



Namwook Kim

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Brief

- Professor, Department of Mechanical Engineering, Hanyang University, S. Korea (2023.09 ~ Current)
- Powertrain Director, Korean Society of Automotive Engineers, S. Korea (2017.01 ~ Current)
- Associate Professor, Department of Mechanical Engineering, Hanyang University, S. Korea
- General Affairs Director, Korean Society of Automotive Engineers, S. Korea (2021.01 ~ 2022.12)
- Visiting Scholar, Argonne National Laboratory, U.S. (2021.08 ~ 2022.07)
- Advisory Member, Technical Review Advisory Committee in Fair Trade Commission (2019.09 ~ 2021.08)
- Assistant Professor, Department of Mechanical Engineering, Hanyang University, S. Korea
- Mechanical Engineer, Argonne National Laboratory, U.S. (2012.11 ~ 2015.08)
- Postdoc Appointee, Argonne National Laboratory, U.S. (2009.11 ~ 2012.10)
- Visiting Researcher, University of Michigan, U.S. (2007.12 ~ 2008.11)

Major Research Topics

- Vehicle system modeling and control strategy development
- Optimization of hybrid system performance based on optimal control
- Optimization of real-time control using forward road traffic information
- Develop speed-optimized driving strategies for individual vehicles

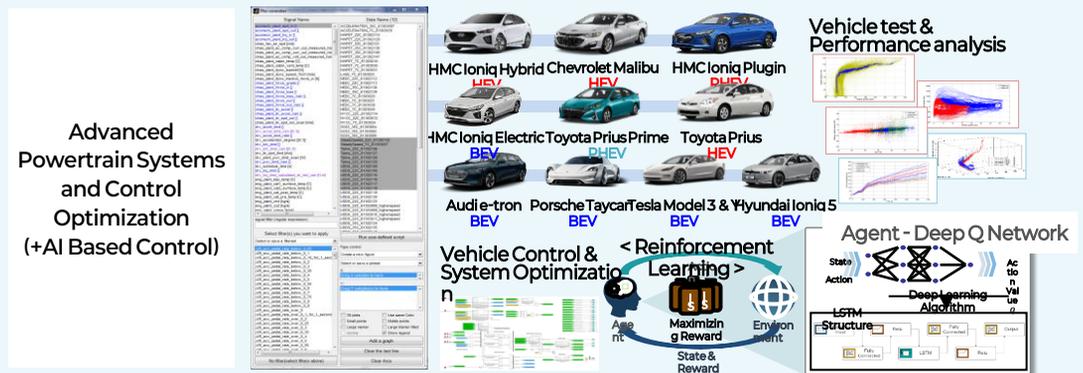
Research Keywords

#Electrified vehicle, #Model-based System Engineering, #Optimization & Optimal Control, #Autonomous Vehicle, #Mobility Network Study

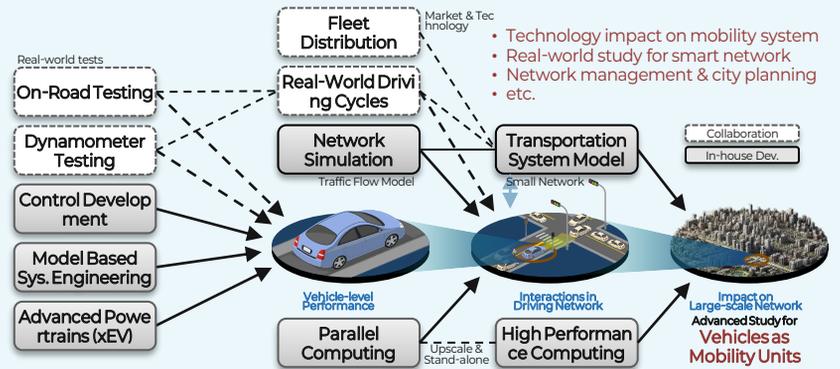
Research Objectives

- Model-based studies and control optimization for electrified powertrain systems
 - Hybrid vehicles, electric vehicles, fuel cell vehicles, and special-purpose electrified vehicle
- Analysis of system behavior according to the driving situation of individual vehicles and their interaction
- Development of technology to improve fuel efficiency and energy consumption of vehicle systems based on optimization and optimal control
- Development of driving strategies to improve system efficiency in actual road traffic

Research Topics

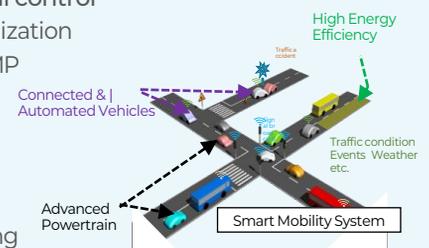


Researches of Vehicle Powertrains to Transportation Systems for Future Mobility



Collaborative Research Fields

- Dynamic system performance simulation and optimal control
 - Powertrain system performance simulation and optimization
 - Optimal control based on control theories like DP & PMP
- System modeling and control based on data
 - Data-driven analysis, model, and control
 - Control based on Artificial Intelligent (RL, SDP, etc.)
- Transportation system modeling and operation
 - Agent-based microscopic traffic flow network modeling
 - Control strategies for energy saving in transportation networks





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Brief

- Professor, Dept. of Mechanical Engineering, Hanyang University (2014 ~ present)
- CEO, Energy & Synergy Eng. Co., Ltd. (2021 ~ present)
- Manager of Research Cooperation, Ansan Green Environment Center (2022 ~ present)
- Research Scientist, Water Desalination and Reuse Center (WDRC), KAUST (2013)
- Post-Doctoral Fellow, Water Desalination and Reuse Center (WDRC), KAUST (2011 ~ 2013)
- Research Fellow, Dept. of Mechanical Engineering, NUS (2010 ~ 2011)
- Post-Doctoral Fellow, Dept. of Mechanical Engineering, Hanyang University (2009 ~ 2010)
- 62 SCIE/SCI-indexed journal articles (Water Res., J. Membr. Sci., Desalination, Chem. Eng. J., Energy Convers. Manag.)
- h-index 28, i10-index 41 (Google scholar)

Major Research Topics

- Thermally- and membrane-based water treatment, concentration, and zero liquid discharge
- Membrane- and adsorbent-based humidification and dehumidification
- Catalyst-, adsorbent-, and membrane-based gas purification
- Design, modeling, simulation, and optimization of thermal process systems

Research Keywords

#열 및 물질 전달, #수처리, #해수담수화, #저온농축, #폐수무방류, #제습 및 건조, #가습, #온도순환흡착, #가스정제, #히트펌프



Research Objectives

- Thermally- and membrane-based water treatment, seawater desalination, low-temperature concentration, and zero-liquid discharge process
- Adsorbent- and membrane-based highly efficient humidification /dehumidification, drying, heat pump process
- Catalyst-, adsorbent- and membrane-based gas purification and upgrading process
- Design, modeling, simulation and performance optimization of thermal process systems

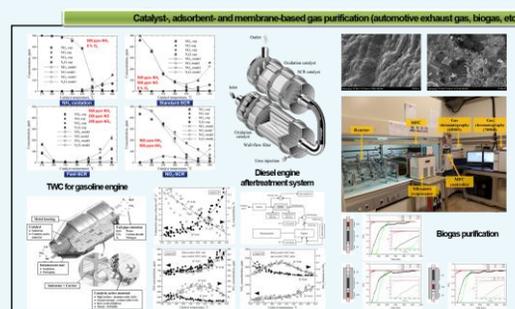


Research Topics

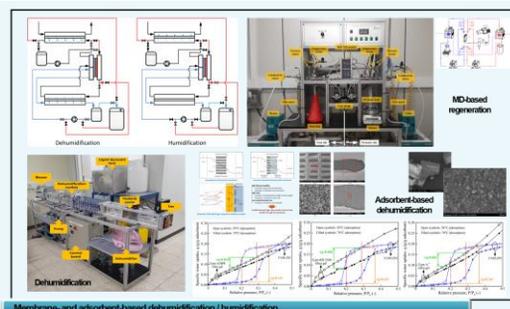
Thermally- and membrane-based water treatment, concentration, and zero liquid discharge



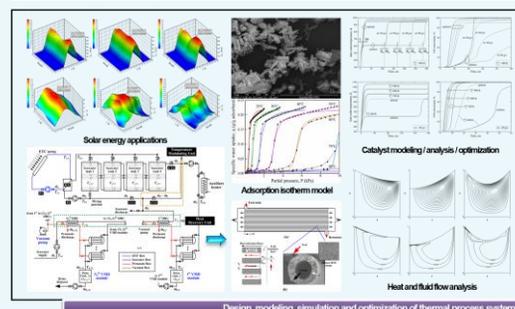
Catalyst-, adsorbent-, and membrane-based gas purification



Membrane- and adsorbent-based humidification and dehumidification



Design, modeling, simulation, and optimization of thermal process systems



Collaborative Research Fields





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Brief

- Senior Engineer, Robot development group, Samsung Electronics Mechatronics Center (2017 ~ 2019)
- Assistant professor, School of Mechanical Engineering, Yeungnam University (2019 ~ 2024)
- SCI Journal Publications : 17

Funding sources

- National Research Foundation of Korea, Ministry of SMEs and Startups, Korea Institute for Advancement of Technology, Gyeongsangbuk-do, etc.

Major Research Topics

- Robot hardware design for special environments
- Control algorithms for precise work
- Smart factories

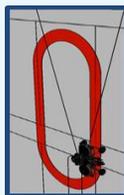
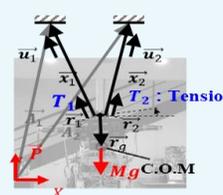
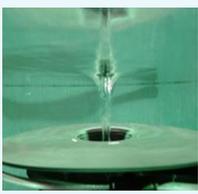
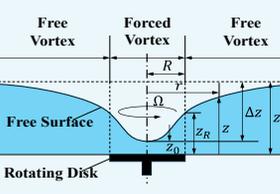
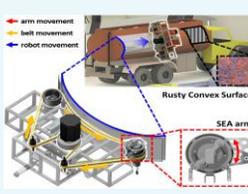
Research Keywords

#Mechanism design, #Robot control, #Field Robot, #Optimal Control, #Smart factory

Research Objectives

- Hardware design and control of special purpose robots
 - Design of robotic mechanisms that can replace humans in hazardous and challenging tasks
 - Development of control algorithms that enable precise operation under conditions of disturbances
 - Integration of robot mechanisms, electrical systems, and robot software
- Application of robots in factory automation and smart factories
 - Design of grippers and development of control algorithms for automating tasks within factories

Research Topics

<p>Wall-Cleaning Robots for High-rise Buildings</p>	 <p>Wall cleaning robot</p>	 <p>2-DOF wall climbing robot</p>	 <p>Rope dynamic modeling</p>
<p>Underwater Robots</p>	 <p>Floating waste-collecting robot</p>	 <p>Vortex</p>	 <p>Fluid modeling</p>
<p>Large Area Grinding Robots</p>	 <p>Grinding robotic manipulator</p>	 <p>Parallel mechanism robot</p>	 <p>Variable stiffness actuator</p>

Collaborative Research Fields

- Application of material and communication technologies for extreme environments

CFD Analysis	Reinforcement Learning	Materials	Communication
<ul style="list-style-type: none"> Development of CFD analysis to analyze fluid behavior of underwater robots and incorporate it into design 	<ul style="list-style-type: none"> Research on applying reinforcement learning with low computational load and high efficiency for robot control and utilization 	<ul style="list-style-type: none"> Development of materials and application of robot hardware for explosion-proof robots 	<ul style="list-style-type: none"> Research on robot communication and applications suitable for extreme environments, including underwater and fire scenes



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Brief

- Assistant Professor Department of Mechanical, Smart, and Industrial Engineering, Gachon University
Head of the Smart Factory Division

(2022.03 – 2022.08)

- Assistant Professor Department of Mechanical Engineering, Gachon University
(2020.03 – 2022.02)

- Assistant Professor Department of Mechanical Engineering, Dong-A University
(2018.03 – 2020.02)

- Principal Engineer Samsung Electronics
(2014.03 – 2018.02)

- Senior Engineer Samsung Electronics
(2008.08 – 2014.02)

- Tes Visiting Professor
(2020.07 – 2022.07)

- SK Hynix Visiting Professor
(2019.04 – 2020.02)

Major Research Topics

- Chaotic Transport
- Turbulence Simulation
- Supercritical Flow Reactor
- Plasma Process Simulation
- Plasma Reactor Design

Research Keywords

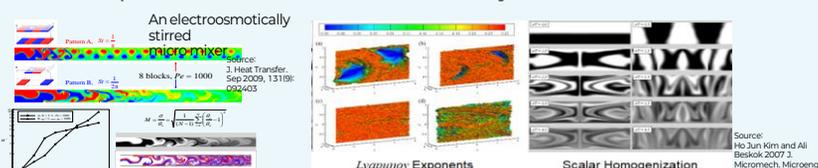
#Plasma Physics, #PECVD, #Dry Etch, #Cleaning, #CF

Research Objectives

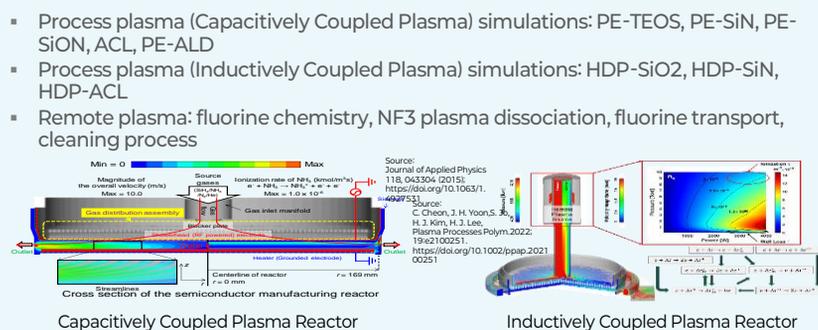
- In our lab, we focus on industry-sponsored research relating to new semiconductor /display equipment development.
- Purpose of our research is to obtain the uniform process results on the wafer/substrate by design and modification of the low temperature plasma process reactor.
- We are creating a digital twin of a smart semiconductor/display equipment based on our research findings regarding equipment development.

Research Topics

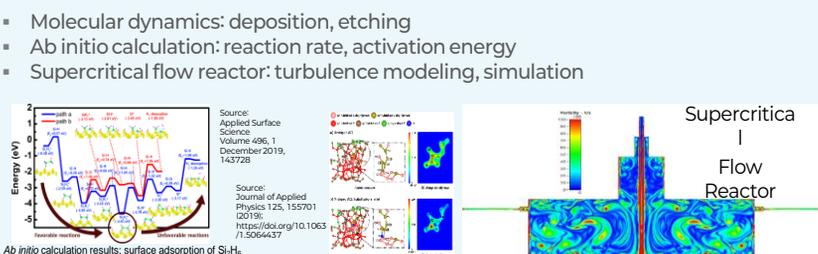
Numerical Investigation of Chaotic Transport



Plasma Discharge (low temperature plasma, plasma processes, plasma treatment)



Surface Chemistry & Supercritical Flow Reactor



Collaborative Research Fields

- Ab-initio Calculations
- Molecular Dynamics
- Reactive Molecular Dynamics
- Artificial Intelligence



Hyung Doh Roh

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Brief

Research

- 26 SCI journal papers (19 for main author), 22 registered patents, and 50 conference talks
- 2020-2021 Post-doc, Mechanical engineering, UNIST
- 2021-2023 Senior researcher, Korea Institute of Materials and Science (KIMS)
- 2023-Present Assistant professor, Mechanical engineering, Hanyang university ERICA
- Conference committee: The Korean Society for Composite Materials, MRS-K
- Start up and community: CEO of BeSTIS (Be Smart, Then It's Safe) and CEO of SACE (Safety And Cost-Effectiveness)

Major Research Topics

- Manufacturing – Rapid manufacturing (HP-RTM, PC-RTM, PC-WCM etc.)
- Joining – Laser welding, Induction welding, and Ultrasonic welding
- Monitoring – Structural health self-monitoring using electrical resistance changes
- Multidisciplinary – From science to engineering, From academia to application, AI, Materials

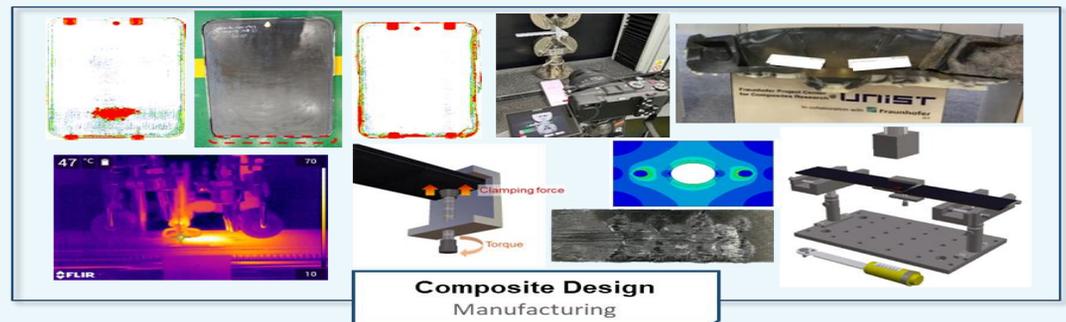
Research Keywords

#Composite, #Carbon fiber reinforced plastic, #Structural health monitoring, #prognostics and health management, #composite manufacturing monitoring, #Functional composites, #Multi-functional composites, #Composite rapid manufacturing, #Artificial Intelligence, #Composite joining

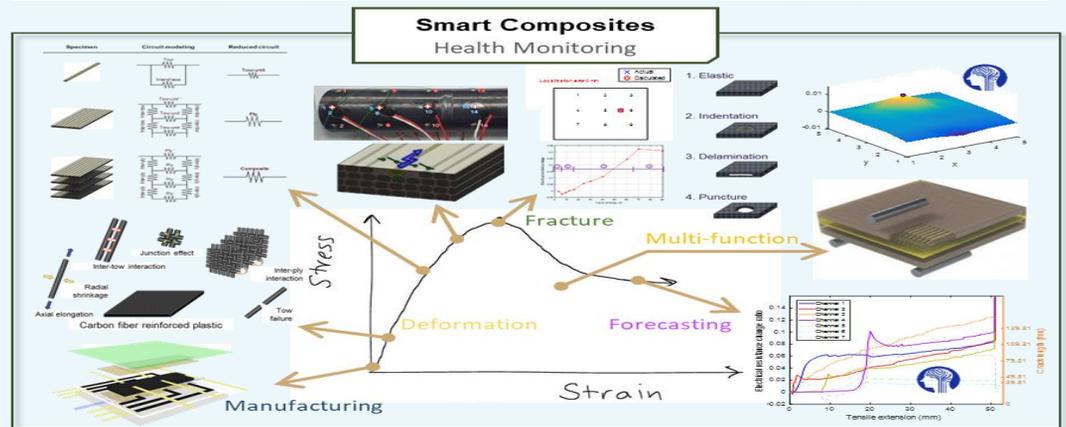
Research Objectives

- Make Smart Composites, Intelligently**
- Composite manufacturing, functionalizing, and lightweighting
- Fastener-free composite joining
- Structural health monitoring and prognostics and health management of composites
- Artificial intelligence aided composite design, manufacturing, evaluating, and monitoring

Research Topics

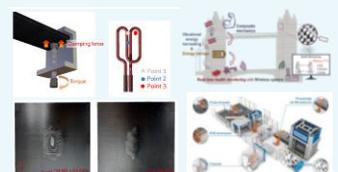


Make Smart Composites, Intelligently *R Lab*



Collaborative Research Fields

- Industrial engineering – Smart factory for smart composites
- Material, electrical, electric, and computational engineering – New advanced material and digital twinning
- Energy engineering – Structural energy storage system as multi-functional composites





Yomin Ahn

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Brief

- Professor, Hanyang University, Dept. of Mechanical Engineering (1994-present)
- Adjunct Researcher, Korea Institute of Industrial Technology (2022-present)
- Courtesy Faculty Member, Oregon State University, USA (2018-2019)
- Guest Researcher, Technische Universitaet Braunschweig, Germany (2011-2012)
- Foreign Research Staff Member, Tohoku University, NICHe, Japan (2003-2004)
- Postdoctoral Research Associate, Seoul National University (1993-1994)
- Postdoctoral Fellow, Purdue University, USA (1992-1993)
- Application Engineer, Samsung Hewlett-Packard Co. Application Center (1997-1998)

Major Research Topics

- Green hydrogen production by microscale solar-bio hybrid water electrolysis cells
- Self-sustainable photosynthetic microbial fuel cell for wearable microelectro-devices
- Eco-friendly power sources for paper-based microfluidic devices
- Disposable microbial electrochemical sensor for detecting environmental pollution

Research Keywords

#Microsystem, # Fuel cell, #Micro-machining, #Bio Electro-chemistry, #Eco-friendly energy

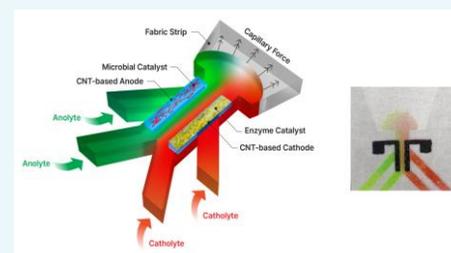
Research Objectives

- Green hydrogen production for micro fuel cell by self-sustainable solar-bio hybrid water electrolysis cell
- Development of a flexible self-sustainable photosynthetic microbial fuel cell using sunlight without fuel for textile-based wearable microelectronics
- Development of ecofriendly power source suitable for paper-based lateral-flow microfluidic device for medical diagnosis
- Development of disposable microbial electrochemical sensor that can detecting contamination of environment and drinking water

Research Topics

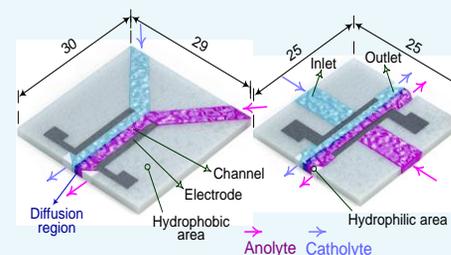
Wearable fabric-based self-pumping, hybrid microbial-enzyme biofuel cell

- A membraneless double-inlet biofuel cell was fabricated with a monolayer fabric substrate, which improves the sustainable of self-pumping microfluidic fuel cells.



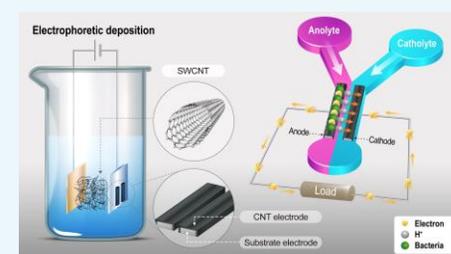
Flexible Paper-based mediatorless enzymatic microfluidic biofuel cells

- A glucose biofuel cell was micromachined to be precise and mass-producible. The microchannel of the biofuel cell was designed with Y-/cross-shaped structure.



Co-laminar microfluidic microbial fuel cell integrated with electrophoretically deposited carbon nanotube flow-over electrode

- A co-laminar flow microbial fuel cell is developed using micromachining techniques. Electrodeposition is used for carbon nanotube electrode microfabrication.



Collaborative Research Fields

- Wastewater treatment microbial fuel cell device development
- Development of microbial fuel cell device using seawater or soil
- Development of textile-based wearable biosensor and electronics
- Development of paper-based disposable biochip for on-site medial diagnosis
- Hydrogen generating microorganism electrochemical device development



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Brief

- Professor, Hanyang University ERICA (2004 – present)
- Member, Hanyang University Senate (2019 – present)
- PI, BK21 ERICA-ACE Center, Hanyang University ERICA (2020 – present)
- Director (past) and Trustee, Korean Society of Mechanical Engineers (2019 - present)
- Director (past) and Trustee, Korean Society for Precision Engineering (2013 – present)
- Visiting Scholar, Purdue University (2010 – 2011)
- Senior Researcher, Samsung SDI (2001 – 2004)

Major Research Topics

- Design and evaluation of the mechanical fasteners and mechanically fastened joints
- Formation and growth mechanism of cerebral aneurysms, prediction of their rupture risks and treatment outcomes, and development of novel endovascular devices and simulators
- Highly flexible wearable pressure sensors, energy harvesters and storages, and integrated systems
- Inkjet printing technique and equipment for large-area, high-resolution OLED displays

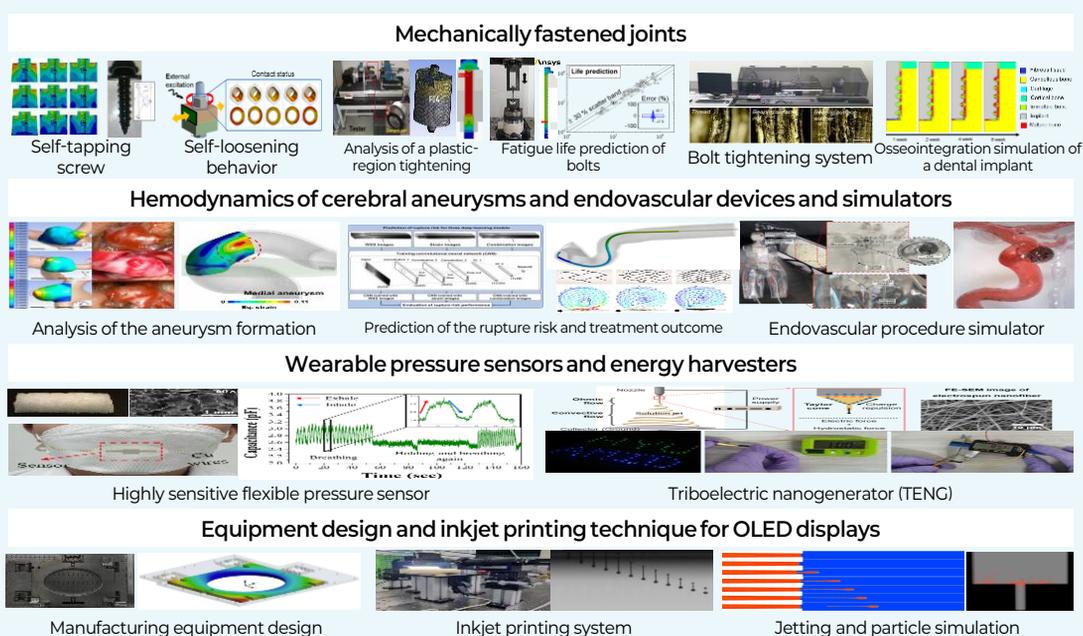
Research Keywords

#FEA, #Bolted Joints, #Hemodynamics, #Cerebral Aneurysm, #Wearable Sensors, #Energy Harvester, #Inkjet Printing, #Equipment Design, #Composites, #Mechanical Design

Research Objectives

- Design and evaluation of the mechanically fastened joints based on the analysis and experiment of fastening behavior
- Design and evaluation of the medical screws based on patient's bone characteristics
- Formation mechanism of cerebral aneurysms using numerical simulations and pathophysiology
- Prediction of the rupture risk and treatment outcome of cerebral aneurysms
- Development of phantom blood vessels and endovascular procedure simulators
- Highly flexible wearable pressure sensors and energy harvesters and storages
- Inkjet printing technique for large-area, high-resolution OLED displays
- Design of the ink circulation system for uniform particle distribution without sedimentation
- Design methodology for semiconductor and display equipment

Research Topics



Collaborative Research Fields

Bolted Joint	Cerebral Aneurysm	Inkjet Printing
<ul style="list-style-type: none"> Optimum design of dental implants and bone screws based on bone characteristics Evaluation of medical screws considering the in-vivo environments 	<ul style="list-style-type: none"> Comparison of CFD and FSI with PIV, 4D-MRI, and HF-OCT Formation, growth, and occlusion of aneurysms Novel endovascular treatment devices 	<ul style="list-style-type: none"> Integrated wearable system including energy harvesters, sensors, and actuators Solution-based process and corresponding equipment for large-area, high-resolution OLED displays



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Assistant Prof., Dept. of Mechanical Engineering
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Brief

- BETTER (Bio-inspired Energy and Thermal Transport Engineering Research) Lab PI
- Postdoctoral Research Fellow, University College London, UK (2019.8-2021.2)
- Internship Researcher, Nokia Bell Labs (2018.5-2018.8)
- Published research articles in Advanced Functional Materials, Nano Letters
 - Dissolvable Template Nanoimprinting Lithography (Nano Lett. 2020)
 - Thin-Film Condensation on Nanostructured Surfaces (Adv. Funct. Mater. 2018)
 - Exploring the Role of Habitat on the Wettability of Cicada Wings (ACS AMI, 2017)
 - Jumping Droplet Active Hot-spot Cooling (Appl. Phys. Lett. 2017, pii 인용 64회)
- Cross-disciplinary collaborative research experience in sciences and engineering
- Worldwide collaborative research network all over North America, Europe & Asia
- Key Research Sponsors: NRF, KOFAC



Major Research Topics

- BETTER Lab, Dept. of Mechanical Engineering (<http://better.hanyang.ac.kr>)
- (Bio-inspired Energy and Thermal Transport Engineering Research Laboratory)
- Multidisciplinary, collaborative research expert on mechanical/electrical/chemical/nano/bioengineering & materials science, biology and medicines
- Published research articles in Advanced Functional Materials, Nano Letters



Research Keywords

#Phase change heat transfer, #thermal engineering, #interfacial science, #nature-inspired engineering, #nanoengineered surface, #wettability, #functional surface

Research Objectives

- Engineering Better Human Life using Thermofluidics and Interfacial Science**
- Various functionalities of natural surfaces for the solutions of engineering problems
- Advanced thermal management systems for electronics, batteries and other thermal engineering systems
- Nanoengineered surfaces to enhance interfacial phenomena and thermofluidic transport
- Transport phenomena on nanoengineered surfaces addressing Energy-Water-Environment-Health Nexus Problems



Research Topics

Phase Change Heat Transfer and Surface Wettability

Lower surface energy
Higher roughness

CA: 0° 30° 90° 150° 180°

Superhydrophilic Hydrophilic Hydrophobic Superhydrophobic

<Wettability of Water – Characterized by Contact Angle >

Nature-Inspired Nanoengineered Surfaces

Anti-reflective

Surfaces with desirable wettability

(Multifunctional Nature-Inspired Nanoengineered Surfaces - ex: Insect wings)

(Dissolvable Template Nanoimprinting Lithography) - Creative, Cost-effective and Efficient NIL

(Surfaces Inspired by Extreme Conditions in Nature)

Advanced Thermal Management Systems using Phase Change Heat Transfer

Hot Spots from GaN Transistors

Cold Superhydrophobic Surface

(Electronics Cooling) (Jumping Droplets Cooling) (Liquid Bridge Confined Boiling)

Collaborative Research Fields

- Thermofluidic Transport and Interfacial Phenomena in Sciences and Engineering**
- Cross-disciplinary collaborative research action related to interfacial phenomena & thermofluidic transport
- Experienced in multidisciplinary collaborative research → expecting effective and synergetic collaboration
- Examples of collaborative research projects:
 - Biology: Interfacial and transport phenomena observed in nature such as plants, insects and animals
 - EE: High power electronics cooling for enhanced performance and device lifetime
 - Pharm&Med: Surgical and interventional instrument, drug delivery, microfluidics and nanomaterials
 - ChemE, Mat.SE: Durable and functional nanomaterials and coatings
- Other collaborations are welcomed regarding wettability, phase change, heat transfer, fluids and else.



Major Research Topics

- standardization expert with various activity such as the domestic chairman of ISO/TC 153 and member of committee for KATA standardization technology
- Research on eco-friendly technology applying cavitation
- Design optimization of various fluid machines through flow analysis

Research Keywords

#Fluid engineering, #CFD, #Flow control, #Cavitation, #Standardization

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Brief

- An experimental study of the possibility of application of hydrodynamic cavitation to washing plastic waste
- (NRF, 2021~2022)
- Cooling capacity measurement system development for EV fast charging cable
- (NRF 2021~2022)
- Development of standard for industrial valve actuators and reducers
- (KEIT, 2015~2019)
- Prime Minister`s commendation in standardization sector(2006)
- Best Researcher in technology transfer sector (2008, Hanyang University)
- ISFMFE "Best Paper Award"(2016)

Research Objectives

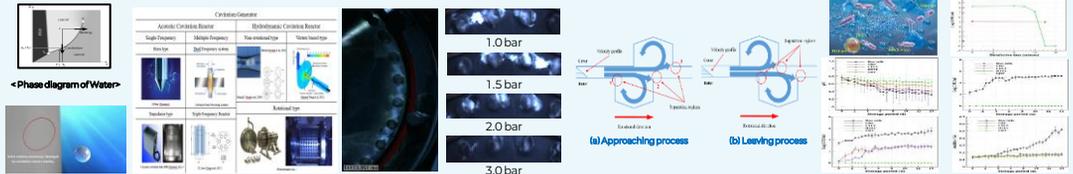
- Analysis and applied research of fluid flow through numerical simulations and experiments
- Eco-friendly technology research using fluid flow
- Design optimization of various fluid machines through flow analysis
- Development of Algorithms applying AI for lowering computational cost



Research Topics

Eco-friendly technology using cavitation

- Inactivation mechanism**
- Mechanical effect: destruction of cell membranes
- Thermal effect: thermal inactivation effect
- Chemical effect: oxidation effect resulting from the reactive free radicals



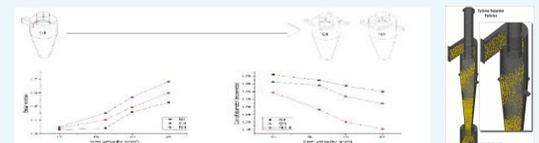
Cooling of super fast charging cable for EV

- Heat generation from connection between charging cable and connector during super fast charging
- Problem with lowering charging time and safety issue
- Direct cooling of charging cable using insulating oil



Research on dust collection by cyclon separator

- Numerical investigation of 2 novel designs of four-inlet cyclone separator
- The design N4 is the best
- Four-inlet cyclone separator provides better performance than single-inlet one



Collaborative Research Fields

- Analysis of the effect of hydrodynamic cavitation on material surface**
- The global trend for plastic disposal is the transition from the existing linear economy to the circular economy through reuse and recycling.
- Korea took an economic benefit from 53.7% of plastic, but this value includes incineration for energy recovery, that is, 22.7% of plastic were circulated into the economy.
- The problem of the plastic cleaning process is 1. residual contaminants 2. deodorization 3. wastewater
- It is expected that the recycling rate can be improved by applying hydrodynamic cavitation to solve this problems

Investigation on washing effect on plastic surface through cavitation

- Investigation on washing principle and
- Investigation of working principles and effectiveness of removing odors from plastic
- Analysis of surface defect of plastic due to cavitation

Analysis of chemical change due to cavitation

- One of the disadvantages of recycling plastic through mechanical recycling is the deterioration of quality due to thermal-mechanical degradation
- Investigation on the relationship between local extreme conditions of washing and thermal-mechanical degradation due to hydrodynamic cavitation



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Brief

- Professor, Department of Mechanical Engineering, Hanyang University (1993 ~ Present)
- President, Korean Society of Automotive Engineers (KSAE) (2021 ~ 2021)
- President, Future Mobility Power Division & Automotive Technology Roadmap Committee (2018 ~ 2020)
- Director, Human Resource Development Center for High-Efficiency Transportation and Energy Reduction Technology (2017 ~ 2022)
- Dean, Industry-University Cooperation Foundation & Dean of Research Affairs, Hanyang University (ERICA) (2015 ~ 2017)
- Full Member, National Academy of Engineering of Korea (NAEK) / Member, Korean Academy of Automotive Engineering (KAAE) (2018 ~ Present)
- Director, Small and Medium Business (SMB) Industry-University Cooperation Center (2013 ~ Present)
- Director, Korea Automobile Environmental Association (KAEA) (2013 ~ 2015)
- Researcher, Central Research Institute, NISSAN Motor Co., Ltd., Japan (1989 ~ 1993)
- Researcher, Technology Development Division, KAWASAKI Heavy Industries, Ltd., Japan (1989 ~ 1989)

Major Research Topics

- Development of engine technology for alternative fuel (LPG) application
- Engine exhaust heat/energy recovery and management
- Optimization of engine performance and power generation for EREV and APU generators
- Optimization of energy consumption and exhaust emissions for hybrid systems

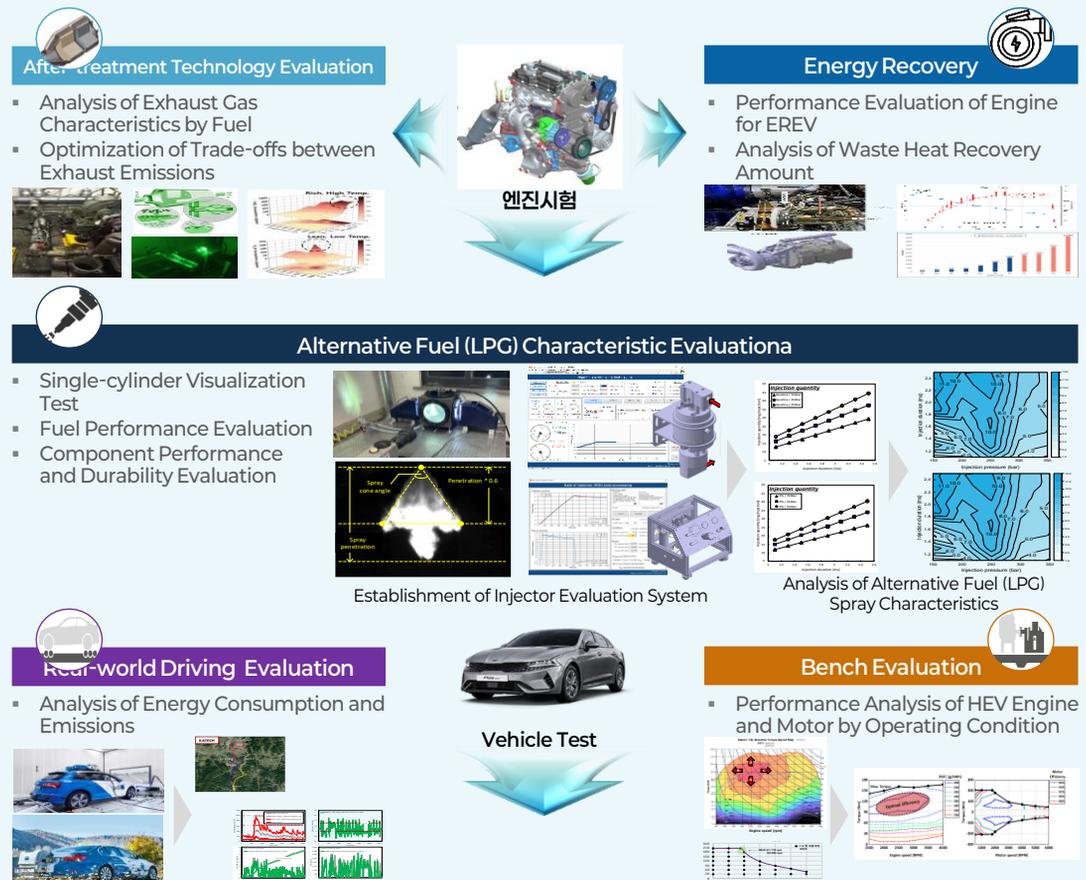
Research Keywords

#Engine Combustion Characteristics, #Optical Diagnostics for Spray and Flow Field Measurement, #Heat/Energy Recovery, #After-treatment Technology, #Real-world Driving Evaluation

Research Objectives

- Engine Combustion Analysis, Spray Visualization & System Development**
- Development of Engine Power Generation for EREV
- Energy Recovery & Management
 - turbo compounding using exhaust energy and PCM-assisted coolant pre-heating.
- Alternative Fuel Engine Performance & After-treatment Feasibility Evaluation on Engine Dynamometer

Research Topics



Collaborative Research Fields

- AI-based Energy/Emission Prediction (from Real-world Data)
- Power Generation from ICE Waste Heat & PCM Storage
- Technology for improving thermal efficiency and reducing emissions in engines using eco-friendly fuels.
- Hybrid/EREV Integrated Energy Management (via Waste Heat Recovery)



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Brief

- Assistant Professor, Hongik Univ. (1997.9 – 1998.8)
- Prof. in Mechanical Eng., Hanyang Univ. (1998.9 –)
- Advisor, Kyunggi Technopark (2000.5 –)

Selected Papers

- Analysis of ductile mode and brittle transition of AFM nanomachining of Silicon, International journal of machine tools and manufacture, 61, 71-79, 2012.
- Prediction of Burr Types in Drilling of Al-7075 Using Acoustic Emission and Convolution Neural Networks. IEEE Access, 10, 67826-67838
- Funding sources: Korea Construction Equipment Technology Institute/ Korea Technology & Information Promotion Agency for SMEs, TIPA/Korea Evaluation Institute of industrial Technology/National Research Foundation of Korea/ BK21 Four research center

Major Research Topics

- Process modeling of precision machining
- Sensor monitoring for ultra-precision machining process control
- Advanced manufacturing process development and analysis

Research Keywords

#Acoustic emission, #AE sensor, #Ultra-precision machining, #Advanced Manufacturing, #process Monitoring, #Sensor monitoring, #Sensor fusion, #A.I

Research Objectives

- Development of in-line AFM-based electrical property measurement and inspection system
- Development of automatic repair system through hybrid AFM-based measurement /analysis
- Manufacture of smart non-destructive sensor with variable sensitivity and development of related measurement/analysis-based basic technology
- Material microcrack detection through machine learning-based PVDF sensor signal processing technology development

Research Topics

<p>Precision Machining process</p>	<p>Nano Scratch Test</p>	<p>Vehicle Scratch Test</p>	<p>Magnetic abrasive finishing</p>
<p>Sensing system</p>	<p>Nano Scratch Test</p>	<p>Vehicle Scratch Test</p>	<p>Magnetic abrasive finishing</p>
<p>Signal analysis</p>	<p>Nano Scratch Test</p>	<p>Vehicle Scratch Test</p>	

Collaborative Research Fields

- Process monitoring system development and sensor development using acoustic emission sensor

AFM	Advanced manufacturing	3D printing	Sensor development
<ul style="list-style-type: none"> Development of Nanoscale Process Automation System 	<ul style="list-style-type: none"> Production of acoustic sensors applicable to advanced manufacturing processing using materials such as PVDF and PZT 	<ul style="list-style-type: none"> Improvement of precision and development of fully automated system through the application of 3D printing process monitoring technology 	<ul style="list-style-type: none"> Development of piezoelectric sensor fusion platform



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Brief

- Published research papers in Science, Nature Nanotechnology, etc.
- Founded a venture company (E&M devices, Inc.) in USA
- Major funding source: NRF (National Research Foundation of Ko)

Major Research Topics

- 나노바이오 기계시스템 연구실 (<https://sites.google.com/site/nanobiohanyang/>)

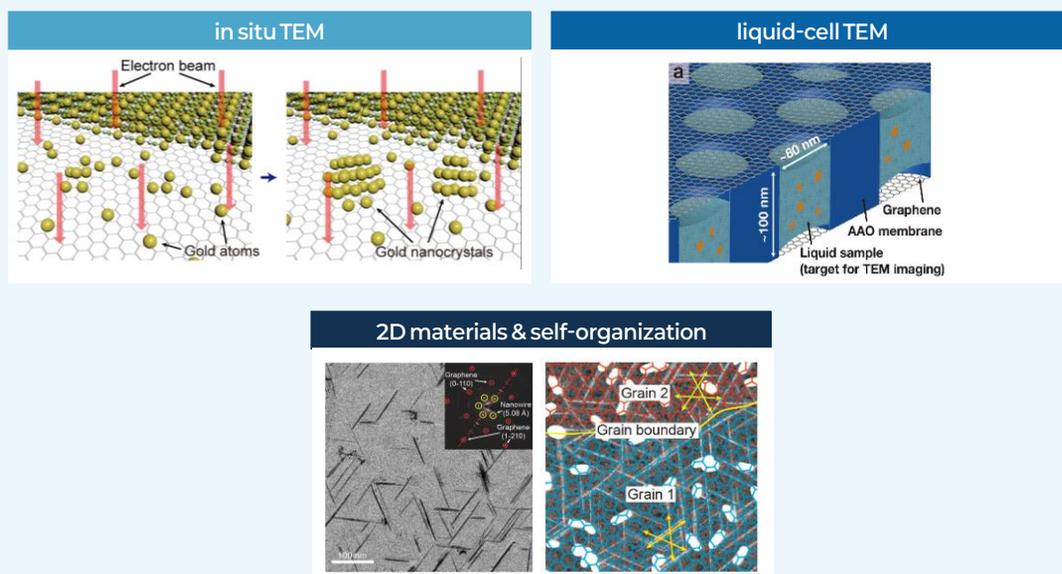
Research Keywords

#in situ TEM, #self-assembly, #liquid-cell TEM, #nanofabrication, #graphene, #MEMS, #2D material, #nanocrystal

Research Objectives

- Collaborative research in interdisciplinary fields including mechanical engineering, MEMS, nanoscience, bioengineering, electrical engineering, material science, chemistry, biology, etc.
- Starting his research career from BioMEMS and microfluidics areas and studying interdisciplinary areas in nanoengineering and nanoscience
- Recent research focus: in situ TEM, liquid-cell TEM, 2D materials, self-organization, and nanocrystal

Research Topics



- Reversible Disorder-Order Transitions in Atomic Crystal Nucleation, Science 2021.
- A Large-Scale Array of Ordered Graphene-Sandwiched Chambers for Quantitative Liquid-Phase Transmission Electron Microscopy, Advanced Materials 2020.
- Ligand-Dependent Coalescence Behaviors of Gold Nanoparticles Studied by Multichamber Graphene Liquid Cell Transmission Electron Microscopy, Nano Letters 2020.
- Precise Identification of Graphene's Crystal Structures by Removable Nanowire Epitaxy, Journal of Physical Chemistry Letters 2017.
- Graphene-templated Directional Growth of an Inorganic Nanowire, Nature Nanotechnology 2015.

Collaborative Research Fields

- Nano/micro-scale observation, analysis, fabrication based on TEM, 2D materials, and self-organization



Major Research Topics

- Measurement system and sensor development
- Measurement of machine error motion and form error
- Development of precision positioning technology
- Surface form measurement of machined product surfaces through 3D vision technology

Research Keywords

#Precision Measurement, #Sensor Development, #Driving Error, #Form Error, #3D Vision Measurement

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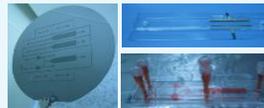
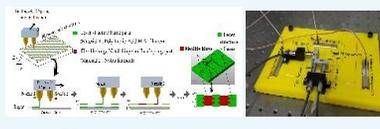
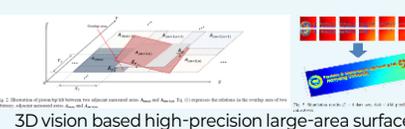
Brief

- Professor, Hanyang Univ. Mechanical Engineering, (1995~)
- KIST Brain-Pool Researcher (1994~1995)
- 49 research papers published in renowned international journals and conferences
- 105 research papers published in renowned domestic journals and conferences

Research Objectives

- Development of precision measurement systems for Multi-D.O.F. error motions of rotational and linear devices
- Development of precision measurement system for form error of mechanical parts and products
- Precision motion control system development for linear and rotational devices through error motion compensation
- Multi-DOF motion measurement and high-precision measurement system for large area surfaces mechanical parts through 3D vision

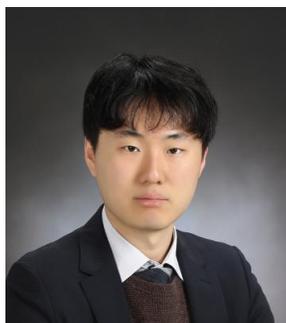
Research Topics

Measurement of machine error motion and form error	 Nano Scratch Test	 Vehicle Scratch Test	 Magnetic abrasive finishing
Measurement of machine error motion and form error	 Linear machine error motion and form error measurement	 Rotational machine error motion and form error measurement	
Development of precision positioning technology	 Multi-DOF Nano-positioning stage	 3D printed nano-positioning stage	
Development of 3D vision technology	 3D vision based high-precision large-area surface measurement system		 3D data measurement through stereovision

Collaborative Research Fields

- Development of smart manufacturing and monitoring technology based on high-efficiency, high-quality sensing systems

Smart Sensor	Sensor Fusion	3D Printing	Stereovision
<ul style="list-style-type: none"> ▪ Precise error motion monitoring and control system of real-time linear and rotary drive systems ▪ Detailed monitoring of product state based on vision systems 	<ul style="list-style-type: none"> ▪ Improvement of registration, processing speed, and accuracy through fusion of several different data obtained by multiple sensors ▪ Ultra-precision registration of area data obtained by multiple sensors ▪ Ultra-precision measurement and self-calibration technology through error separation of multiple sensor data 	<ul style="list-style-type: none"> ▪ 3D printed non-assembly precision force sensor design and fabrication technology based on 3D Printing ▪ Precision Multi-D.O.F Nano-positioning stage design and fabrication technology through 3D Printing 	<ul style="list-style-type: none"> ▪ Development of precision measurement system using precision and compact stereo vision ▪ Large-area precision measurement technology through stereovision



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Brief

- Published more than 90 SCIE papers (h-index: 40, i10-index: 67, Total citation: 8,040 from Google Scholar)

Selected publications

- Nature communications 12 (1), 1-11 (2021)
- Advanced Functional Materials 31 (1), 2170002 (2021)
- Advanced Materials 30 (5), 1703878 (2018)
- ACS nano 11 (12), 12311-12317 (2017)
- Collaboration with domestic/international institutes including KAMIC of KITECH, KERI, Laser Thermal Lab at UC Berkeley,, HiLASE center for the development of ultrafast laser and the relevant optical processing
- Research sponsors: NRF, ADD, KITECH, etc.

Major Research Topics

- Optical nanoprocessing Laboratory (<https://sites.google.com/site/onlhanyang>)
- Development of selective laser process techniques for targeted materials
- Fabrication of electrical/optical/mechanical devices
- Published research articles in Advanced Materials, ACS Nano, Nature Communication

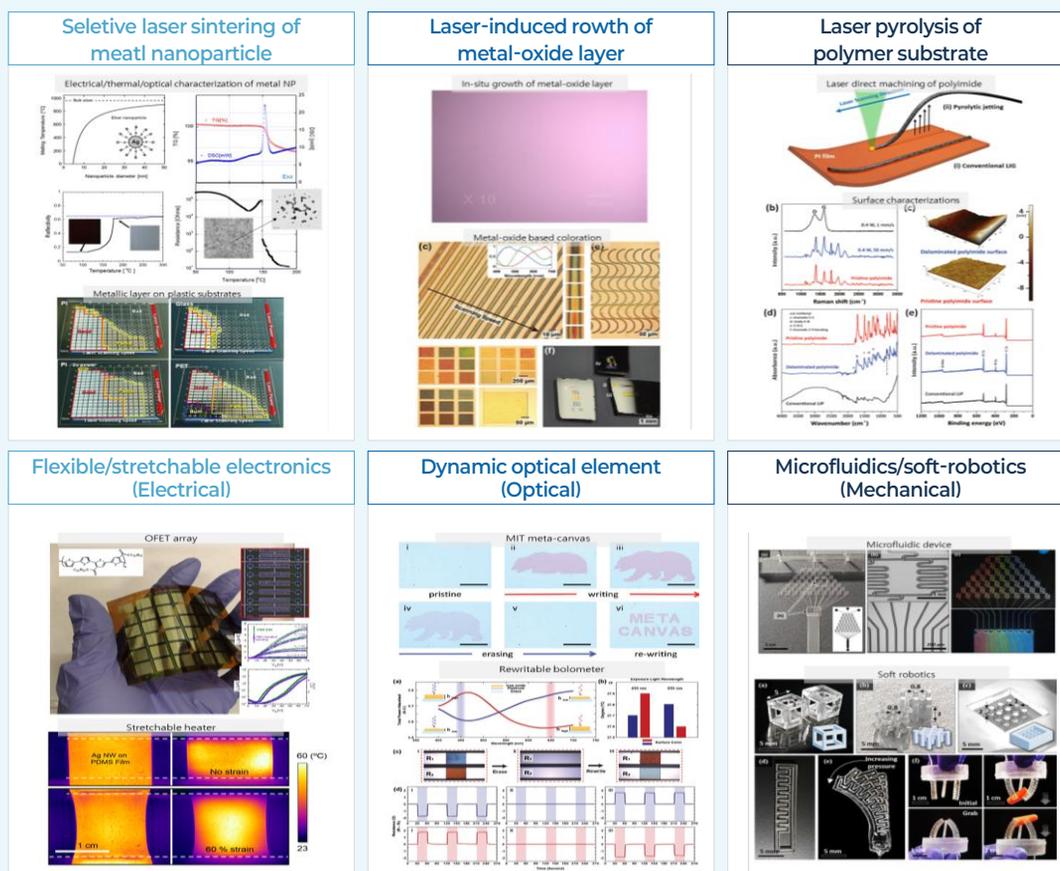
Research Keywords

#selective laser process, #ablation, #sintering, #pyrolysis, #nanomaterial synthesis

Research Objectives

- Analysis of photothermal/photochemical reaction by continuous or pulsed laser, Development of selective laser process
- Selective laser sintering for metal nanoparticles
- Selective laser nanowelding of metal nanowires
- Laser-induced growth of metal oxide layer
- Laser pyrolysis of polymer films
- Applications: electrical/optical/mechanical devices

Research Topics



Collaborative Research Fields

Selective laser process for emerging materials

Materials	Laser source	Applications
<ul style="list-style-type: none"> Hydrogel Conducting polymer 3D printable materials 	<ul style="list-style-type: none"> Femtosecond laser SLM based beam shaping Burst mode 	<ul style="list-style-type: none"> Microfluidic devices Untethered microrobots Wearable devices