UOS RESEARCHER PROFILES

Bio

Faculty

Life Science

01	**Hyunsung Park**	Department of Life Science
02	**Eek-Hoon Jho**	Department of Life Science
03	**Yun-Doo Chung**	Department of Life Science
04	**Jung-Woo Choe**	Department of Life Science
05	**Kwon-Yul Ryu**	Department of Life Science
06	**Jung-Hyun Lee**	Department of Life Science
07	**Hongik Hwang**	Department of Life Science
08	**Jiyeon Han**	Department of Applied Chemistry

Bio ICT

09	**Ha-Jin Yu**	School of Computer Science
10	**Moon-Que Lee**	School of Electrical and Computer Engineering
11	**Hyuk Choi**	School of Computer Science
12	**Jong Bum Lee**	Department of Chemical Engineering
13	**Inhee Choi**	Department of Life Science
14	**Jinhee Choi**	School of Environmental Engineering
15	**Byung Eun Park**	School of Electrical and Computer Engineering
16	**Hyunggu Jung**	School of Computer Science
17	**Myun Joong Hwang**	Department of Mechanical and Information Engineering
18	**Yong-Jun Choi**	School of Environmental Engineering

Bio Big Data

19	**Rakwoo Chang**	Department of Applied Chemistry
20	**Changyi Park**	Department of Statistics
21	**Joungyoun Kim**	Department of Artificial Intelligence
22	**Hyelim Son**	School of Economics
23	**Dong-Sung Lee**	Department of Life Science
24	**Seungill Kim**	Department of Plant Science

Bio Device

25	**Dong-Wook Park**	School of Electrical and Computer Engineering
26	**Hyeok Kim**	School of Electrical and Computer Engineering

Public Health

27	**Sangshin Park**	Graduate School of Urban Public Health
28	**Dong Hwa Kang**	Department of Architectural Engineering

Hyunsung Park (박현성 교수)

Department Department of Life Science
Lab Molecular Cellular Physiology Laboratory
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Research Epigenetics
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Key Words

Hypoxia, Cellular Senescence and Histone Demethylases, Hypoxia, Adipogenesis, and Lipid Metabolism, Inhibitors of Oxygen-Dependent Dioxygenases, Signals Regulating HIF-1α and Oxygen-Dependent Dioxygenases

Areas of Research

Our dedicated efforts to uncover the connections between hypoxia, cellular senescence, and histone demethylases have revealed a complex web of interactions that hold significant importance. By studying these detailed mechanisms, we aim to better understand how cells react to changes in oxygen levels. This could potentially lead us to discover new ways to develop innovative treatments.
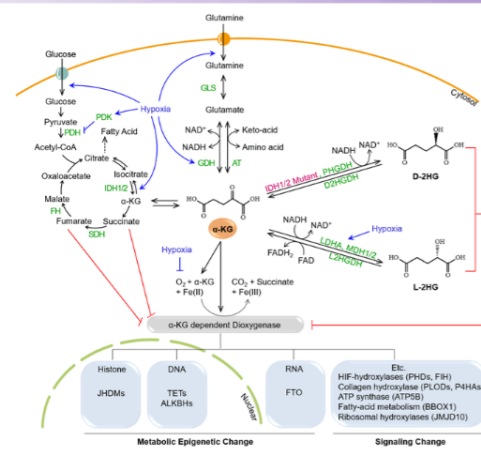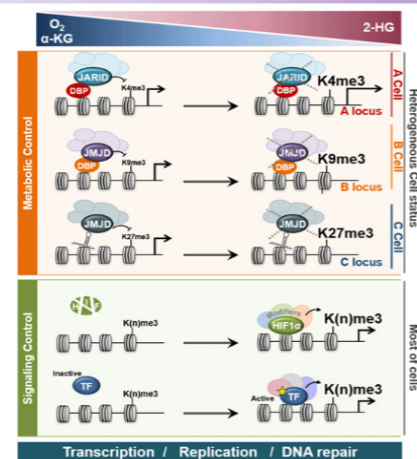
Recent Publications & Projects

- Cell Death & Diseases, "YAP-dependent Wnt5a induction in hypertrophic adipocytes restrains adiposity" (2022)
- Experimental And Molecular Medicine, "The Cancer driver genes, IDH1/2, JARID1C/ KDM5C, and UTX/ KDM6A: Crosstalk between histone demethylation and hypoxic reprogramming in cancer metabolism" (2019)
- Nucleic Acids Research, "Multi-dimensional histone methylations for coordinated regulation of gene expression under hypoxia" (2017)
- 과기부, "저산소에 의한 미토콘드리아 DNA의 후성유전적 조절기전 연구" (2023~2027)
- 과기부, 기초연구실, "세포의 경험이 기록된 히스톤 코드의 새로운 해석" (2018~2021)

Honors & Awards

- 과학기술진흥유공자 (장관표창), 과학기술정보통신부 (2020, 2009)
- 생명약학연구회 학술상 (2020)
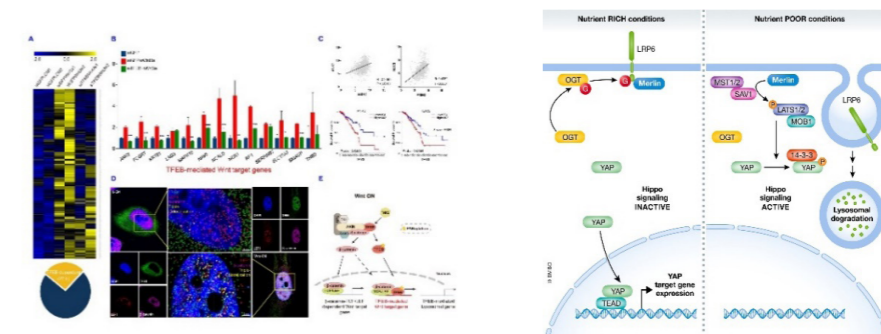- 한국로레알유네스코 여성과학자상 학술진흥상 (2023)

Eek-Hoon Jho (조익훈 교수)

Department Department of Life Science
Lab Cellular Signal Transduction Laboratory
Ph.D. Michigan State University, 1995
Research Cellular Signal Transduction
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Homepage lifesci.uos.ac.kr/cstl

Key Words

Wnt signaling, Hippo signaling, Cancer, Stem cells, Alzheimer's diseases, Neurodegeneration, Development

Areas of Research

In our lab, we focus on elucidating the mechanisms behind how Wnt and Hippo signaling pathways are regulated to discover therapeutic targets of the diseases caused by abnormal regulation of these pathways. Wnt and Hippo signaling pathways were first studied as factors that take part in cancer development, early development of the body, or as a mechanism regulating organ size. Nowadays, as it was also found to have connections with apoptosis, NF-κB signaling, synaptogenesis, embryonic stem cell maintenance/differentiation, as well as Alzheimer's disease, the fields of Wnt/Hippo signaling pathway are being studied with utmost attention around the world. We conduct experiments not only to clarify the regulatory mechanisms of Wnt and Hippo signaling pathways but also to broaden our view on involvement of these pathways to cancer development, regulation of embryonic stemness/ differentiation, and Alzheimer's disease, using molecular biological techniques, mouse embryonic stem cells, primary neural cultures, organoids and transgenic mice etc.


<Identification of noble signal transduction of Wnt signaling by TFEB (left), Studying cross-talks with Wnt and Hippo signaling and providing therapeutic targets (right)>

Recent Publications & Projects

- Cell Death & Differentiation, "PARsylated transcription factor EB (TFEB) regulates the expression of a subset of Wnt target genes by forming a complex with β-catenin-TCF/LEF1." (2021)
- PNAS, "MAML1/2 promote YAP/TAZ nuclear localization to enhance tumorigenesis." (2020)
- EMBO Reports, " LDL receptor-related protein LRP6 senses the level of nutrient and regulates Hippo signaling." (2020)
- 과기부 중견과제 (유형 2, 후속), "Wnt와 Hippo 신호전달을 조절하는 새로운 인자들의 기능연구" (~2026)
- 복지부 치매극복연구개발사업단, "알츠하이머 치매의 진행 단계에 따른 신규 발병기전의 발굴 및 분석" (~2024)

Honors & Awards

- 건강한 연구실 선정 (과기정통부 장관상, 2022)
- 서울시립대 국가연구개발사업 우수연구자 포상 (2022)
- 한국분자세포생물학회 Rose Lecture Award 수상 (2019)
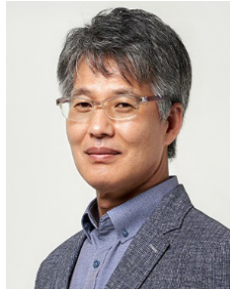
Yun-Doo Chung (정연두 교수)

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Lab Laboratory of Neuroscience
Ph.D. Seoul National University, 1998
Research Neurobiology
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Key Words

Molecular mechanisms underlying Drosophila auditory transduction, The role of THO in eukaryotic gene regulation

Areas of Research

Drosophila auditory system The auditory transduction machinery requires sophisticated molecular structures to convert mechanical forces to membrane receptor potentials. This structure includes the core transduction ion channels and intra- and extra-cellular connecting apparatuses. In Drosophila, two TRP channels, TRPV and TRPN, play critical roles on auditory transduction and amplification. Interestingly the two TRP channels segregate into distinct sub-ciliary compartments in the auditory sensory neuron called chordotonal neuron whose denritic outer segment constitutes ciliary structure. Another protein, NompA, constitutes the extracellular apparatus called dendrite cap which directly contacts with the tip of chordotonal cilia. Thus, trafficking of these proteins into the precise subcellular compartments are essential for their function. In our laboratory, we are searching for the specific mechanisms underlying trafficking and targeting of these proteins

<Drosophila auditory system(left), The THO complex in eukaryotic gene regulation(right)>
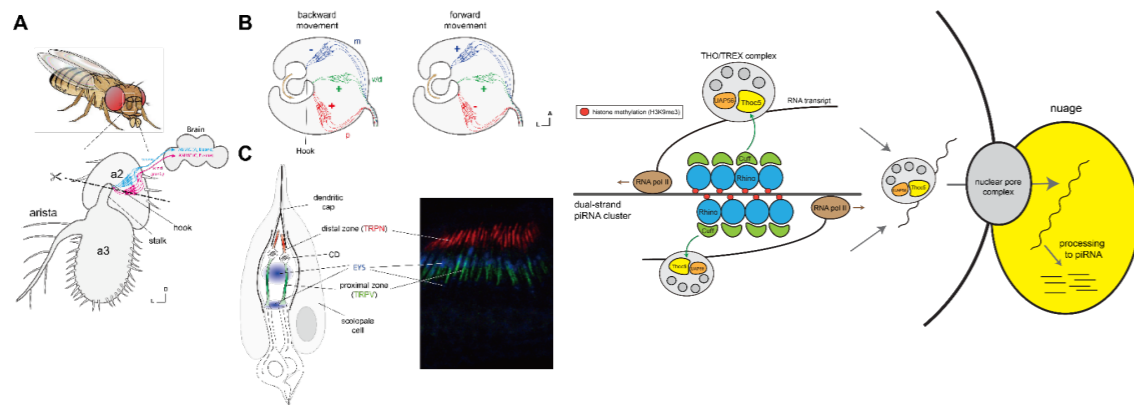
Recent Publications & Projects

- Genes & Development, "Splicing-independent loading of TREX on nascent RNA is required for efficient expression of dual-strand piRNA clusters in Drosophila" (2016)
- Mol Cells, "Sub-Ciliary Segregation of Two Drosophila Transient Receptor Potential Channels Begins at the Initial Stage of Their Pre-Ciliary Trafficking" (2020)
- 교육부, "염색질구조 재구성을 통한 유전자발현 조절에서 초파리 THO의 역할 연구" (~2024)

Jung-Woo Choe (최정우 교수)

Department Department of Life Science
Lab Structural Biology Laboratory
Ph.D. University of Washington, 2003
Research Structural biology
**E-mail** jchoe21@uos.ac.kr
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Key Words

Determining protein and protein complexes including protein/nucleic acid, protein/small molcole complexes

Areas of Research

In our research laboratory, we are utilizing X-ray crystallography to elucidate the three-dimensional structures of proteins. Using this technique, we aim to comprehend the enzymatic mechanisms, ligand recognition methods of receptor proteins, and the principles underlying the interactions of signaling proteins, from both physical and chemical perspectives

- Proteins involved in human innate immune responses and signaling (ex. Toll-like receptors (TLRs), Adaptor proteins for TLR signaling (MyD88, TRAM, TIRAP, TRIF), RIG-I, MDA5 and ZAP)
- Mechanism of viral evasion of innate immune systems (ex. HCV NS5A and Vaccinia virus A46)
- Bacterial proteins in diverse function (ex. Elongation factor P from Pseudomonas aeruginosa, Pseudomonas aeruginosa PA2196, TetR family transcriptional repressor, Bacillus subtilis HmoB, a heme oxygenase)
- Crystallization using gold nanoparticles by inducing crystal nucleation (ex.Use of gold nano particles coated with NTA group for crystallization of his-tagged proteins)
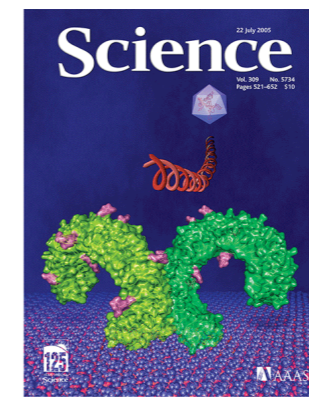
Innate immunity
Toll-like receptor 3
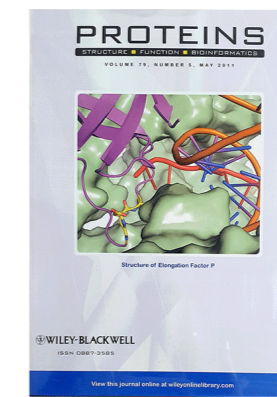
Bacterial Proteins
Elongation factor P
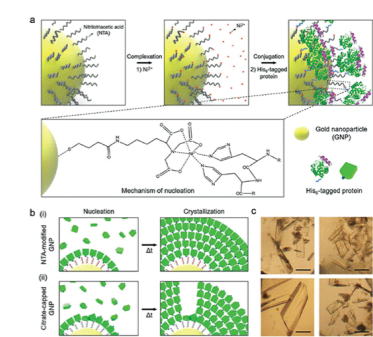
Crystallization
Gold nanoparticle induced crystals

<Structural Biology Laboratory Research Area>

Recent Publications & Projects

- iScience, "Clioquinol as an inhibitor of JmjC-histone demethylase exhibits common and unique histone methylome and transcriptome between clioquinol and hypoxia" (2022)
- Crystals " Structural and Biochemical Studies of Bacillus subtilis MobB" (2021)
- 과기부, "항바이러스 작용과 인터페론의 mRNA를 조절하는 두 가지 기능을 가진 ZAP 단백질의 생화학적 및 구조적 연구" (~2024)

Kwon-Yul Ryu (유권열 교수)

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Ph.D. The Ohio State University, 2001
Research Cell Biology
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Homepage lifesci.uos.ac.kr/cellbio

Key Words

Neurodegenerative diseases, Reactive astrogliosis, Ubiquitin-proteasome system, Autophagy-lysosome pathway

Areas of Research

The cell biology laboratory aims to understand the maintenance and disruption of neuronal integrity, as well as the occurrence of neuronal loss during aging. In light of the deterioration of cellular quality control systems, such as the ubiquitin-proteasome system and autophagy-lysosome pathway, during aging, our particular focus lies on these two pathways. The objective is to identify preventive measures against neuronal loss, a phenomenon observed in various neurodegenerative diseases, including Alzheimer's and Parkinson's diseases. To address these inquiries, our laboratory employs genetic, biochemical, cell biological, and organismal approaches. With expertise in working with mouse models and primary cells derived from them, we conduct research with the following keywords: (1) neurodegenerative diseases, (2) reactive astrogliosis, (3) ubiquitin-proteasome system, and (4) autophagy-lysosome pathway

<Cell Biology Laboratory Research Area>
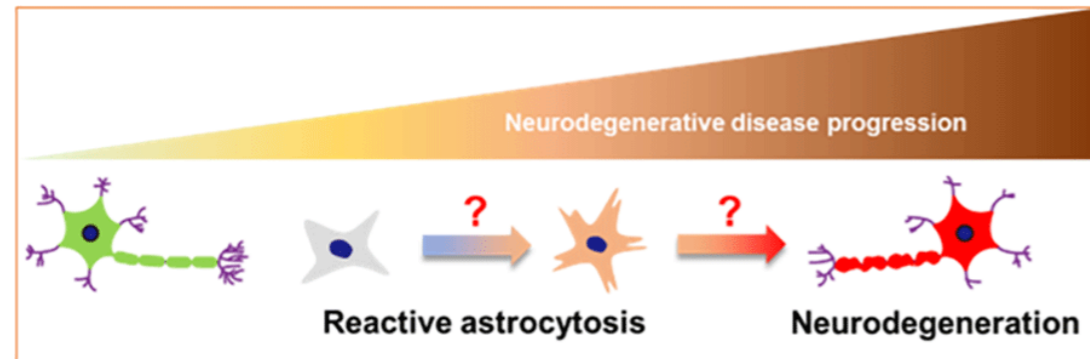
Recent Publications & Projects

- Experimental & Molecular Medicine, "Lipocalin-2: a therapeutic target to overcome neurodegenerative diseases by regulating reactive astrogliosis" (2023)
- Autophagy, "Reduced secretion of LCN2 (lipocalin 2) from reactive astrocytes through autophagic and proteasomal regulation alleviates inflammatory stress and neuronal damage" (2023)
- Journal of Hazardous Materials, " Increased clearance of non-biodegradable polystyrene nanoplastics by exocytosis through inhibition of retrograde intracellular transport" (2022)
- 과기부, "성상세포 분비단백질 리포칼린-2 레벨 조절 및 성상세포 활성화 유형 변화를 통한 신경세포 생존력 강화 모델 구축" (~2028)

Honors & Awards

- 한국인 과학자들이 발표한 생명과학 관련 우수 논문(IF 10 이상의 학술지에 게재) 선정 (2022년 1건, 2023년 2건)

Jung-Hyun Lee (이정현 교수)

Department Department of Life Science
Lab Viral Immunology Laboratory
Ph.D. Friedrich-Alexander-University Erlangen-Nürnberg, 2014
Research Virus-Host interactions, Extracellular Vesicles
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**Homepage** llifesci.uos.ac.kr/jhlab_vil

Key Words

Virus infection, Extracellular vesicles, Immune sensors, Immune responses, Neurodegenerative disease (AD)

Areas of Research

The interplay between a viral pathogen and its host organism involves a myriad of intricate molecular and cellular processes that govern viral entry, replication, immune evasion, and host immune activation. Understanding the underlying mechanisms driving these interactions is paramount for advancing our knowledge of virology and developing effective strategies to combat viral infections.

- Investigating the intricate roles of extracellular vesicles in viral infection and shedding light on their involvement in viral dissemination, immune regulation, and disease progression
- Identifying and characterizing key host factors that restrict viral replication
- Identifying viral strategies to manipulate host cellular system to evade immune surveillance

<Viral Immunology Laboratory Research Area>
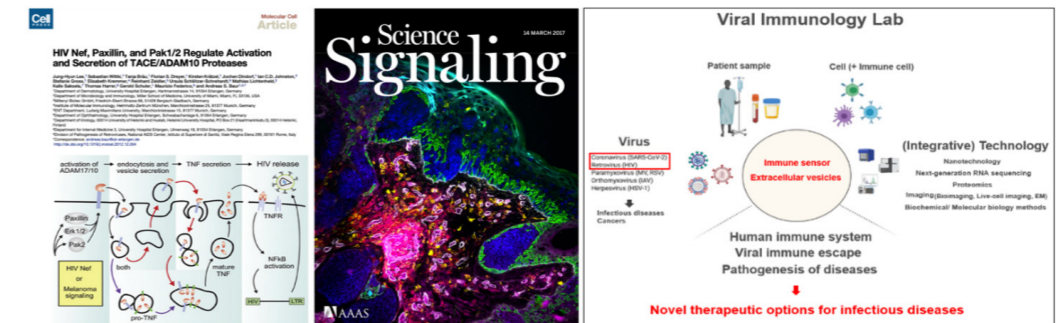
Recent Publications & Projects

- Science Immunology, "GTF3A mutations predispose to herpes simplex encephalitis by disrupting biogenesis of the host-derived RIG-I ligand RNA5SP141" (2022)
- EBioMedicine, "Alzheimer's disease protease-containing plasma extracellular vesicles transfer to the hippocampus via the choroid plexus" (2022)
- Nature Microbiology, "ISG15-dependent activation of the sensor MDA5 is antagonized by the SARS-CoV-2 papain-like protease to evade host innate immunity" (2021)
- 과기부, "Horizon Europe 사업 지원을 위한 한-EU HIV 공동협력 추진 연구" (~2024)

Honors & Awards

- Women Professors III Award, Baden-Württemberg, Germany (2022)
- IZKF Award, Germany (2018)
- GRK 1660 Scholarship, Harvard Medical School and FAU, USA & Germany (2013)

Hongik Hwang (황홍익 교수)

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Lab Neurophysiology Laboratory
Ph.D. Massachusetts Institute of Technology (MIT), 2016
Research Neurophysiology
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Key Words

Neurobiology, Neurophysiology, Electrophysiology, Synaptic plasticity, Molecular psychiatry

Areas of Research

A neuron (brain cell) communicates with neighboring neurons by releasing neurotransmitters at specialized contact sites, called synapses, and such synaptic transmission plays a major role in delivering information from one neuron to another and also integrating signals at a neuronal network level. Interestingly, the efficiency of synaptic transmission constantly changes depending on the history of neuronal activation, and in this sense, the connection strength between neurons is considered "plastic". This phenomena is known as synaptic plasticity, which is widely accepted as a cellular basis of learning and memory formation in the brain. Synapse is an extremely small cellular compartment, but is heavily loaded with a number of different proteins. A myriad of synaptic proteins must work in a cooperative manner to maintain brain functions, and a mutation or single-nucleotide polymorphism in synaptic proteins is commonly associated with neurological disorders. Several genome-wide association studies (GWAS) identified a calmodulin-binding protein, neurogranin, as a risk factor of schizophrenia as well as autism-spectrum disorder, but the molecular mechanism by which neurogranin regulates synaptic transmission and plasticity is largely unknown. Through the synergistic combination of electrophysiology and quantitative proteomics, our group investigate how schizophrenia risk genes, such as neurogranin, modulate synaptic plasticity and animal behaviors at the molecular level.

Recent Publications & Projects

- Mol Psychiatry, "Cyclin Y regulates spatial learning and memory flexibility through distinct control of the actin pathway" (2023)
- Prog Neurobiol, "Myristoylation-dependent palmitoylation of cyclin Y modulates long-term potentiation and spatial learning" (2022)
- Biol Psychiatry, "Neurogranin, encoded by the schizophrenia risk gene NRGN, bidirectionally modulates synaptic plasticity via calmodulin-dependent regulation of the neuronal phosphoproteome" (2021)
- Prog Neurobiol, "Cyclin Y, a novel actin-binding protein, regulates spine plasticity through the cofilin-actin pathway" (2021)
- 과기부, "인지유연성에 대한 통합적 연구: 동물행동학, 뇌신경생물학, 단백질체학 및 생물정보학적 접근" (~2026)

Honors & Awards

- Best Presentation Award, KSBNS (2021)
- Best Presentation Award, KSBNS (2020)
- Korea Foundation for Advanced Studies Fellowship, KFAS (2014)
- Henry E. Singleton Graduate Fellowship, MIT (2012)

Jiyeon Han (한지연 교수)

Department Department of Applied Chemistry
Lab Bioinorganic Chemistry Laboratory
Ph.D. Korea Advanced Institute of Science & Technology, 2022
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Homepage sites.google.com/view/jiyeonhan

Key Words

Transition metal ions, neurodegenerative diseases, amyloidogenic proteins, small molecule-based chemical tools

Areas of Research

Elucidation of Functional Amyloids under Metal Ion Dyshomeostasis
- We are studying the role of metal ions in aggregation kinetics of functional amyloids under conditions of metal ion dyshomeostasis.

Development of Chemosensors against Intracellular Metal Pools
- We aim to elucidate the role of intracellular copper ions in signal transduction and oxidative metabolism. In order to distinguish between different oxidation states of redox-active copper ions, we are developing reactivity-based chemosensors attributed to copper–sulfur chemistry.
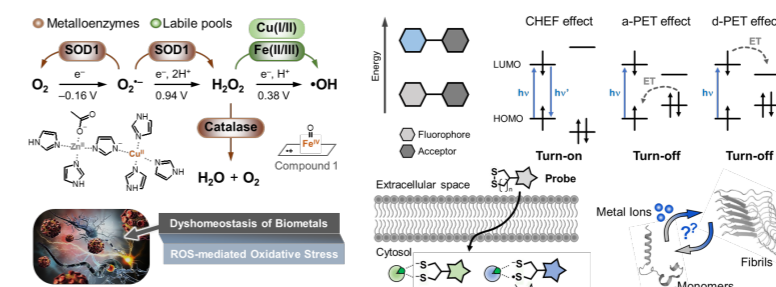
Our laboratory uses multiple experimental techniques including organic/inorganic syntheses, protein analysis, mass spectrometric studies, confocal microscopy, transmission electron microscopy, spectroscopic studies, electrochemical studies, mammalian cell culture, and biochemical assays.

Recent Publications & Projects

- Nat. Chem., "Conformational and Functional Changes of the Native Neuropeptide Somatostatin Occur in the Presence of Copper and Amyloid-β" (2022)
- Acc. Chem. Res., "Mechanistic Insight into the Design of Chemical Tools to Control Multiple Pathogenic Features in Alzheimer's Disease" (2021)
- Proc. Natl. Acad. Sci. U. S. A. "Mechanistic Approaches for Chemically Modifying the Coordination Sphere of Copper–Amyloid-β Complexes" (2020)
- 과기부, "싸이올 반응성에 기반한 세포 내 구리(I/II) 동시 표적 센서 개발" (~2024)

Honors & Awards

- 한국여성과학기술단체총연합회 연차대회 미래인재상 (2022)
- 대한화학회 우수박사학위논문상 (2022) & 한국과학기술한림원/에쓰–오일 우수학위논문상 (2022)
- Global Ph.D. Fellowship, National Research Foundation of Korea (2019~2022)
- Poster prize & flash poster presentation, ICBIC-19, Interlaken, Switzerland (2018)
- Ulsan City Mayor's Award (2017)

Ha-Jin Yu (유하진 교수)

Department School of Computer Science
Lab Intelligent Robot Laboratory
Ph.D. Korea Advanced Institute of Science & Technology, 1997
Research AI, Speech & Audio Processing
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Homepage speech.uos.ac.kr

Key Words

AI, Speech, Voice, Speaker, Audio signal processing

Areas of Research

We analyze speech and audio signals using deep learning models to perform many tasks that humans can do with their ears. These include speech and speaker recognition, deep (fake) voice detection, disease detection, sound event detection, acoustic scene classification, music information retrieval, and so on. We are improving the algorithms to cope with real-world situations such as noisy environments and short duration data.
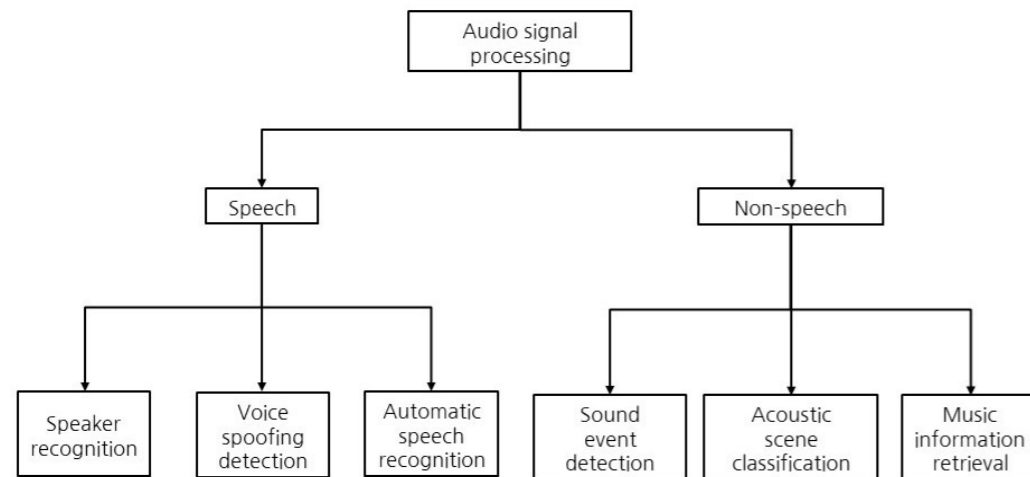
Recent Publications & Projects

- IJCAI, "SS-BSN: Attentive Blind-Spot Network for Self-Supervised Denoising with Nonlocal Self-Similarity" (2023)
- Interspeech "One-Step Knowledge Distillation and Fine-Tuning in Using Large Pre-Trained Self-Supervised Learning Models for Speaker Verification" (2023)
- Applied Sciences, "Self-Supervised Noise Reduction in Low-Dose Cone Beam Computed Tomography (CBCT) Using the Randomly Dropped Projection Strategy" (2022)
- IEEE Access, "Knowledge Distillation in Acoustic Scene Classification" (2020)
- 과기부, "적대적 공격에 강인한 AI기반 위변조 음성 탐지시스템 개발" (~2025)
- ㈜케이티, "2023년 화자 인증/분류 음성 스푸핑 탐지 기능 개발" (~2024)

Honors & Awards

- 특허출원 (미국) "Apparatus and Method for Determining Brain Language Area Invasion Based on Speech Data" (2024)

Moon-Que Lee (이문규 교수)

Department School of Electrical and Computer Engineering
Lab Intelligent RF energy center
Ph.D. Seoul National University, 1999
Research RF Circuit and System
E-mail mqlee@uos.ac.kr
Homepage cafe.naver.com/mwm

Key Words

RF/Microwave energy applications (plasma, heating, and wireless power transfer), RF System Design, RF/mmWave Circuit and System Design, Satellite RF/Microwave payload design

Areas of Research

- RF/Microwave heating system design (RF source, applicator, sensor)
- RF/Microwave generator and V/I sensor for plasma generation
- RF active and passive components design (e.g., Switching-mode power amplifier, auto-matcher, RF/microwave IC, Ceramic Filter/Duplexer, etc.)
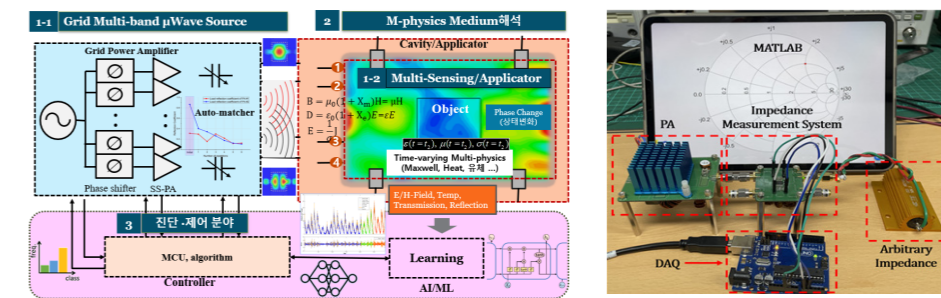
Recent Publications & Projects

- IEEE Access, "High Power Microwave Signal Generation Based on Recursive Balanced Power Amplifier" (2023)
- International Journal of RF and Microwave Computer-Aided Engineering, "Wide E-Plane Beamwidth Microstrip Patch Antenna Using H-Shaped Gap-Coupling with Three Parasitic Patches for the K-Band" (2023)
- 과기부, "ISM 응용을 위한 지능형 마이크로파 에너지 시스템 핵심·원천 기술 개발" (~2030)
- 과기부, "전자기파를 활용한 알츠하이머 치료 기술 연구" (~2025)
- 과기부, "다중 무선 충전을 위한 근역 자기장 성형 기술 개발" (~2025)
- 과기부, "차세대 위성 핵심기술 개발" (~2024)

Honors & Awards

- [수상] The 14th Global Symposium on Millimeter-Waves & Terahertz (GSMM) Best Paper Awards (2022), 제7회 전자파측정 논문경진대회 (2022), 제33차 한국전자파학회 정기총회 및 추계학술대회 학술상 수상 (2021), IEEE RFID conference Best-paper award (2013)
- [표창] 장관표창 (2021)−주파수업무−면허/비면허 (2021), 전파산업활성화 (2015), 서울지방중소벤처기업청장상 (2022)
- [기술이전] 선택적 전력 분배 기능을 갖는 전력 분배기 (2021), 근접장 응용을 위한 RFID 신호 처리 장치 (2020), Ceramic Filter/Duplexer (2023)
- 국가주파수심의위원, 비면허 실무위원회 위원, 국과심 ICT융합전문위원 등

Hyuk Choi (최혁 교수)

Department School of Computer Science
Lab Information Security Lab.
Ph.D. Seoul National University, 2002
Research Senior(Elderly) care using ICT technology
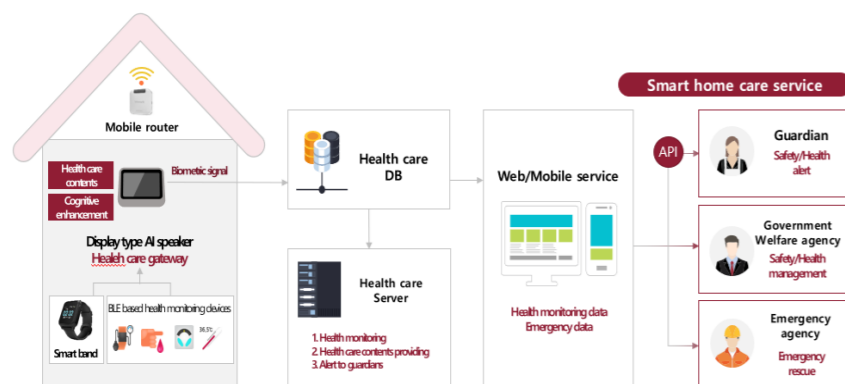**E-mail** chyuk@uos.ac.kr
Homepage www.marknova.co.kr

Key Words

Senior care using ICT technology, digital biomarker and health care service, AI and wearable device development

Areas of Research

Senior care (digital health care) service using ICT technology

- Smart home care service, community health care, AI care device based digital caregiving

AI and wearable device development

- Digital biomarker and health care service, location tracking and emergency alert service

Recent Publications & Projects

- 과기정통부, "시니어 심뇌혈관 질환과 치매 예측을 위한 디지털 마커 및 지능형 엣지 디바이스 개발" (2022~2026)
- 산자부, "중장년층의 근감소증 예방을 위한 개인 맞춤형 운동 디바이스 및 서비스 개발" (2020~2022)
- 산자부, "커뮤니티 헬스케어 서비스 디자인 기반 IoMT 연동 유니버셜 홈케어 제품 및 시스템 개발" (2020~2022)
- 보복부, "웨어러블 디바이스를 이용한 실내외 위치추적 기반 치매환자 돌봄서비스 구축 및 실증사업" (2019~2021)
- 산자부, "의료용 조영제를 활용한 의료수술현장용 투시형 증강현실 기기 개발 및 상용화 기술 개발" (2018~2021)

Honors & Awards

- [표창] 대통령표창 (2011)

Jong Bum Lee (이종범 교수)

Department Department of Chemical Engineering
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Ph.D. Cornell University, 2007
Research Drug Delivery, Biosensing, Biomaterials
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Key Words

DNA & RNA Nanotechnology, Drug Delivery, Molecular Sensing

Areas of Research

Development of Nucleic Acid-based Drug Delivery Systems

- Our research group is focusing on the potential of drug delivery research areas described above. Our researchers are working on controlling the metabolism of cells using our technology based on nucleic acid engineering

Development of Nucleic Acid-based biosensing Systems

- Our research group is focused on the potential of biosensing research areas described above. Our researchers are working on building a biosensing system based on nucleic acid using the biocompatibility and programmable properties of the nucleic acid and the specific binding properties typified by the aptamer

Fabrication of Multiscale/Multifunctional Nucleic Acid-based Structures

- Our research group is focused on the potential of biocompatability of nucleic acid-based materials. Our researchers are working on building a biomaterials based on nucleic acid using the biocompatibility and programmable properties of the nucleic acid

\<Drug Delivery(left), Biosensing(center), Biomaterials(right)\>
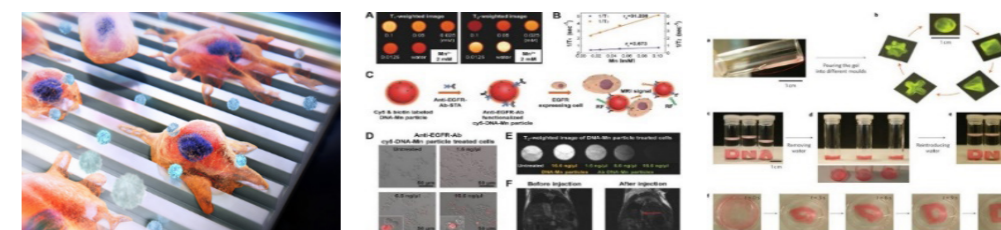
Recent Publications & Projects

- iScience, "Self-assembly of a multimeric genomic hydrogel via multi-primed chain reaction of dual single-stranded circular plasmids for cell-free protein production" (2023)
- Chemical Engineering Journal, "Module-assembly of injectable cellular DNA hydrogel via clickable cells and DNA scaffolds" (2022)
- Nano Letters, "Rapid Diagnosis of Coronavirus by RNA-Directed RNA Transcription Using an Engineered RNA-based Platform" (2021)
- 과기부, "유전성 췌장염 예방을 위한 가이드 RNA 나노입자−마이크로버블 복합체를 통한 초음파 감응형 유전자 편집 전달체 기술 개발" (~2027)
- 과기부, "Small RNA 기반 스트레스과립체 항상성 조절을 통한 뇌단백병증 제어기술 개발" (~2027)
- 과기부, "RdRP탐지기술기반의 다변이 알엔에이 바이러스 감염 신속 진단 플랫폼 개발" (~2024)

Honors & Awards

- 생체물질(DNA) 이용한 고성능 전기변색소자 개발, 미국 화학회 재료·화학 분야 국제학술지 ACS NANO 온라인 게재 (2022)
- 스마트폰으로 확인할 수 있는 신개념 코로나바이러스 진단 키트 개발, 화학 및 분석 분야 국제 학술지 Biosensors and Bioelectronics 온라인 게재 (2021)

Inhee Choi (최인희 교수)

Department Department of Life Science
Lab Nano Bio Interface Laboratory
Ph.D. Seoul National University, 2009
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**Homepage** lifesci.uos.ac.kr/nanobio

Key Words

Nanobiotechnology, Biosensor, Bioimaing, Immediate diagnosis, Drug delivery

Areas of Research

We are pursuing to develop new emerging technologies bridging the Nanoscience to Bioscience. In our lab, notable approaches for fabricating new types of functional nanomaterials and their versatile applications to biological sensing, imaging, and molecular delivery would be conducted

- First, we aim to develop simple and robust fabrication strategies of functional nanostructures, which can be easily followed by non-expert researchers, and demonstrate their versatile applications to optical signal enhancements for early diagnosis of diseases and ubiquitous biological monitoring
- Second, we aim to explore cellular behaviors from signal cellular levels to multicellular organ levels through the functional nanoprobes with high-sensitivity and high-spatial resolution for revealing the biological mechanisms
- Lastly, we aim to deliver biologics (ex., drugs, genes, and etc.) in controlled and targeted manners using functional nanocarriers with biocompatibility, biodegradability, stimuli-responsivity, and target-selectivity for precision and personalized medicine

<Nano Bio Interface Laboratory Research Area>
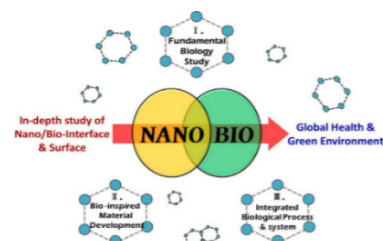
Recent Publications & Projects

- Advanced Science, Alveoli-like Multifunctional Scaffolds for Optical and Electrochemical in-situ Monitoring of Cellular Responses from Type Ⅱ Pneumocytes" (2023)
- Advanced Materials, "Metasurfaces-driven Hyperspectral Imaging via Multiplexed Plasmonic Resonance Energy Transfer" (2023)
- Small, "Colloidal Multiscale Assembly via Photothermally-driven Convective Flow for Sensitive In-solution Plasmonic Detections" (2022)
- Nano Letters, Quantum Electrodynamic Behavior of Chlorophyll in Plasmonic Nanocavity" (2022)
- Nature Communications, "High-Spatial and Colourimetric Imaging of Histone Modifications in Single Senescent Cells Using Plasmonic Nanoprobes" (2021)
- 과기부, "다기능성 플라즈몬 나노프로브를 이용한 싱글 세포 센싱, 이미징, 조절 및 3차원 세포배양 모델로의 확장 응용" (~2028)

Honors & Awards

- WBF-코스맥스 여성과학 약진상 (2018)/한국바이오칩학회 신인 학술상 (2017)
- Advanced Materials, Advanced Science, Small, ACS Nano등 다수의 논문에 커버 게재

Jinhee Choi (최진희 교수)

Department School of Environmental Engineering
Lab Environmental Systems Toxicology Lab.
Ph.D. University of Paris-Sud (XI), France, 1998
Research Environmental Toxicology
E-mail jinhchoi@uos.ac.kr
Homepage est.uos.ac.kr(Environmental Systems Toxicology Lab), uoschemdsrc.creatorlink.net(Chemical Big data AI Research Center)
LinkedIn linkedin.com/in/jinhee-choi-0aa2b43b

Key Words

Environmental Toxicology, Molecular Toxicology, Adverse Outcome Pathway, Toxicity Prediction, Next-Generation Risk Assessment, Safe-by-Design

Areas of Research

Our lab leads in developing Adverse Outcome Pathways (AOPs) of chemicals by integrating literature and toxicity big data. Through AOP, we advance AI-driven toxicity predictions and develop a smart chemical management system with Next-Generation Risk Assessment (NGRA) based on new approach methodologies. Our focus extends to Safe-and-Sustainable-by-Design (SSbD) for the development of safer materials at the research and development stage, by analyzing toxicity mechanisms based on physicochemical properties.

<AOP-based AI toxicity prediction for NGRA and SSbD>
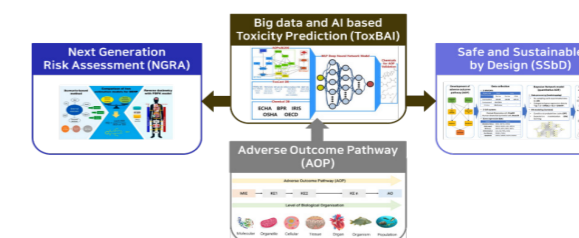
Recent Publications & Projects

- AOP: Chemical Research in Toxicology, "Integrative data mining approach: Case study with adverse outcome pathway network leading to pulmonary fibrosis" (2023)
- ToxBAI: Environmental Science & Technology, "Artificial intelligence-based toxicity prediction of environmental chemicals: future directions for chemical management applications" (2022)
- ToxBAI: Environment International, "Identification of toxicity pathway of diesel particulate matter using AOP of PPARγ inactivation leading to pulmonary fibrosis" (2021)
- SbD: Environmental Science: Nano, "Toxicity assessment of nano-sized MAX phases: considerations for safe-by-design approaches" (2024)
- 환경부(한국환경산업기술원/생활화학제품 함유 혼합물 유해성평가 기술개발사업), "생활화학제품 함유 혼합물 대상 인체 복합 유해성 평가용 AOP 기반 통합 시험평가 접근법 (ITS/IATA)" (2023~2027)
- 환경부(한국환경산업기술원/환경성질환 예방관리 핵심 기술개발사업), "분자독성 네트워크 기반 환경성질환 예측모델 개발" (2021~2025)
- 과기부(한국연구재단 중견연구자지원사업), "화학물질의 독성발현 경로에서 후생유전 역할규명" (2020~2025)

Honors & Awards

- Clarivate Analytics, Highly Cited Researcher HCR) (2015, 2016, 2017)
- 미래창조과학부, 올해의 여성과학기술자상 (2016)
- 환경부, 장관표창 (2016), 2022년 환경기술개발 우수성과 20선 (2022)
- 식약처, 연구개발사업 우수기획 유공자 (2023)
- 서울시립대학교, 강의우수교수상 (2014, 2016, 2018, 2019, 2021)

Byung Eun Park (박병은 교수)

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Lab Memory Device Laboratory
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Key Words

Ferroelectric Memory Device, Paper Device, Dementia, Biosensor, Piezo materials, Solar cell, Ontology, Aesthetics

Areas of Research

- Ferroelectric-Gate Field Effect Transistor Memories
- Non-volatile Paper Memory Devices
- Vibration device installed in subarachnoid space
- Amyloid beta(Aβ) plaque removal apparatus

<Non-volatile Paper Memory Device(left), Amyloid beta(Aβ) plaque removal apparatus(center), Vibration device installed in subarachnoid space(right)>
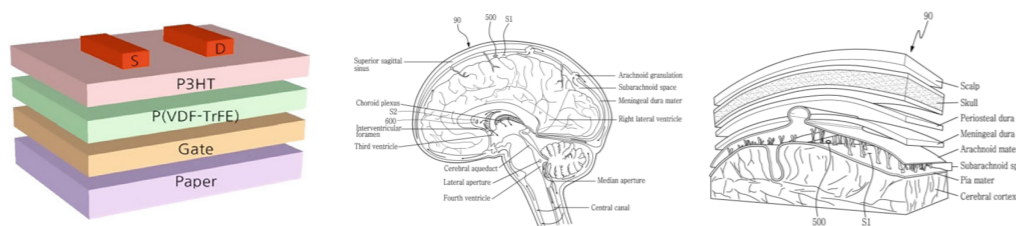
Recent Publications & Projects

- Springer, "Ferroelectric-Gate Field Effect Transistor Memories -Device Physics and Applications- 2nd Edition" (2020)
- Springer, "Ferroelectric-Gate Field Effect Transistor Memories -Device Physics and Applications" (2016)
- 충남산학융합원, "태양광 발전시스템 운영" (2022)
- 충남산학융합원, "태양광 발전시스템 시공 및 유지보수" (2021)
- 충남산학융합원, "태양광 발전시스템의 이해" (2021)

Honors & Awards

- [미국, 일본, 한국 특허등록] 세계최초로 유기압전소재 PVDF(Polyvinylidene fluoride)를 열처리 공법으로 박막형성
- [한국 특허등록] 세계최초로 종이를 기판으로 이용한 유기물 비휘발성 강유전체 메모리소자 (Paper Ferroelectric Memory Device) 제작
- [한국특허 출원중] 세계최초로 외과적 수술방법으로 치매 치료방법 제시
- 약 350여 건 이상의 국내·외 특허출원 및 등록 (PCT 포함) (반도체메모리소자, 바이오, 태양전지, 센서, 압전소재, 방음(층간소음), 건축자재 등)
- [기술이전] 층간소음 (2014), 건축자재 2건 (2023)
- [수상] 서울시립대학교 강의우수교수상 (2015, 2020)
- [수상] 서울시립대학교 연구최우수교수상 (2008, 2010), 연구우수교수상 (2005, 2006)
- [수상] 한국도로학회 가을학술대회 우수논문상 수상 (2021), 안개저감장치

Hyunggu Jung (정형구 교수)

Department School of Computer Science
Lab Human-Centered Artificial Intelligence Lab
Ph.D. University of Washington School of Medicine, 2017
Research Artificial Intelligence, Health Informatics, Human-Computer Interaction
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Homepage hcail.uos.ac.kr

Key Words

Artificial Intelligence, Health Informatics, Human-Computer Interaction, Social Computing, Accessibility & Aging

Areas of Research
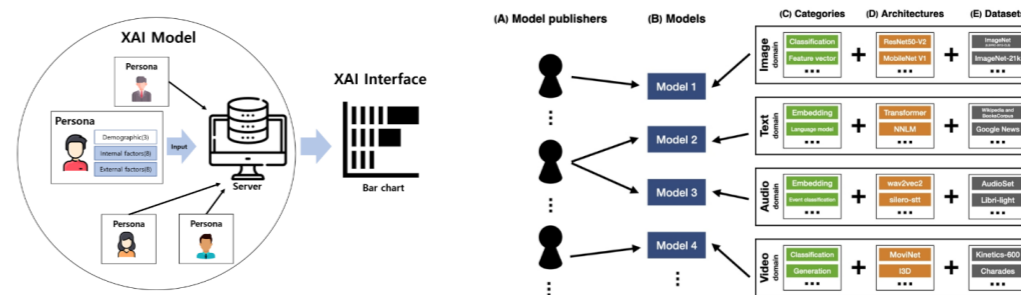
Artificial Intelligence
- Generative AI, human-in-the-loop systems, fairness-based models, responsible AI, explainable AI
Health Informatics
- mHealth, clinical informatics, consumer health informatics, clinical research informatics
Human-Computer Interaction
- Accessibility & aging, social computing, extended reality including VR, AR, & XR

<Left: Example of an explainable AI framework. Right: The overview of the relationship between (A) model publishers and (B) models on TensorFlow Hub>

Recent Publications & Projects

- IEEE Access, "SUV: Students' Understanding Visualizer to Support Instructors in Synchronous Online Lectures" (2023)
- Heliyon, "Essential Properties and Explanation Effectiveness of Explainable Artificial Intelligence in Healthcare: A Systematic Review" (2023)
- IEEE Access, "Development of Korean Food Image Classification Model Using Public Food Image Dataset and Deep Learning Methods" (2022)
- 한국연구재단, "노인 당뇨병 환자용 디지털 치료제를 위한 인공지능 기반 영양평가 시스템 개발" (2020~2023)

Honors & Awards

- HCI 2024 학술대회 우수논문상(구두) (2024)
- 2023 대한지역사회영양학회 추계학술대회 우수 신진과학자 성과 발표 우수상 (2023)
- Korean-American Scientists and Engineers Association (KSEA) & Korea-U.S. Science Cooperation Center (KUSCO) Scholarship (2015)
- The Korean Computer Scientists and Engineers Association Scholarship (2014)
- 국비유학장학금 (2012-2014)

Myun Joong Hwang (황면중 교수)

Department   Department of Mechanical and Information Engineering
Lab   UOS Robotics Lab
Ph.D.   Korea Advanced Institute of Science & Technology, 2007
Research   Robotics, Control
E-mail   mjhwang@uos.ac.kr
Homepage   robotics.uos.ac.kr

Key Words

Robot motion planning & control, Robot vision & Manipulation, Robotic grasping, Autonomous Mobile Robot

Areas of Research

Robot motion planning & control
- Path planning & Trajectory planning (Spline motion), Task planning for multiple manipulators, Mobile-manipulation & Loco-manipulation, Kinematic calibration, Force control, Vibration control

Robot vision & Manipulation
- 3-D vision, Pose estimation, Bin picking & Bin packing

Robotic grasping
- Robotic gripper, Grasping, Mechanism design

Autonomous Mobile Robot
- Path planning & following, Navigation in indoor & outdoor, SLAM, Localization, Collision avoidance, Autonomous robot racing

<Robot platform & Simulation environment>

Recent Publications & Projects

- IEEE Access, "Trajectory-based 3D Point Cloud ROI Determination Methods for Autonomous Mobile Robot" (2023)
- Machines, "Robot-based Automation for Upper and Sole Manufacturing in Shoe Production" (2022)
- Electronics, "Task Space Trajectory Planning for Robot Manipulators to Follow 3-D Curved Contours" (2020)
- 산업부, "소방용4족보행로봇기반인명탐지·화재진압솔루션개발 및 소방 로봇·센서 실증" (~2028)
- 산업부, "차체 프레스 금형의 폴리싱 자동화를 위한 딥러닝 기반 자율이동형 시스템 개발" (~2026)

Honors & Awards

- JKSPE Contribution Award, 한국정밀공학회 (2023)
- 젊은공학교육자상, 한국공학교육학회 (2023)
- First place, RoboCup Autonomous Robot Manipulation(ARM) Challenge (2022, 2023 2년 연속우승)
- 한국공학교육인증원 이사장상 (2022)
- 권욱현 젊은연구자논문상, 제어로봇시스템학회 (2019)

Yong-Jun Choi (최용준 교수)

Department   School of Environmental Engineering
Lab   Advanced Eco-Microbiotechnology Lab
Ph.D.   Korea Advanced Institute of Science & Technology, 2012
Research   Environmental microbial engineering, Microbial metabolic engineering
E-mail   yongjun2165@uos.ac.kr
**Homepage**   aemluos.wixsite.com/aeml

Key Words

Metabolic Engineering, Environmental Microbiology, Synthetic Biology, Biofoundary, Biorefinery

Areas of Research

AEML is a creative and inclusive research group at the forefront of bioengineering and environmental engineering.
We harness biology to address diverse critical challenges in the sustainable development and environmental pollution.
Our mission is to develop microbial platforms to solve important global environmental problems
- Development of genetic manipulation system for microbial platforms
- Metabolic engineering for bioconversion of waste resources to value-added products
- Bioremediation using nanoparticle-containing microbial cells
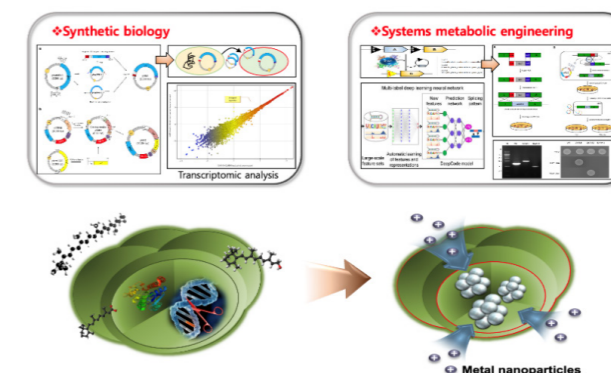
Recent Publications & Projects

- Bioresour. Technol, "Machine learning-guided prediction of potential engineering targets for microbial production of lycopene" (2023)
- Environ. Pollut, "Mitigation of hazardous toluene via ozone-catalyzed oxidation using MnOx/Sawdust biochar catalyst" (2022)
- Chem. Eng. J., "Enhancement of bioaromatics production from food waste through catalytic pyrolysis over Zn and Mo-loaded HZSM-5 under an environment of decomposed methane" (2022)
- Environ. Res., "Biochar application strategies for polycyclic aromatic hydrocarbons removal from soils" (2022)
- 산업부, "납사분해공정 부생가스로부터 고부가 화학제품 생산기술 개발" (~2030)
- 해수부, "메탄자화균을 이용한 바이오 산업소재 생산기술 개발" (~2026)
- 과기부, "다핵종 방사성 폐기물 처리 기술 개발" (~2027)

Honors & Awards

- Selected as a journal cover paper, Bioresour. Technol. (2023)
- Selected as a supplementary journal cover paper, ACS Sustainable Chemistry & Engineering (2021)

Rakwoo Chang (장락우 교수)

Department   Department of Applied Chemistry
Lab   Computer Molecular Modeling Laboratory
Ph.D.   University of Wisconsin–Madison, 2003
Research   Physical/biological phenomena using computer simulation techniques
E-mail   rchang90@uos.ac.kr
Homepage   sites.google.com/view/theochem

Key Words

Computer simulation of bio and nanomaterials, Organic photovoltaic cells, Nanoparticles on biological membranes, Structural behavior of neurofilaments, Polymer dynamics in confined geometry

Areas of Research

Membrane Structure of Chlorosulfolipids, Organic Photovoltaics, Molecular Modeling of Neurofilaments, Effects of Nanoparticles on Biological Membranes, Polymer Dynamics in Porous Medium, DNA Conformation in Nanochannels

<Membrane Structure of Chlorosulfolipids(left), Organic Photovoltaics(center), Molecular Modeling of Neurofilaments(right)>
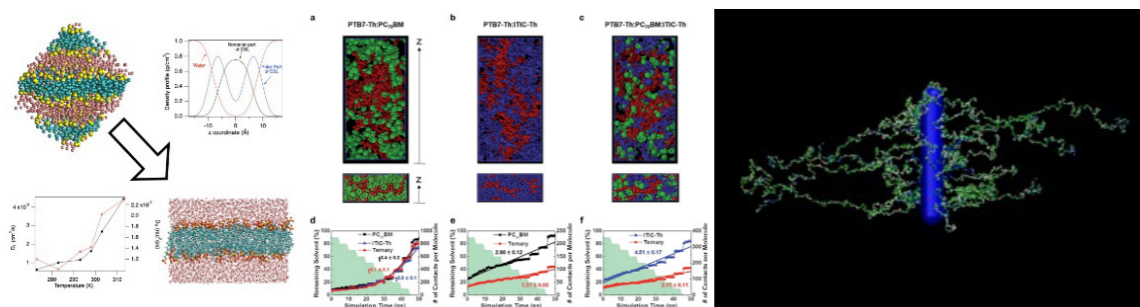
Recent Publications & Projects

- Advanced Functional Materials, "Novel Diffusion-Regulated Layering Methodology to Improve Blend Miscibility and Thermal Stability of Organic Photovoltaics" (2023)
- Scientific Reports, "Attitudinal analysis of vaccination effects to lead endemic phases" (2023)
- iScience, "Clioquinol as an inhibitor of JmjC-histone demethylase exhibits common and unique histone methylome and transcriptome between clioquinol and hypoxia" (2022)
- Journal of Physical Chemistry Letters, "Chlorosulfolipid (Danicalipin A) Membrane Structure: Hybrid Molecular Dynamics Simulation Studies" (2021)
- Nano Letters, "Interstitially Mixed Self-Assembled Monolayers Enhance Electrical Stability of Molecular Junctions" (2021)
- Nano Energy, "Alternative sequential deposition for optimization-free multi-component organic bulk heterojunctions" (2020)
- 과기부, "탈메틸화를 이용한 테라헤르츠 암 치료 기술 연구" (~2025)
- 과기부, "차세대 소재 개발용 다중 규모 컴퓨터 모델링 시스템 구축" (~2024)

Honors & Awards

- [수상] Best Teacher Award, University of Seoul (2022)
- [수상] 대한화학회 물리화학분과회 신국조 학술상 (2021)

Changyi Park (박창이 교수)

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Lab
Ph.D.   The Ohio State University, 2005
Research   Statistical learning, Non-parametric inference
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Key Words

Unsupervised Learning, Semi-Supervised Learning, Supervised Learning, Graphical Models, Applications in Biology, Applications in Transportation

Areas of Research

My theoretical areas of interests include nonparametric function estimation, asymptotics, and statistical learning. I am also interested in statistical computing. Currently, my research is centered on statistical learning, particularly, feature selection for high dimension data. My applied areas of research include statistical applications in biology, environment, and engineering. I am also interested in interdisciplinary research of these and other areas

Recent Publications & Projects

- Computational Statistics and Data Analysis, "Multiclass Laplacian support vector machine with functional analysis of variance decomposition" (2023)
- Journal of Applied Statistics, "Classification of histogram-valued data with support histogram machines" (2023)
- Genetics, "Improving Disease Prediction by Incorporating Family Disease History in Risk Prediction Models with Large-Scale Genetic Data" (2017)
- Communications in Statistics - Simulation and Computation, "Analysis of survival data with group lasso" (2012)
- 과기부, "DS플러스 차세대 융합인재 양성사업" (~2028)

Honors & Awards

- Achievement Award, University of Seoul (2023)
- Best Paper Award, Korean Data & Information Society (2019)
- Excellent Research Award, University of Seoul (2010)
- Excellent Research Award, University of Seoul (2009)

Joungyoun Kim (김정연 교수)

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Lab Medical Big Data Lab
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Research Medical big data
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Homepage sites.google.com/view/joungyoun

Key Words

Medical Big data, Variable selection for Gene-Environmental interactions, Statistical and Computational methods in Genetics, Machine learning algorithms for Cancer screening, Survival Analysis, Case-Control study, Bayesian Statistics, Hidden Markov Random Field Model.

Areas of Research

My broad research goal is to combine AI technology with healthcare big data. More specifically, my research focuses on developing machine learning models for predicting the onset of diseases. Also, I have been working on developing statistical models based on Hidden Markov Random Field and Bayesian MCMC algorithms for many years.

Recent Publications & Projects

- Journal of Statistical Computation and Simulation, "Post Hotelling's T-square Procedure to Identify Fault Variables" (2024)
- Scientific Reports, "A prediction model for childhood obesity risk using the machine learning method: a panel study on Korean children" (2023)
- Expert Review of Hematology, "Association between polycythemia and risk of ischemic stroke in males based on the National Health Insurance Service-Health Screening cohort" (2023)
- Clinical Drug Investigation , "Association Between Migraine and Ischemic Cardio-Cerebrovascular Disease (CCVD) and Effects of Triptans and Ergotamine on the Risk of Ischemic CCVD in Patients with Migraine in the Korean NHIS-HEALS Cohort" (2023)
- Statistical Modeling, "Semi-parametric hidden Markov model for large-scale multiple testing under dependency" (2022)
- Scientific Reports, "Effect of metabolic health and obesity on all-cause death and CVD incidence in Korean adults: a retrospective cohort study" (2022)
- American Journal of Hypertension, "Higher pulse pressure is associated with increased risk of cardio-cerebrovascular disease and all-cause mortality: A Korean national cohort study" (2022)
- Epidemiology and Health, "Recent trends in opioid prescriptions in Korea from 2002 to 2015 based on the Korean NHIS-NSC cohort" (2022)

Honors & Awards

- 충북대학교 자연과학대학 우수연구자상 (2019)

Hyelim Son (손혜림 교수)

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Lab
Ph.D. University of Columbia, 2014.
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Key Words

Health economics, Economics of Education, Development economics, Labor economics, Public economics, Applied microeconomics, subjective well-being, mental health

Areas of Research

I specialize in conducting research utilizing quasi-experimental techniques and employing data-driven, evidence-based approaches to discern the causal impact on diverse outcomes of policy significance. My previous work has centered on evaluating the effects of education across different levels, and on factors that affect education attainment in both developing and developed countries. Recently, I have started to work on topics in health, with a particular focus and subjective well-being and mental health related outcomes leveraging big data sourced from the National Health Insurance Service and panel data in Korea. I aim to investigate causal effects of social policies and factors that impact physical and mental health outcomes.

Recent Publications & Projects

- Labour Economics, "The Effect of Housing Price Inequality on Mental Health" (2023)
- The World Economy, "Industry selection of regional migrants in China: The role of urban industry structures of home and destination" (2023)
- Labour Economics, "The Long-Term Effects of Labor Market Entry in a Recession: Evidence from the Asian Financial Crisis" (2020)
- Energy for Sustainable Development, "Reducing Energy Poverty: Characteristics of Household Electricity Use in Vietnam" (2020)
- Journal of the Asia Pacific Economy, "An Exchange Motive in Upstream Intergenerational Transfers: Evidence from South Korea" (2018)
- 서울시, "서울형 스마트 헬스케어 효과성 평가 용역" (2023)

Honors & Awards

- W.E Upjohn Institute for Employment Research Early Career Research Award (2017-2018)

Dong-Sung Lee (이동성 교수)

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Homepage lifesci.uos.ac.kr/bioinfo

Key Words

Gene Regulatory Mechanism, Cancer Biology, Experimental Method Development, Computational Tool development

Areas of Research

Experimental Method Development
- We have developed and published single nucleus methyl 3C sequencing (snm3C-seq), a single-cell multimodal-omics technique that allows for the simultaneous observation of more than two features from a single cell (Nature Methods 2019)

Analysis Tool Development
- We are developing analysis methods for various sequencing techniques. Among them, we have particularly studied Structural Variants (SVs) in cancer cells using Hi-C sequencing, and the resultant changes in the three-dimensional structure of the genome and their impact on gene expression, which was published in 2022 (Nature 2022)

<Experimental Method Development(left), Analysis Tool Development(right)>
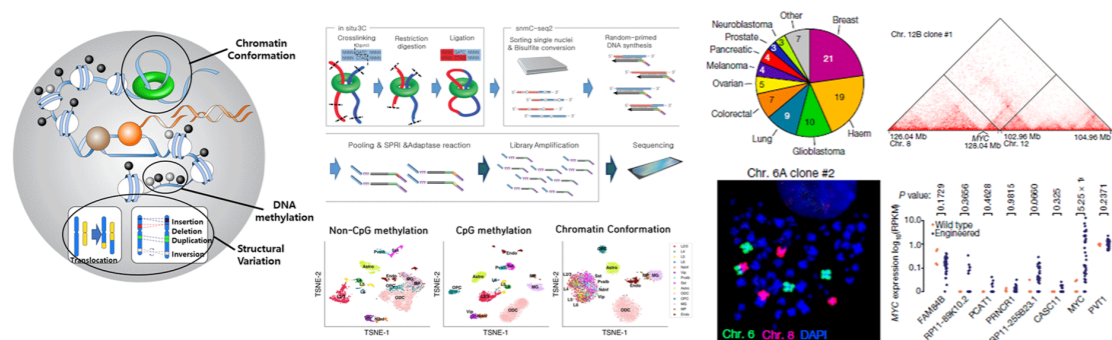
Recent Publications & Projects

- Nano Letters, "Genetically Stable and Scalable Nanoengineering of Human Primary T Cells via Cell Mechanoporation" (2023)
- Nature, "Widespread somatic L1 retrotransposition in normal colorectal epithelium" (2023)
- Nature, "Structural variants drive context-dependent oncogene activation in cancer" (2022)
- 과기부, "암 조직 유래 단일 세포의 유전체 구조 변이, 크로마틴 구조, DNA 메틸화의 동시 프로파일링을 통한 암 발생 기전 연구" (~2024)

Honors & Awards

- 암 유전자 발현 조절 기전 규명 네이처지 게재 (2022)


Seungill Kim (김승일 교수)

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Research Genomics, Bioinformatics, Genome-based breeding
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Homepage

Key Words

Plant genome, Pan-genome, Haplotype-resolved genome assembly, Trait-related genes, Uncharacterized genes, Evolutionary mechanism of genes, Computational tool development

Areas of Research

Our lab performs the research on understanding important agricultural traits in plants by analyzing omics data. Currently, we are conducting 1. Evolutionary and functional studies of agricultural trait-associated genes, 2. Identification and functional prediction of hypothetical proteins, 3. Plant pan-genome construction, and 4. Development of methods and software for genome analyses.

<Research examples for trait-associated gene and pan-genome analyses in our lab>
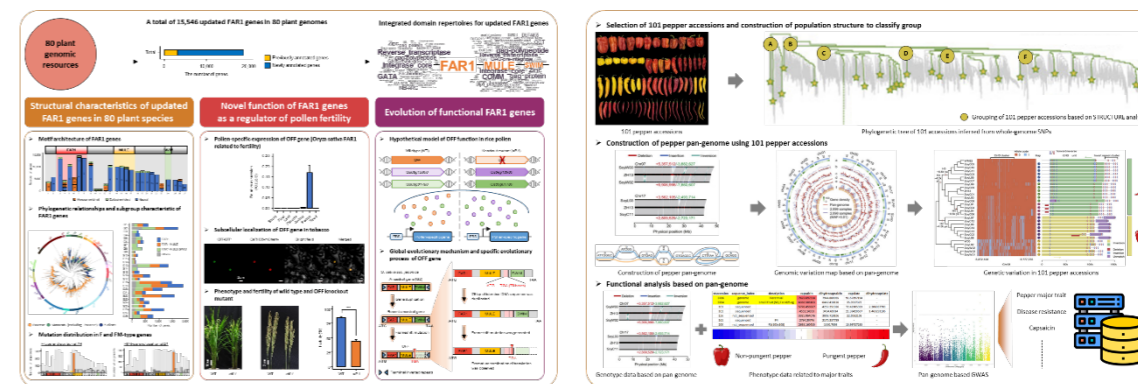
Recent Publications & Projects

- Nucleic Acids Research, "Genomic basis of multiphase evolution driving divergent selection of zinc-finger homeodomain genes" (2023)
- Plant Biotechnology Journal, " De novo phasing resolves haplotype sequences in complex plant genomes" (2022)
- Nucleic Acids Research, "Recurrent mutations promote widespread structural and functional divergence of MULE-derived genes in plants", (2021)
- 과기부, "원예작물 전사인자 정보 고도화 및 기능분석 플랫폼 구축" (~2026)
- 농식품부, "농생명 빅데이터 기반 디지털육종 정보 검색 기술개발" (~2024)

Honors & Awards

- 식물 전사인자와 억제 유전자의 상호보완적 기능 및 독립적 진화과정 규명, Nucleic acid research 게재 (2023)
- 2023년도 한국차세대과학기술한림원(Y-KAST) 농수산학 분야 회원 선정 (2022)
- 식물 전이인자 진화기작 규명, 생명과학 분야 국제 학술지 Nucleic acid research 온라인 게재 (2021)
- 제 5회 한광호 농업연구인상 (2019)

Dong-Wook Park (박동욱 교수)

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Homepage bionano.uos.ac.kr

Key Words

Biomedical devices, Biosensors, Transparent Neural electrode, Flexible and Stretchable Devices, DNA Aptamer Sensors

Areas of Research

- Developing emerging biomedical devices using novel materials and nanotechnologies. In specific, we focus on transparent neural electrodes and flexible electronic devices and circuits.
- Graphene and polymer-based transparent electrodes arrays for micro-electrocorticography (uECoG) and electromyography (EMG) are under development. Field-effect transistors (FETs) integrated in microfluidic channel and DNA aptamer sensors are of interests.

<Transparent Neural electrode(left), Flexible and Stretchable Devices(center), DNA Aptamer Sensors(right)>
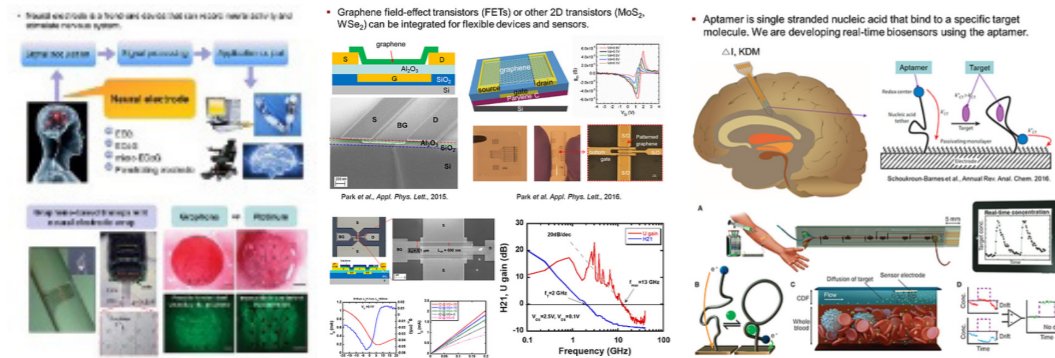
Recent Publications & Projects

- Applied Physics Letters, "Trench field-effect transistors integrated in a microfluidic channel and design considerations for charge detection" (2022)
- ACS Nano, "Electrical neural stimulation and simultaneous in vivo monitoring with transparent graphene electrode arrays implanted in GCaMP6f mice" (2018)
- Nature Protocols, "Fabrication and utility of a transparent graphene neural electrode array for electrophysiology, in vivo imaging, and optogenetics" (2016)
- 산업부, "차세대시스템반도체설계전문인력양성사업" (~2026)
- 과기부, "지능형 사물 에너지 (iEoT) 반도체 시스템 융합 다빈치형 인력양성센터" (~2026)
- 과기부, "고성능 고신뢰성 생체이식형 유무기 하이브리드 투명 바이오전극 개발" (~2024)

Honors & Awards

- [기술이전] 뇌 심부 자극 투명 전극 어레이 및 이를 이용한 신경 신호 검출 방법 (2021)
- [수상] 서울시립대학교 우수강의교수수상 (2017, 2018, 2019, 2021, 2022)
- [수상] 반도체학술대회 우수 포스터 논문상 (2022)
- [수상] 한국전기전자학회 우수 포스터 논문상 (2021)

Hyeok Kim (김혁 교수)

Department School of Electrical and Computer Engineering
Lab Nano-Optoelectronics & Bio-Electronics Lab (NOBEL)
Ph.D. CNRS & U. Paris 7, 2015
Research Flexible Devices
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Homepage nobel.uos.ac.kr

Key Words

Bioelectronics, Semiconductor devices (diode, transistor), Display/sensor/energy semiconductor devices

Areas of Research

- Bioelectronics (Artificial Skin, Biosensor, Biochip)
- Display Optoelectronics (TFT for OLED/QLED, Perovskite LED)
- Advanced Nano Semiconductor Device
- Flexible Nanoelectronics
- Eco-friendly Energy Device (Energy Harvesting, Solar Cell)

<Solar Panel(left), Flexible Display(center), Convergent Sensors(right)>

Recent Publications & Projects

- Advanced Functional Materials, "Surface Reconstruction of Ni–Fe Layered Double Hydroxide Inducing Chloride Ion Blocking Materials for Outstanding Overall Seawater Splitting" (2023)
- Solar RRL, "Top-Gate Field Effect Transistor as a Testbed for Evaluating the Photostability of Organic Photovoltaic Polymers" (2022)
- Advanced Energy Materials, "Rational Design of Highly Efficient Semi-Transparent Organic Photovoltaics with Silver Nanowire Top Electrode via 3D Optical Simulation Study" (2021)
- Advanced Materials Interfaces, "Universal Elaboration of Al-Doped TiO2 as an Electron Extraction Layer in Inorganic-Organic Hybrid Perovskite and Organic Solar Cells" (2020)
- 과기부, "초민감 증폭형 유기 및 페로브스카이트 광센서 연구와 이를 활용한 트랜지스터 어레이 집적회로 개발" (~2026)
- 과기부, "고유연성 폴리머 기반 고민감도 촉각센서 개발" (~2023)

Honors & Awards

- [기술이전] 유연성 압력센서를 포함하는 스마트 장갑 (2020), 절전형 나노 에너지 하베스터 외 2건 (2020), 자가충전형 저전력 광센서 제조 기술 (2020)

Sangshin Park (박상신 교수)

Department Graduate School of Urban Public Health
Lab Epidemiology Lab
Ph.D. Texas A&M University, 2013
Research Infectious and chronic disease epidemiology
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Homepage sites.google.com/view/epidemiology-lab

Key Words

One health, Zoonosis, Dengue, Malaria, Vaccine, Food safety, Cardiovascular diseases, Quality of life, Big data analyses, Structural equation modeling, Geospatial modeling, Predictive modeling

Areas of Research

One health and infectious disease epidemiology
- We have elucidated the transmission route of the zoonotic and food-borne diseases to humans and the diseases spread based on human behavioral patterns.

Chronic disease epidemiology
- We have identified risk factors of chronic diseases and impaired health-related quality of life.

Epidemiologic methodology
- We have developed structural equation modeling to predict the progress of the tropical infectious diseases based on initial clinical and laboratory indicators.

<Japanese encephalitis (left), Plasmodium falciparum (center), dengue (right)>
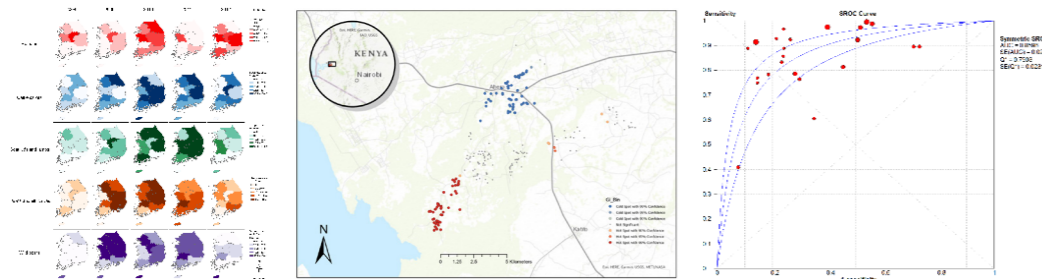
Recent Publications & Projects

- Int J Infect Dis, "Increasing seroprevalence of Japanese encephalitis virus in even-toed hoofed mammals (Artiodactyla species) associated with an upsurge of human cases in South Korea" (2023)
- J Infect Dis, "Whole-proteome differential screening identifies novel vaccine candidates for S. japonica" (2021)
- Nature, "Anti-PfGARP activates programmed cell death of parasites and reduces severe malaria" (2020)
- Clin Infect Dis, "Maternally-derived antibodies to PfSEA-1 and protection of infants from severe malaria" (2019)
- PLoS Negl Trop Dis, "Use of structural equation models to predict dengue illness phenotype" (2018)
- Hypertension, "Age at first childbirth and hypertension in postmenopausal women" (2017)
- J Allergy Clin Immunol, "The association of asthma, total IgE, and blood lead and cadmium levels" (2016)
- Pediatrics, "Mechanistic pathways from early gestation through infancy and neurodevelopment" (2016)
- 과기부, "비만·대사질환 및 관련지표에 따른 열대열말라리아와 삼일열말라리아 예후 및 진행기전 연구"(~2027)

Honors & Awards

- 서울시립대학교 우수강의교수상 (2020, 2021, 2023)
- 보건복지부 장관 표창 (2021)


Dong Hwa Kang (강동화 교수)

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Lab Building Environmental Performance Lab
Ph.D. Seoul National University, 2010
Research Ventilation and indoor air quality for sustainable and healthy buildings
E-mail dhkang@uos.ac.kr
Homepage ae.uos.ac.kr

Key Words

Ventilation, Indoor air quality, Air cleaning, HVAC system, Architectural environmental system, Energy-efficient building, Healthy building

Areas of Research

- Ventilation and air cleaning technology in buildings
- HVAC system for epidemic preparedness
- Occupant exposure to indoor air pollutants
- Smart ventilation system for energy-efficient and healthy buildings

<Indoor pollutant transport experiment and simulation (left and middle), Integrated Indoor environment control system (right)>
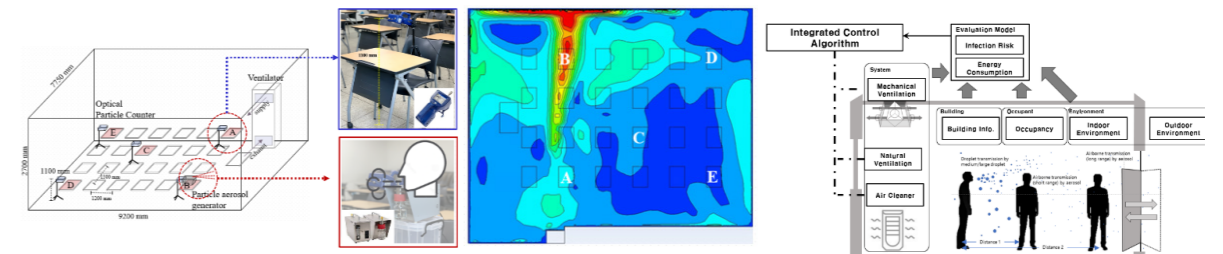
Recent Publications & Projects

- Building and Environment, "Particle dispersion and removal associated with kitchen range hood and whole house ventilation system" (2023)
- Journal of Building Engineering, "Estimation of airborne infection risk in a school classroom according to operation of a floor-standing type ventilation system" (2023)
- Journal of Building Engineering, "Feasibility of applying an electrostatic precipitator integrated with a naturally ventilated double-skin facade in residential buildings" (2023)
- 과기부, "고위험 다중이용시설의 감염위험도 및 에너지소비 저감을 위한 지능형 실내환경제어시스템 개발" (~2027)
- 보건복지부, "감염병 격리 치료 시설 확충을 위한 기존 의료시설 긴급 전환 기술 개발" (~2024)

Honors & Awards

- [표창] 환경부 장관 표창 (2021)
- [수상] 한국건축친환경설비학회 논문상 (2022)
- [수상] 한국의료복지건축학회 학술공로상 (2020)