other working environments with similar conductivity range as human blood were selected, such as saline and culture medium. The resonance frequency of the air wireless pressure sensor was 400 MHz and moved to 280, 260, and 250 MHz as the device environment was changed to DI water, saline, and culture medium, respectively. The high conductivity of saline and culture medium increases the capacitance of the device, lowering the resonance frequency and Q factor. Based on the measurement results, we anticipate that the proposed smart stent can be used to measure biological signals in in-vivo environment.

Keywords: Wireless pressure sensor, Inductive coupling, Resonance frequency, In-vivo environment

Acknowledgement

This work was supported by the National Research Foundation of Korea (NRF) grant funded by the Korea government (MSIT) (No. 2020R1A5A8018367, No. 2022R1C1C2012280).

References

- [1] X. Chen, B. Assadsangabi, Y. Hsiang and K. Takahata, "Enabling angioplasty-ready "Smart" Stents to detect in-stent restenosis and occlusion", *Adv. Sci.*, Vol. 5, No. 5, p. 1700560, 2018.
- [2] J. Park, J.-K. Kim, D.-S. Kim, A. Shanmugasundaram, S. A. Park, S. Kang, S.-H. Kim, M. H. Jeong and D.-W. Lee, "Wireless pressure sensor integrated with a 3D printed polymer stent for smart health monitoring", *Sens. Actuators, B*, Vol. 280, No. pp. 201-209, 2019.
- [3] D.-S. Kim, N.-E. Oyunbaatar, A. Shanmugasundaram, Y.-J. Jeong, J. Park and D.-W. Lee, "Stress induced self-rollable smart-stent-based U-health platform for in-stent restenosis monitoring", *Analyst*, Vol. 147, No. 21, pp. 4793-4803, 2022.