Bio Photonic Machine System & Image Processing Lab.

Prof. Ki Hean Kim
(kiheankim@postech.ac.kr)

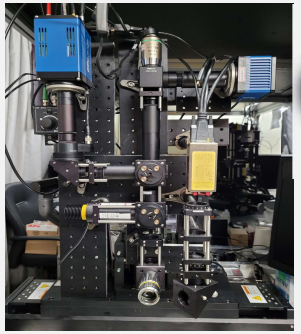
https://sites.google.com/site/bmoptics5

Mission

Developing optomechanical systems to address challenges in medicine and biology

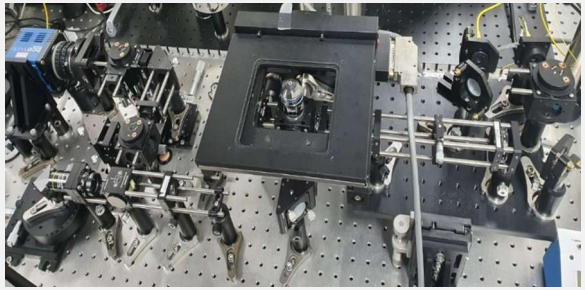
Research areas

- ○ Advanced optical microscope systems to overcome current limitations
  - ▪ Novel high-performance optical microscope systems including linear 3D confocal, nonlinear high-depth two-photon, high-speed 3D light sheet, and non-contact extended depth-of-field microscopy etc. & multifunctional optical coherence tomography (OCT)
- ○ Computational technologies including AI for image processing and feature extraction
  - ▪ Image processing algorithms and imaging system modeling
- ○ Medical research: early precision diagnosis/ surgical guidance
  - ▪ Non-contact conjunctival goblet cell examination in human eyes for dry eye diagnosis (In collaboration with SNU Hospital, Seoul, Korea)
  - ▪ High-speed optical tissue scanner and AI image analysis for rapid pathology examination (Asan Medical Center, Seoul)
  - ▪ Ultra-fast microscopy and AI image analysis to guide brain tumor and skin cancer surgery (Severance Hospital, Seoul)
- ○ Biological research: in vivo cancer/immune/neuronal cell biology
  - ▪ Neuronal and immune cell interactions in the brain, cornea, and retina

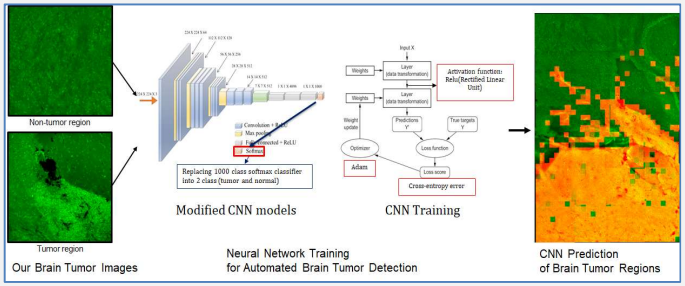


Eye exam

3D optical pathology



Optomechanical imaging systems



Brain tumor detection

AI based cancer detection

Lab. for MARCH

Prof. Keehoon Kim

MARCH Lab.
Robotics and Bionics

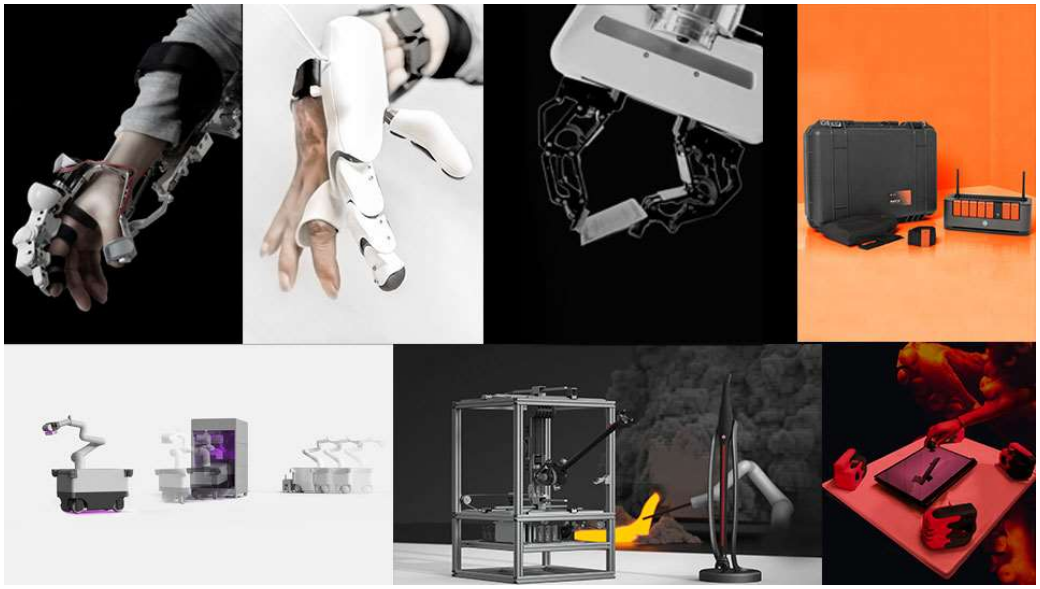
"We design intelligent assistant robots that extend human capability
through intuitive and immersive human-robot interfaces",
Keehoon Kim 2007

Robotics
- Autonomous Manipulation
- Mechanism Design Synthesis
- Haptics & Haptic Interface
- Teleoperated Robotic System in Extreme Environment

Bionics
- Invasive-type Peripheral Nerve Interface
- Non-Invasive Bionic Signal Sensors, sEMG sensors
- Bionic Signal Classification & Clustering
- Prothesis Design and Control

website: http://march.postech.ac.kr

Selected Research Achievements
- sEMG based human motion prediction system (MATCH)
- Upper limb exoskeleton system for the elderly and disabled (KULEX)
- Robotic Prosthesis for Partial Hand Amputation (ReFill)
- Fully Passive Robotic Finger (Omega Gripper)
- Cable-Driven Mobile-Type Haptic Interface (Octopus)
- Haptic Interface for High-Risk Steel Production Tasks (POSTICK)



Materials Processing & Integrated Biosystems Lab.

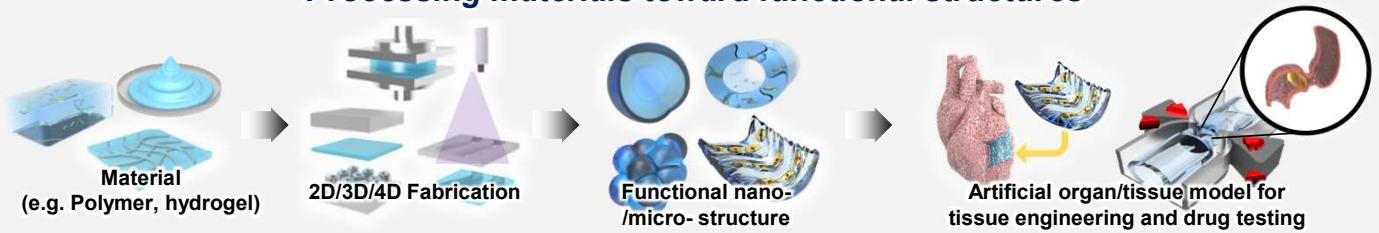
Prof. Dongsung Kim
(smkds@postech.ac.kr)
https://mib.postech.ac.kr

Mission

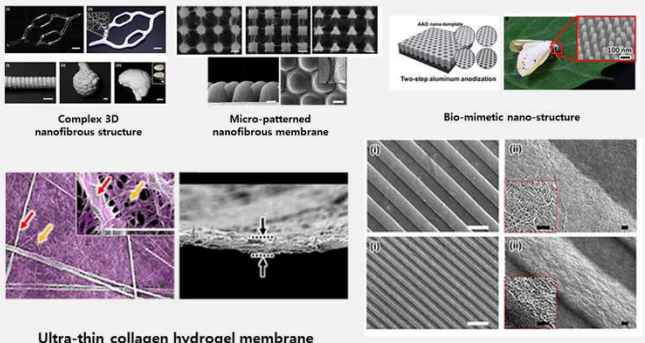
- Advancing multi-dimensional (2D/3D/4D) manufacturing technologies across various materials to develop artificial tissues/organ models for tissue engineering and *in vitro* drug test applications (e.g., Organoids, Organ-on-a-chip, 3D cell culture platform, etc.)

Research areas

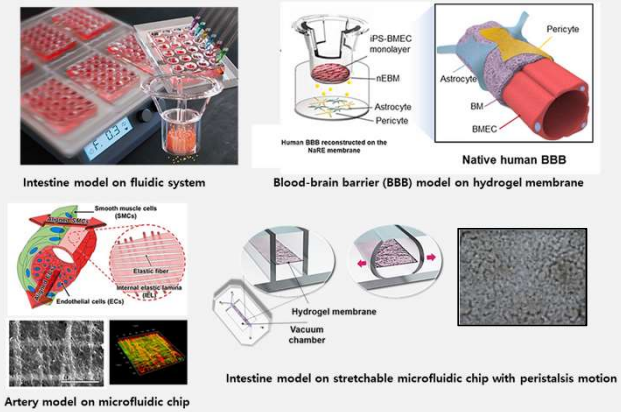
Processing materials toward functional structures



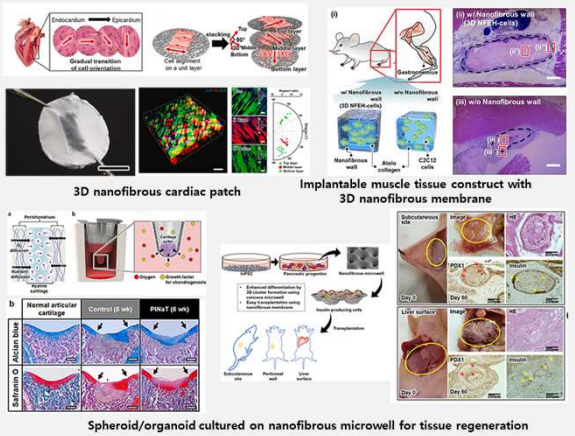
Polymer & Hydrogel Processing



In vitro artificial organ model



Artificial tissue for *in vivo* implantation



Laser Processing & Microscale Heat Transfer Lab.

Prof. Dongsik Kim
(dskim87@postech.ac.kr)

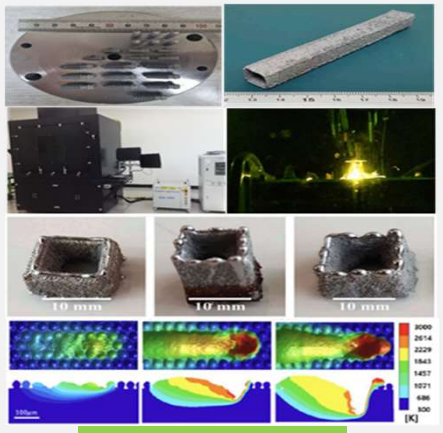
http://lpmht.postech.ac.kr

Mission

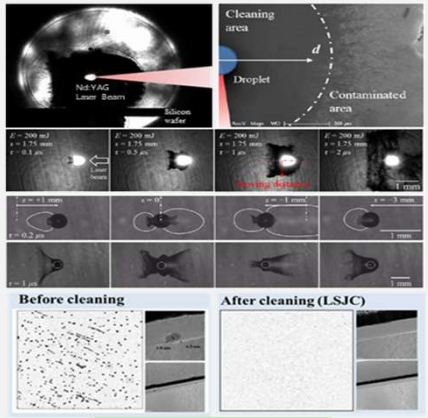
The Laser Processing and Microheat Transfer Laboratory aims to develop various applied technologies for advanced material processing processes such as metal 3D printing and semiconductor cleaning based on basic research on laser-material interaction and micro energy transfer/conversion.

Research areas

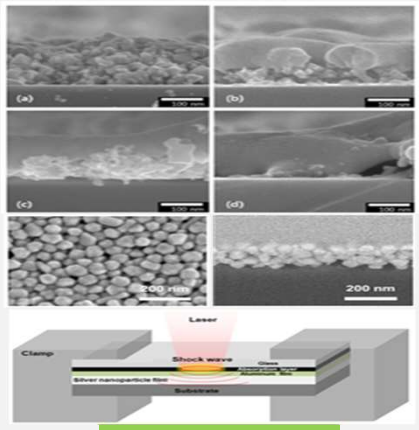
- ◯ Development and analysis of various micro/nano fabrication processes using lasers
- ◯ Development of laser metal 3D printing processes
- ◯ Development of laser surface cleaning techniques
- ◯ Development of thermal-sensing techniques and micro sensors



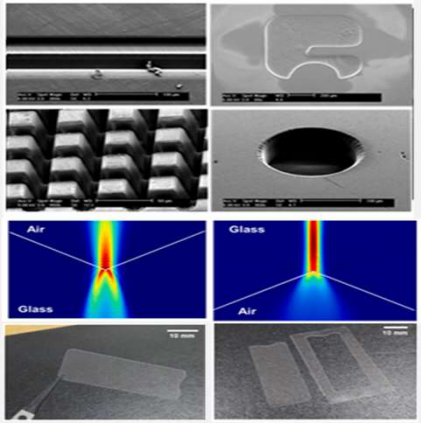
Laser 3D Printing



Laser Cleaning

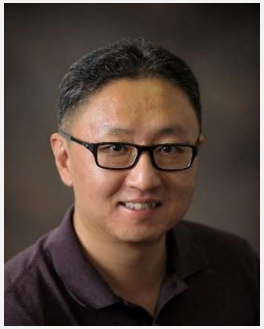


Laser Sintering



Laser Fabrication

Multifunctional Materials & Micro/nanosystems Lab.



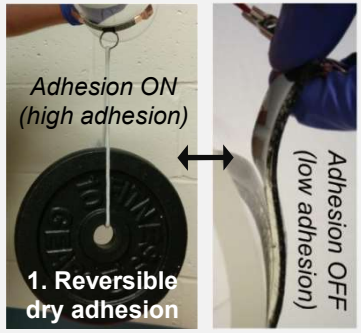
Prof. Seok Kim
(seok.kim@postech.ac.kr)
https://3mns.postech.ac.kr

Mission

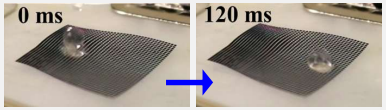
To establish the understanding needed to design and manufacture materials, devices, and systems with multifunctionalities

Research areas

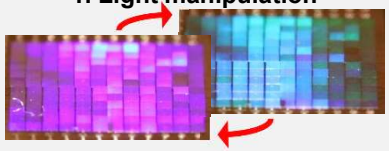
- ○ Biomimetic Smart Surfaces
  - ▪ Reversible dry adhesion & tunable wetting & light manipulation
- ○ LEGO-like Microassembly
  - ▪ Heterogeneous integration for semiconductor and display technology
  - ▪ Microelectromechanical systems (MEMS)
- ○ Soft Micro Robotics
  - ▪ Digital microfluidics platforms

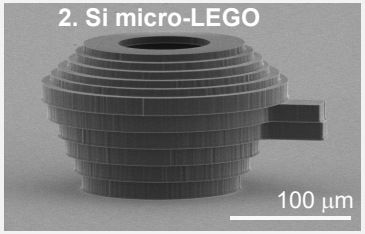


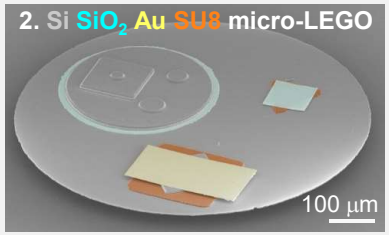
1. Tunable wetting



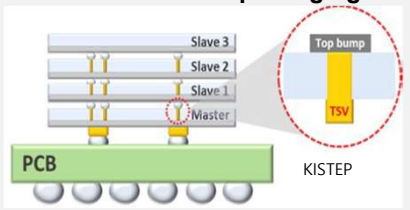
1. Light manipulation





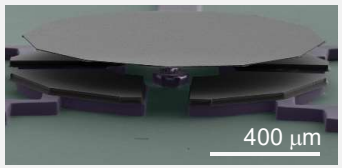


2. Semiconductor packaging



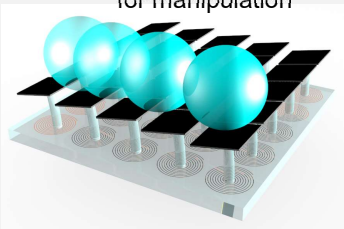
2. Micro-LED, QD-LED display

2. MEMS



3. Soft micro robot platforms

for manipulation



MEMS & NANOTECHNOLOGY Lab.

Prof. Joonwon Kim
(joonwon@postech.ac.kr)

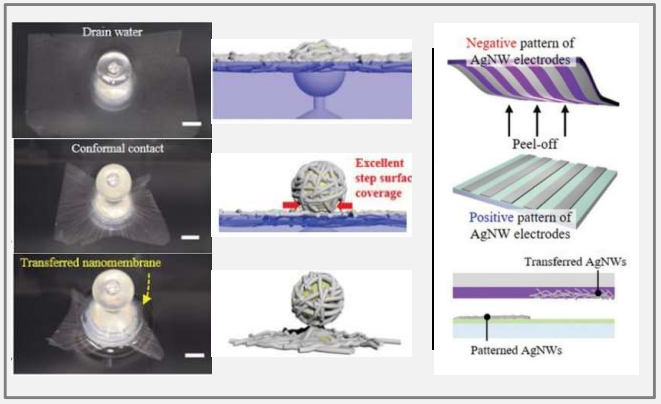
http://mnt.postech.ac.kr

Mission

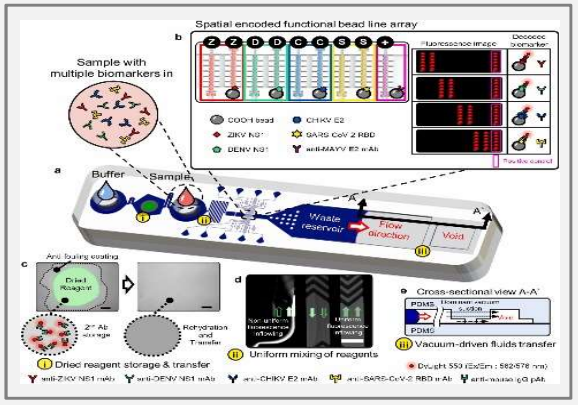
Combining MEMS technology and nanotechnology with creative ideas to develop and apply products that are useful in real life through practical research.

Research areas

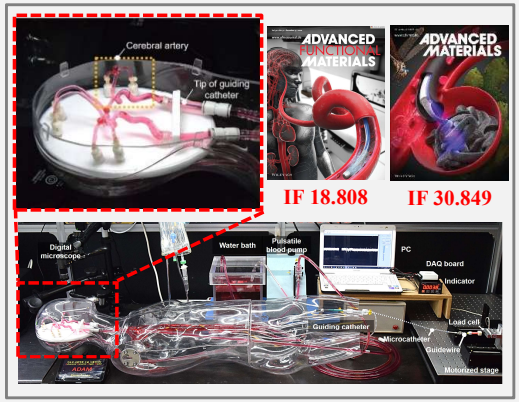
- ○ Surface modifications for various applications and theoretical analysis
- ○ MEMS sensors: accelerometer, force sensor, flexible touch sensor
- ○ Microfluidic applications: heteroparticle co-locating systems, In-vitro diagnostic chips
- ○ Biomedical devices: endovascular treatment system, endovascular simulator



MEMS sensors
(MEMS fabrication)



Microfluidic applications



Biomedical devices

Continuum Mechanics with Computer Vision and Soft Electronics

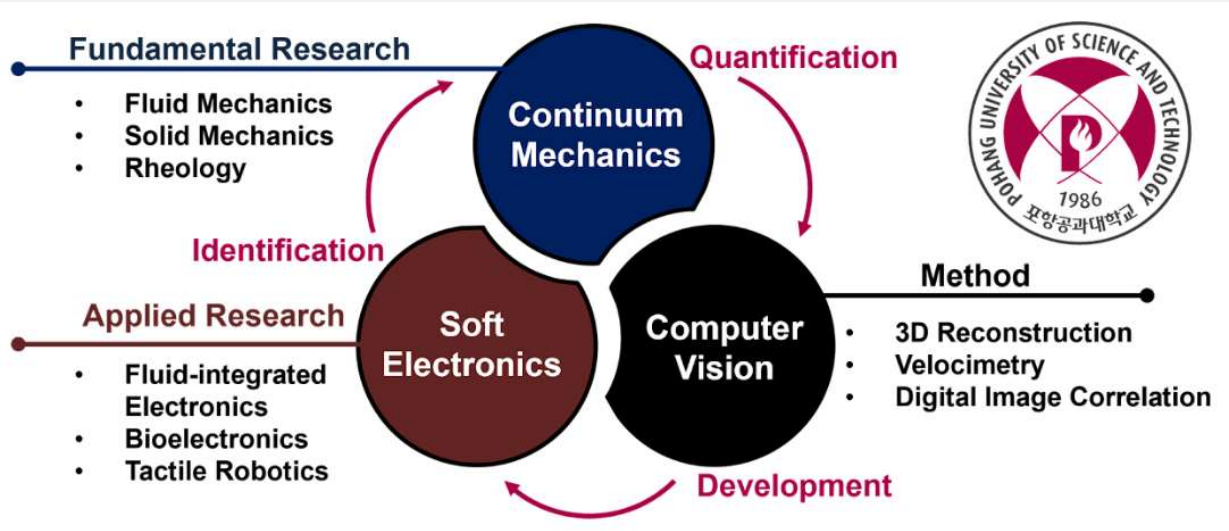
Prof. Jin Tae Jimmy Kim
(jimmy516@postech.ac.kr)
https://sites.google.com/view/mechanicslab/

Research areas

Our research focuses on experimental and theoretical **continuum mechanics** with **computer vision** techniques and **soft electronic** devices.

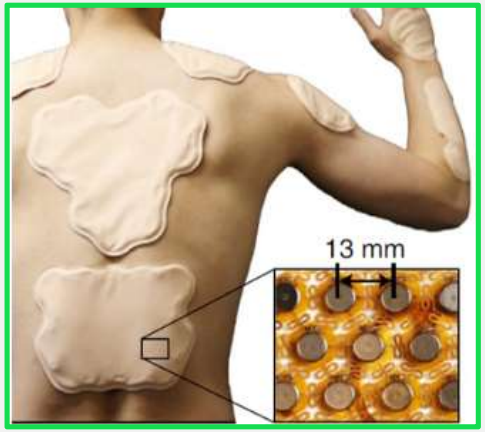
Applications

- Aerodynamics
- Hydrodynamics
- Astronautics
- Environment
- Health
- Haptics



Fluid Mechanics

Fluid-integrated Electronics



Tactile Robotics

Bio Optics and Acoustics Lab.

Prof. Chulhong Kim

(chulhong@postech.ac.kr)

http://www.chulhongkim.com/

Mission

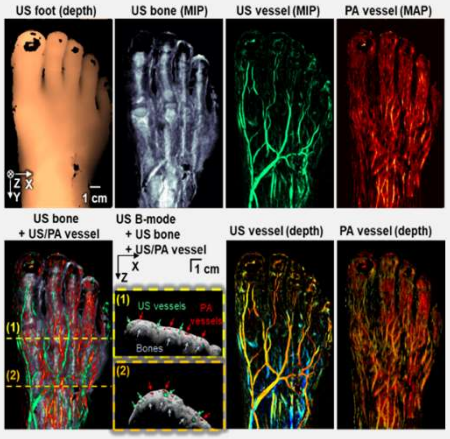
Research: From Bench to Bedside, From Innovative Ideas to Commercial Products

Education: Great place for training next-generation leaders on IT based medical devices, greatly contributing to the transformation of healthcare in the 21st century

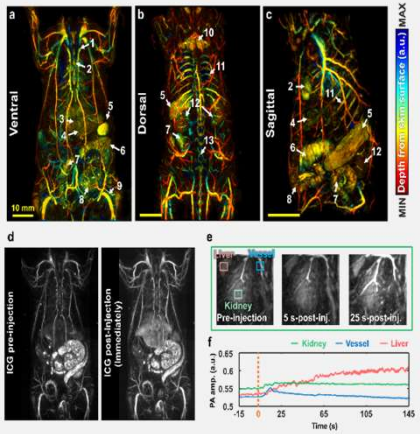
Research areas

- ○ Multimodal Imaging: Photoacoustic/Ultrasound/Optical/AFM/RF/Magnetic
- ○ High Performance Computing (CPU/GPU/DSP), Processing, and Artificial Intelligent in Healthcare
- ○ Digital Healthcare
- ○ Medical Device Commercialization

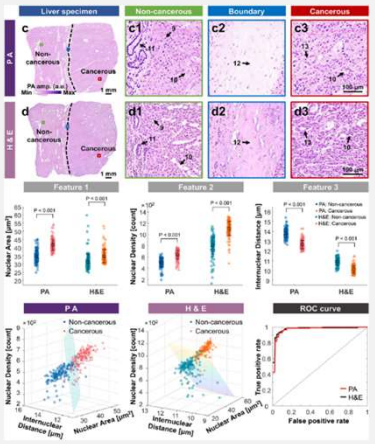
PA/US Peripheral Angiography



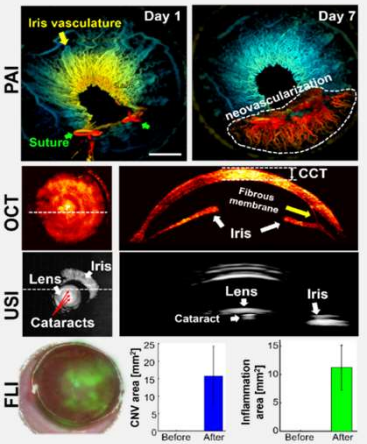
PA Preclinical imaging



UV-PAM virtual H&E



Multi-modal PAM



Nanoscale Photonics & Integrated Manufacturing Lab.

Prof. Junsuk Rho

(jsrho@postech.ac.kr)

http://photonics.postech.ac.kr

- **2007 BS SNU, Mechanical and Aerospace Engineering**
- **2008 MS UIUC, Mechanical Engineering**
- **2013 PhD, UC Berkeley, Mechanical Engineering**
- **2013-2013 Postdoc, Lawrence Berkeley National Laboratory**
- **2013-2014 Principal Investigator, Argonne National Laboratory**
- **2014~present, Professor, POSTECH Mechanical/Chemical/Electrical Engineering**
- **2019- present, *Mu-Eun-Jae* Endowed Chair Professor**
- **2021- present, Director of the Center for Flat Optics and Metaphotonics**
- **2021- present, POSTECH Young Distinguished Professor**

Research

✓ **Research Areas**
- Metamaterials and Metasurfaces
- Nanoscale Optics and Photonics
- Nanoprocessing and Nanofabrication
- Display and Imaging
- Acoustic/Elastic Metamaterials
- AI Design Applications

✓ **Total paper achievements**
- Total number of papers : 320
- Total citations : 17,000
- h-index: 71

✓ **Major Awards**
- ACS Nano Lectureship, 2024
- Clarivate Highlit Cited Researcher, 2023
- *Hong Jin Ki* Creator Award, 2022
- Young Engineers Award, National Academy of Engineering, 2021
- 100 Next Generation Leaders, SISA Journal, 2020-2023
- MNE/MEE Young Investigator Award, Elsevier, 2020
- MINE Young Scientist Award, Springer-Nature, 2020
- Presidential Early Career Award, Korean government 2019
- Minister's Commendation, Korean government, 2019, 2021

✓ **Journal Editor**
- Light: Science and Applications (Springer-Nature)
- Microsystems and Nanoengineering (Springer-Nature)
- npj Nanophotonics (Springer-Nature)
- Nanophotonics (Springer-Nature)
- … 10 mnore

Publications

✓ **Representative research in the last 5 years**

1) *Nature* 592, 54-59, 2021 **(IF 69.504, JCR 1% 이내)**
2) *Nature* 556, 360-365, 2018 **(IF 69.504, JCR 1% 이내)**
3) *Nature Materials* 22, 474-481, *2023* **(IF 47.656, JCR 1% 이내)**
4) *Nature Nanotechnology* 16, 508-524, 2021 **(IF 40.523, JCR 1% 이내)**
5) *Nature Nanotechnology* 15, 948-955, 2020 **(IF 40.523, JCR 1% 이내)**

Lab activities

- **Most of the PhD graduates get faculty appointments**
- Global recognition (Forbes "Influential Leaders" and more)
- 50+ active PhD graduate students working on research and industrialization of metamaterial source technology
- Support for study abroad

Vibration and Acoustic Transducers Lab.

Prof. Wonkyu Moon

(wkmoon@postech.ac.kr)
http://vatrans.postech.ac.kr

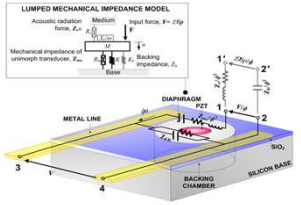
- **Wonkyu Moon**
- **Professor, POSTECH**
- **B.S. 1984 Seoul Nat'l Univ.**
- **M.S. 1986 KAIST**
- **Ph.D. 1995 U. Texas at Austin**

Mission

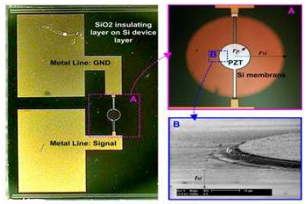
Since 1998, our VATrans lab. (Vibration and Acoustic Transducers laboratory) has investigated vibration and acoustic related systems. Final targets are systems for applications, and physical modeling is also performed to understand the profound meaning. Engineering innovations can be realized by the system based on understanding of physical meaning. Main topics are transducers based on vibration and acoustics, and nowadays, we extend our research fields to nanotechnology and bio applications. In each field, our lab members always do our best to be world first class.

Research areas

pMUT application for Parametric array



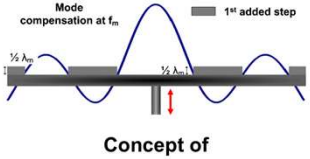
Lumped parameter model of thin-film transducer



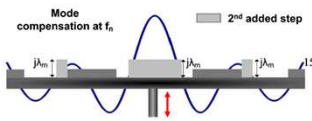
Fabricated pMUT

Stepped plate application for Parametric array

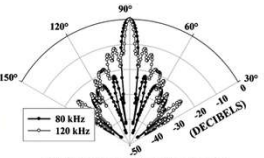
Mono & Bi-Frequency Stepped Plate Radiator



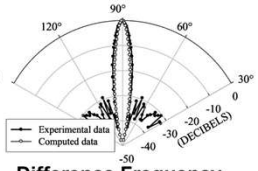
Concept of Mono-Frequency Steps



Concept of Bi-Frequency Steps

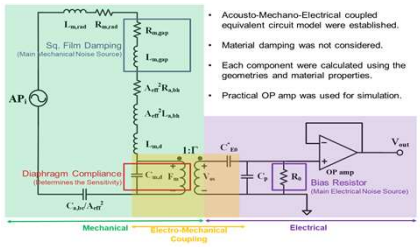


Primary Frequency Wave Generation



Difference Frequency Wave Generation

Polymer-Based Design High Fidelity MEMS Microphone

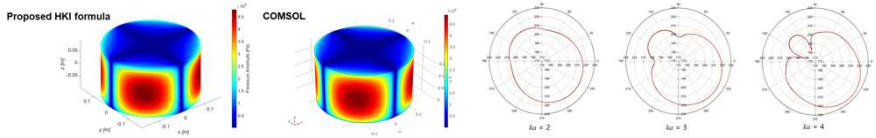


- Acousto-Mechano-Electrical coupled equivalent circuit model were established.
- Material damping was not considered.
- Each component were calculated using the geometries and material properties.
- Practical OP amp was used for simulation.

Acoustic field simulation by 3-dimensional Boundary Element Methods

Interval vibration on side surface

Partial vibration on side surface



Innovative Medical Solution

Prof. Sung min Park
(sungminpark@postech.ac.kr)
https://www.ims-postech.com/

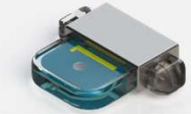
Mission

Engineering for Diagnostics and Therapeutics & Designing for Future Healthcare

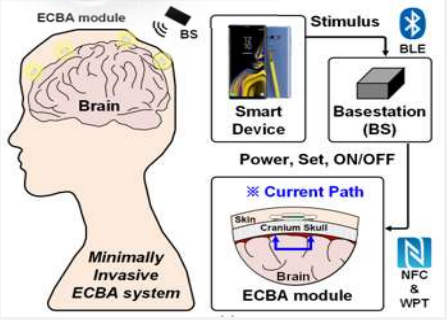
Research areas

- ○ Miniaturized active implantable medical devices
- ○ Noninvasive or minimally invasive sensors
- ○ Closed loop digital therapeutics with biosignal sensing
- ○ AI based medical decision algorithm

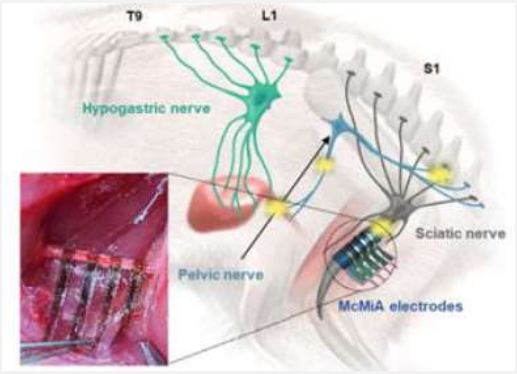
Brain Stimulation



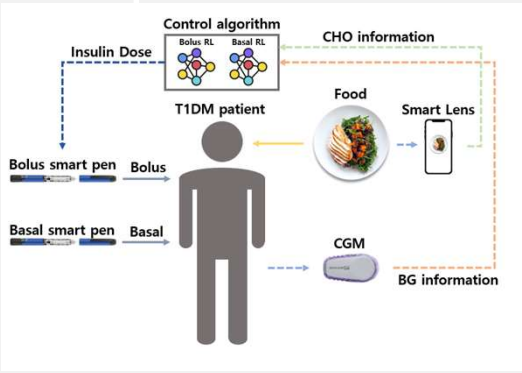
Implantable brain stimulator



Neuromodulation



AI closed loop control



Micro-manufacturing and multiscale simulation laboratory

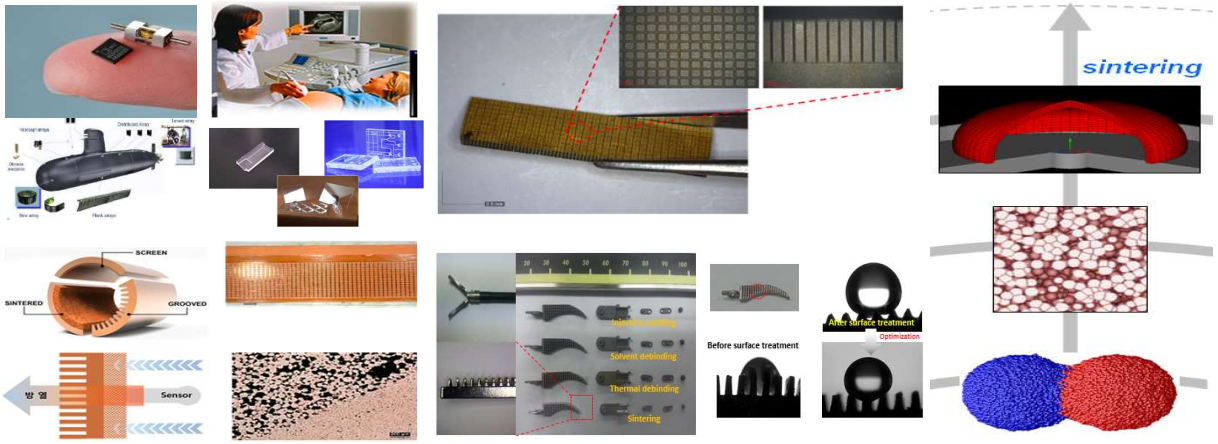
Prof. Seongjin Park
(sjpark87@postech.ac.kr)
http://m3s.postech.ac.kr

Mission

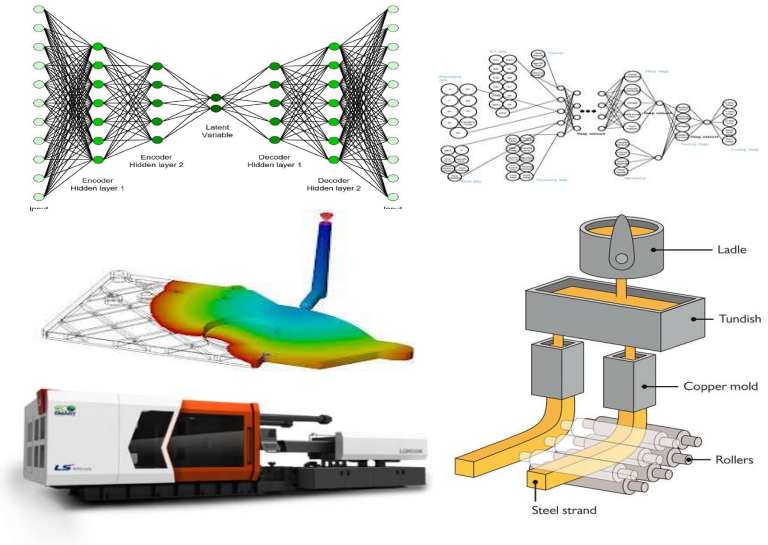
Research and Development with Micro-Manufacturing and Multiscale Simulation
Research and development of A.I Manufacturing based on mechanical engineering

Research areas

- ✓ Powder Injection Molding & Powder Metallurgy
- ✓ FEM Simulation
- ✓ Molecular Dynamics Simulation
- ✓ Artificial Intelligence Manufacturing



PIM Applications & Multiscale Simulation



Artificial Intelligence Manufacturing

Nanoparticles and Vesicles Lab.

Prof. Jaesung Park

(jpark@postech.ac.kr)

http://mbme.postech.ac.kr

Mission

- Extracellular vesicles are important mediators of information and material transfer between cells. Since vesicles not only have the characteristics of the cells from which they are derived, but are also distributed in most body fluids, their isolation has great potential for disease diagnosis, and they are attracting attention as a medium for drug delivery.
- These nanovesicles are at scales smaller than the diffraction limit and cannot be observed and analyzed with conventional instrumentation, requiring an understanding of physico-chemical phenomena at the microscopic scale.
- The lab is conducting various biomechanical engineering research related to nanovesicles, including development of vesicle production systems, design of optical systems for nanoparticle analysis, separation of nanovesicles using aqueous solutions, and CFD of biofluids.

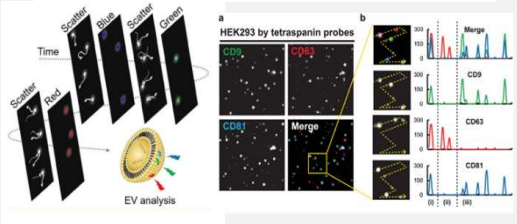
Research areas

○ Research on bioreactors and artificial vesicle fabrication to improve productivity of cell-derived particles

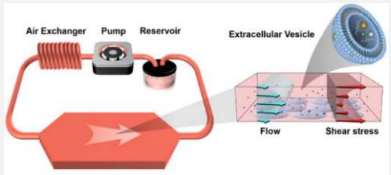
○ Research on how MEMS can be used to form vesicles ○ Isolation and diagnosis of extracellular vesicles

○ Developing analytical systems for nanobioparticles

Developing analytical methods for cell-derived nanoparticles

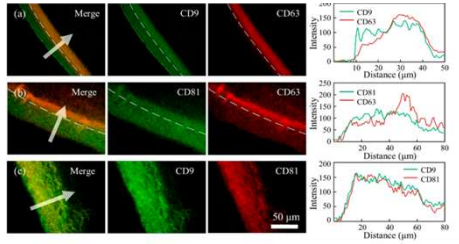


Fluid-controlled bioreactors



Research how to create artificial vesicles

Extracellular vesicle analysis based on the Coffering effect



◆ **Equipment owned**

○ TIRF microscopy (with custom LASER system) ○ Nanoparticle-tracking Analysis instrument. ○ Ultracentrifuges, etc.

NANOSCIENCE for ENERGY TECHNOLOGY & SUSTAINABILITY (NETS)
Center for LOW-DIMENSIONAL TRANSPORT PHYSICS (C-LDTP)

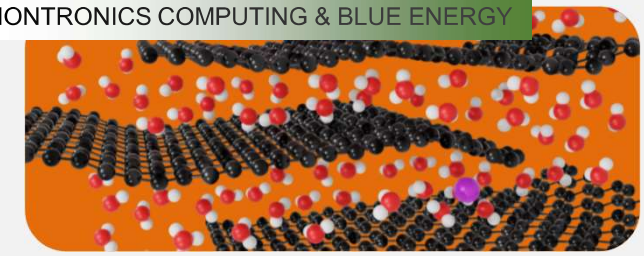
Prof. Hyung Gyu Park
parkhg@postech.ac.kr
https://nets.postech.ac.kr

Mission

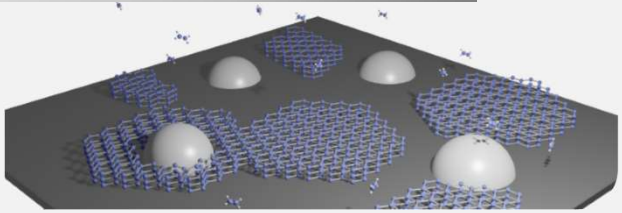
- Explore **MOLECULAR TRANSPORT PHENOMENA in SUB-3-DIMENSIONAL SPACE** provided by 1D- and 2D materials
  - ▷ BRAIN-INSPIRED COMPUTATION: iontronics for neuromorphic computing
  - ▷ BLUE ENERGY HARVESTING: ion-exchange membranes for osmotic power generation
- Understand **ELECTRIC FIELD ENHANCEMENT** of intersecting metal nanowires
  - ▷ SERS-AI: multiplex machine perception from ultrasensitive sensation of chemicals and pharmaceuticals
  - ▷ SERSBRANE: “sensor membrane” that detects chemical species in situ while passing them across the membrane

Research areas

2D MOLECULAR TRANSPORT
IONTRONICS COMPUTING & BLUE ENERGY

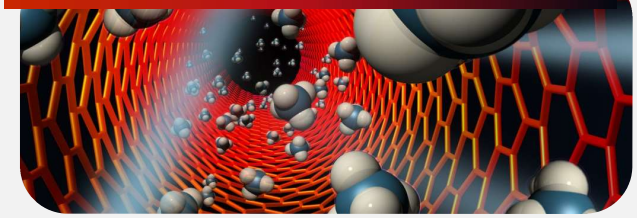


ADVANCED SYNTHESIS
SINGLE-STEP POROUS GRAPHENE



PLASMONIC ENGINEERING
SERS-AI & SENSBRANE

LOW-DIMENSIONAL TRANSPORT PHYSICS
MOLECULAR DYNAMICS SIMULATION



Glossary
SERS:
Surface-Enhanced Raman Spectroscopy

SENSBRANE:
SENSor + memBRANE

NETS
Nanoscience for Energy Technology and Sustainability

Data-driven Solid Mechanics Laboratory

Prof. Dongil Shin
(alamosds@gmail.com)
Homepage: TBA

Mission

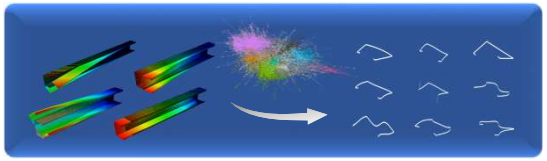
Our data-driven solid mechanics group's research interests lie in the **computational simulation and optimization of engineering problems, with a specific focus on transforming data into actionable decisions within complex systems.** We develop methods that combine data-driven methodologies with physics-based models for applications in structural optimization, real-time simulation, reduced-order modeling, uncertainty quantification, and other similar areas. We aim to improve performance/efficiency and foster innovation in addressing solid mechanics problems.

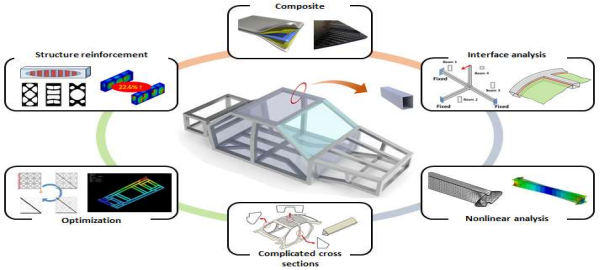
Applications

Our research is integral in developing theory, analysis, modeling, and design of various structures, ensuring their performance, efficiency, safety, and sustainability. Applications include the **automotive and aerospace industries, extreme sensors, sustainable design, environmental engineering, personalized design, and design automation.**

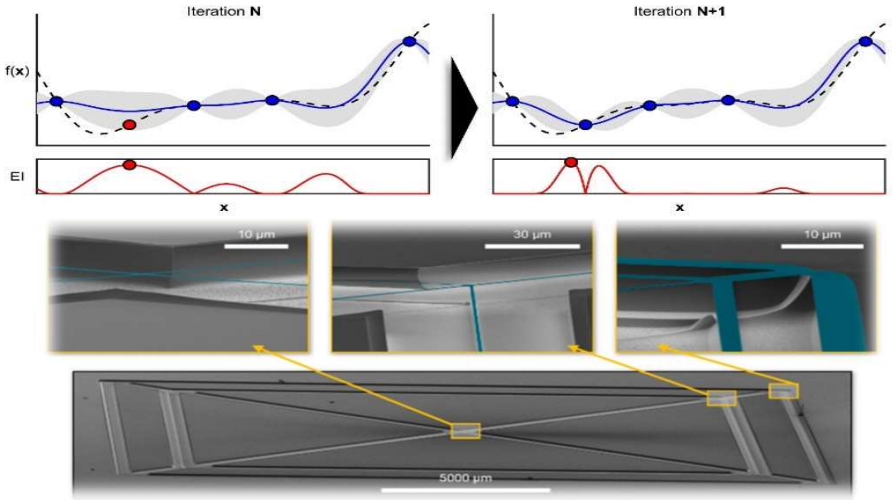
Research Area

Solid mechanics, Scientific machine learning, Computational mechanics, Digital twin,
Micromechanics, Multiscale-Multiphysics, Vehicle design, Bio-inspired design, Reduced-order modeling

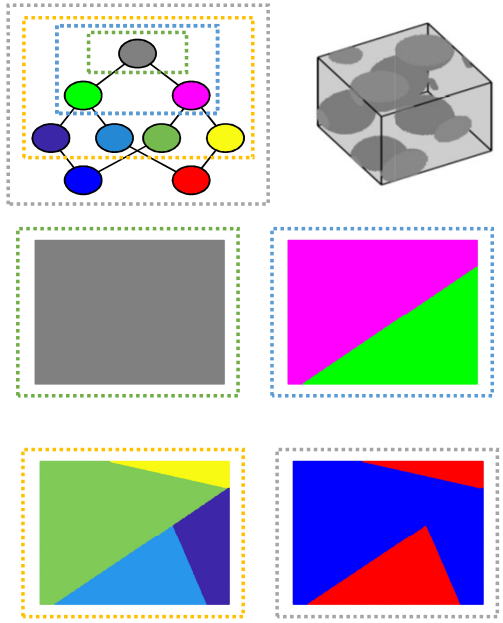




Computational solid mechanics
(e.g. finite element analysis)



Structure and material design
(e.g. multi-fidelity/modality design)



Scientific machine learning
(e.g. material modeling)

Energy-NanoTech Integrated Design & Manufacturing Research Lab.

ENTeR Lab

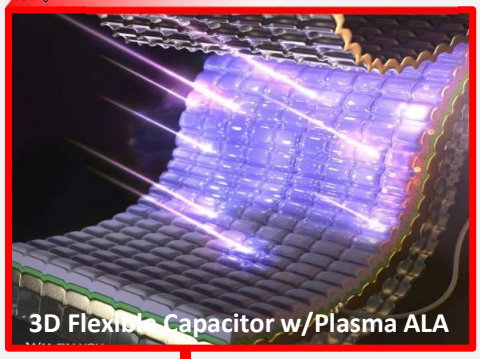
Prof. Jihwan An
(jihwanan@postech.ac.kr)
sites.google.com/view/enterlab

Research areas

We want to overcome the performance limitations of next-generation energy devices with atomic layer-level semiconductor process technology.

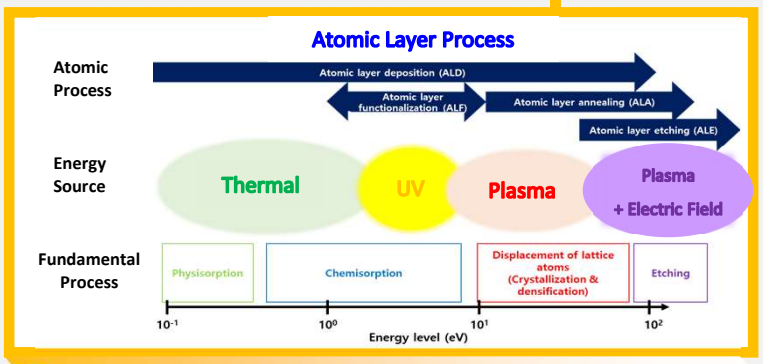
Renewable Energy Devices (SOFC/SOEC)

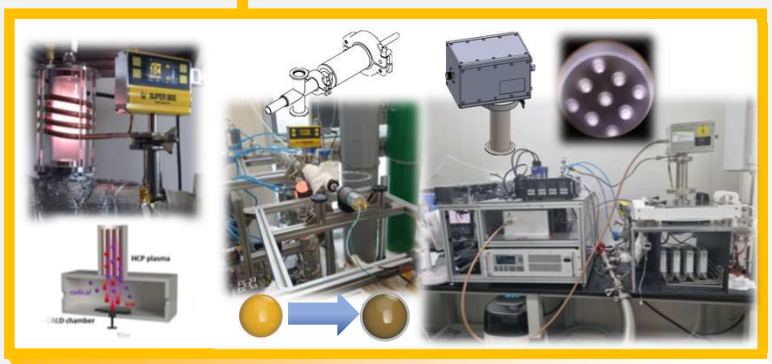
Unconventional Electronic Devices



Catalytic Devices

Atomic Level Interface/Surface Engineering for Electrochemical/Electronic Energy Devices

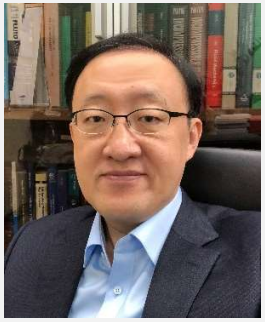




Understanding/Exploring Atomic Layer Processes

Designing/Manufacturing Atomic Layer Systems

Fluid Physics and Engineering Lab.



Prof. Donghyun You

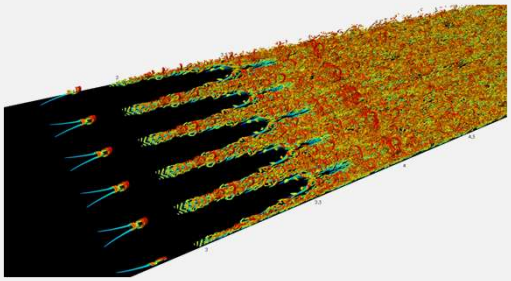
(dhyou@postech.ac.kr)
http://fpe.postech.ac.kr/postech/

Mission

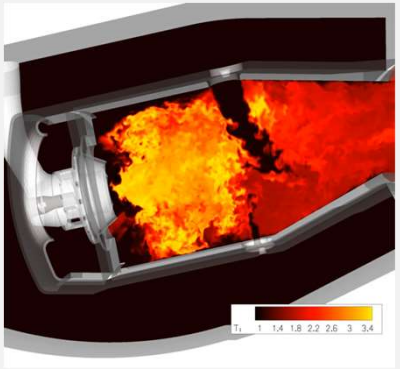
Conduct research to solve physical and engineering problems of fluid flow using theory, computational analysis, experiments, and artificial neural network technology

Research areas

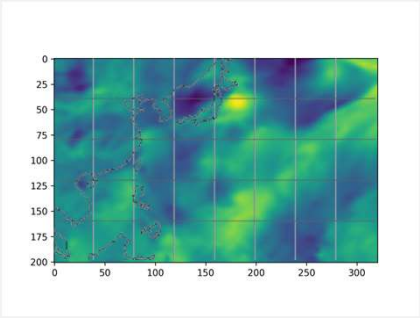
- ◯ AI for fluid mechanics
- ◯ Computational methods for fluid mechanics
- ◯ Flow physics (turbulence and transition)
- ◯ Gas turbine thermo-fluid mechanics
- ◯ AI-based control of a wind farm and wind turbines



Turbulent flow, Numerical methods



Gas turbine combustor



AI Prediction of Typhoon tracks

Wind turbine experiment

Future Fluid and Biomimetics Lab.

Prof. Sangjoon Lee
(POSTECH Univ. Professor)

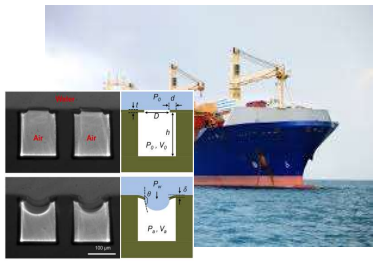
(sjlee@postech.ac.kr)
http://bbrc.postech.ac.kr/

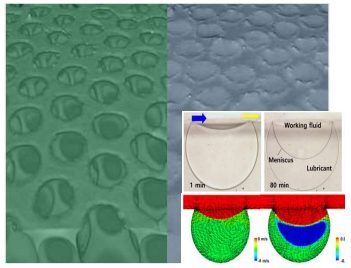
Mission

World-class leading research to resolve global issues through drag reduction, seawater desalination and PM removal technologies based on biomimetics inspired by nature, micro/nano-fluidics and advanced flow visualization techniques

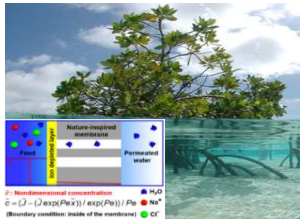
Research areas

- ◯ Biomimetic drag reduction technologies
- ◯ Biofluid mechanics and Biomimetics inspired by nature
- ◯ Removal of PM particles and Wind environment improvement
- ◯ Desalination of seawater and wastewater
- ◯ Micro-& nanofluidics for creative flow control
- ◯ Advanced flow visualization technologies

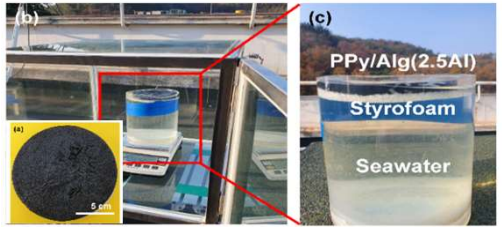




Biomimetic drag-reduction surfaces inspired by marine nature

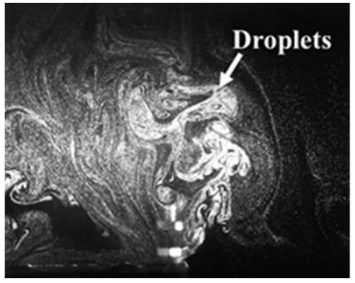


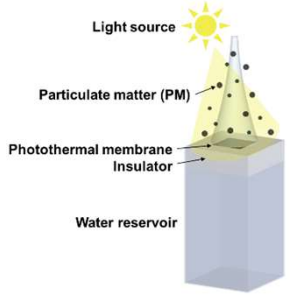
Mangrove-mimicking seawater desalination



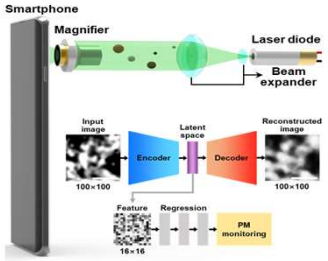
Solar-based phothermal desalination

Development of biomimetic seawater desalination tech.

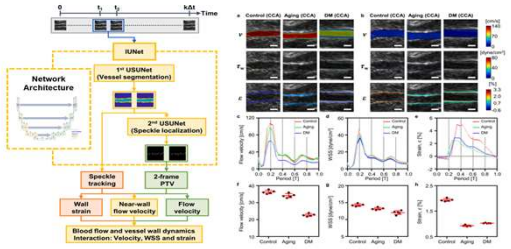




Removal of PM particles using micro/nano-scale water droplets



AI-based holographic microscopy



AI-based ultrasound imaging technique

Development of AI-based flow visualization technologies

Extreme Mechanics Lab.

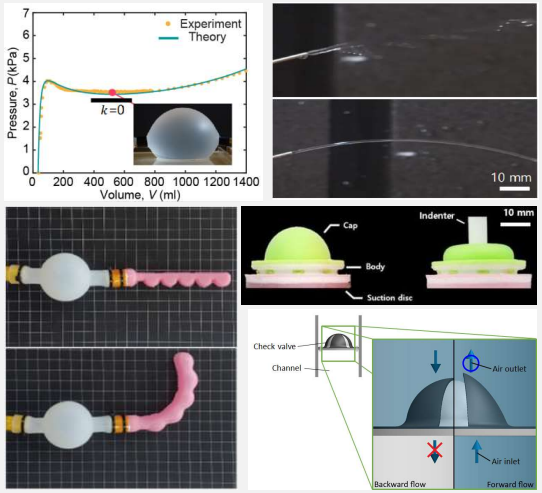
Prof. Anna Lee
(annalee@postech.ac.kr)
http://xml.postech.ac.kr

Mission

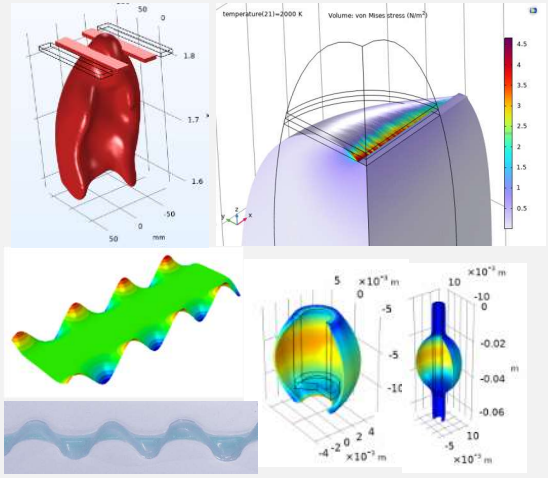
To analyze the extreme deformation of soft materials and structures, and utilize them to develop soft devices

Research areas

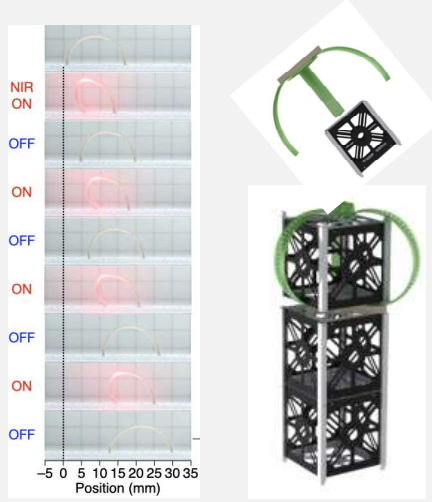
- ◯ Developing soft devices
- ◯ Analyzing mechanics of soft & biomaterials
- ◯ Actuators for robotics and small satellites



Soft Devices



Mechanics analysis of soft materials



Actuators and small satellites

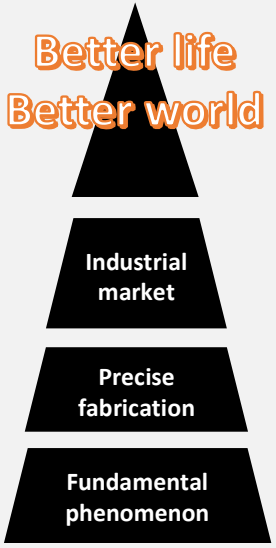
Nano & Bio-MEMS Lab.

Prof. Geunbae Lim
(limmems@postech.ac.kr)
http://biomems.postech.ac.kr/

Mission

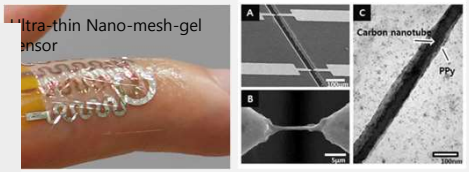
Developing MEMS devices for medical/energy/environmental/industrial applications using phenomena at the micro/nano scale

Research areas



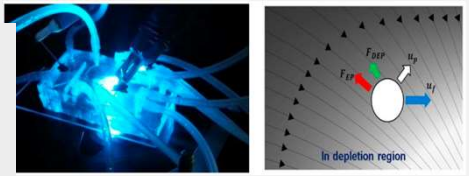
Nano/Micro-biosensor

- ✓ Micro needle-based painless implantable biosensor
- ✓ Nano fibrous breathable biosensor
- ✓ Micro channel-based biosensor



Nano/Micro-fluidics

- ✓ Electro-hydro-dynamic lithium recovery
- ✓ Electro-hydro-dynamic cell analysis
- ✓ Electro-hydro-dynamic lipid nano particle fabrication

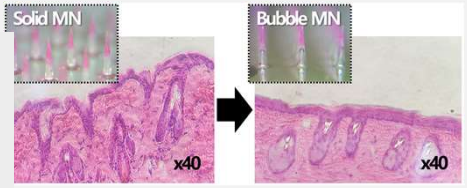


Nano/Micro-structure

- ✓ Super omni-phobic surface modification
- ✓ High flux water-oil separation filter
- ✓ Transparent flexible heater

Nano/Micro-medicine

- ✓ Micro needle-based painless drug/vaccine delivery
- ✓ Biodegradable micro particles
- ✓ Bioadhesive hydrogel suturing



Biofabrication & Translational Medicine Lab.

Prof. Jinah Jang

(jinahjang@postech.ac.kr)

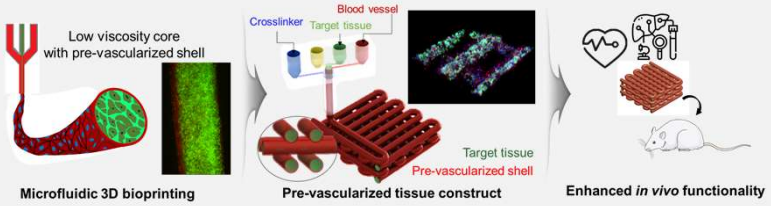
http://www.btmpostech.com

Research areas

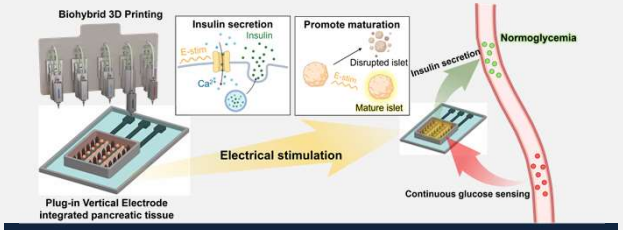
- Bioprinting and biofabrication technology
- Multifunctional tissue-specific bioinks
- Transplantable bioprinted tissues for regenerative medicine
- Alternative *in vitro* testing platform
- Biohybrid tissue-device integrated platform
- Assemblable organ modules for smart organ factory

"Engineering Human Tissues for Advanced Therapeutics"

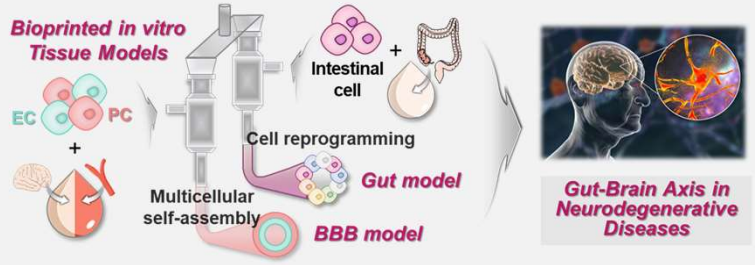
Innovative Tissue Therapeutics



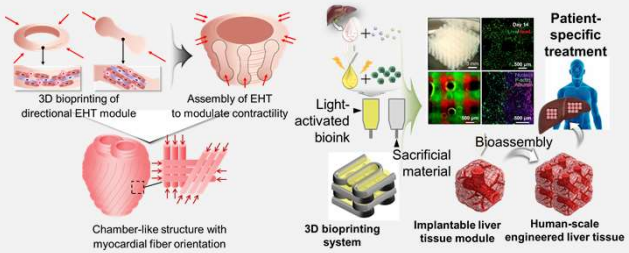
Biohybrid Systems



Alternative Testing Platforms



Assemblable Organ Modules



➢ **Journal Papers**

(H-index 48; total citation: 10940, # of publication: 141)

Contact us!
(www.btmpostech.com)

Robotics Lab.

Prof. Wankyun Chung

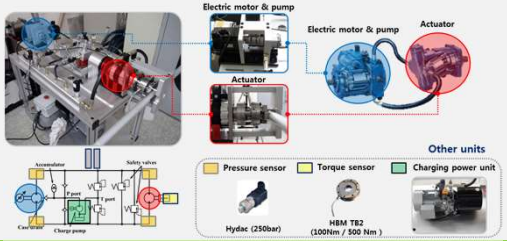
(wkchung@postech.ac.kr)

http://rnb.postech.ac.kr/

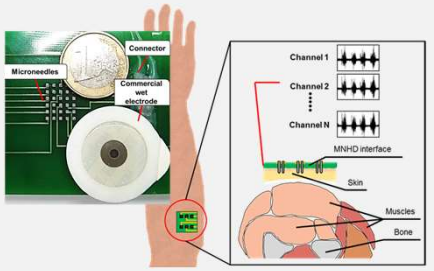
Research areas

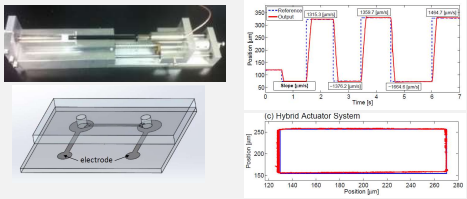
- ○ Medical Robots
- ○ Manipulation: Hydraulic Actuator Control, Robust Control
- ○ Artificial intelligence for robot vision and control
- ○ s-EMG sensor development and control
- ○ Control of microfluidics

Corneal transplant surgery robot

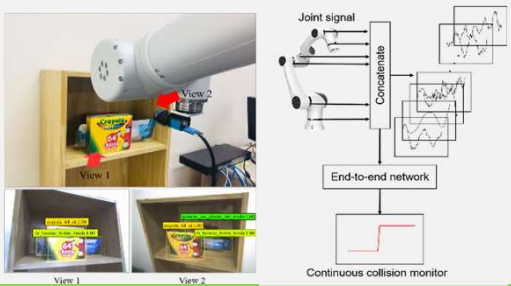


Hydraulic actuator development and torque control

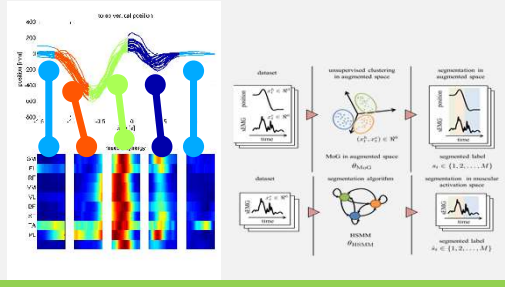




Microfluidic Control



Deep learning-based robot vision and control



Develop and control electromyographic sensors

Thermal hydraulics & Energy system Lab.

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Mission

Exploring the underlying physics of thermal hydraulics, and extending the knowledge for advanced safe and reliable energy systems

Research areas

- ○ Improving heat transfer with innovative material surface characteristics
- ○ Reactor thermal hydraulics & reactor safety beyond normal operating conditions
- ○ Advanced modeling and simulation through science-based predictive for engineering applications

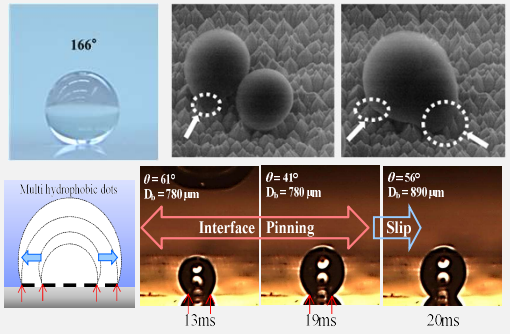


Fig 1. Phase change heat transfer & Interface dynamics on tailored surfaces

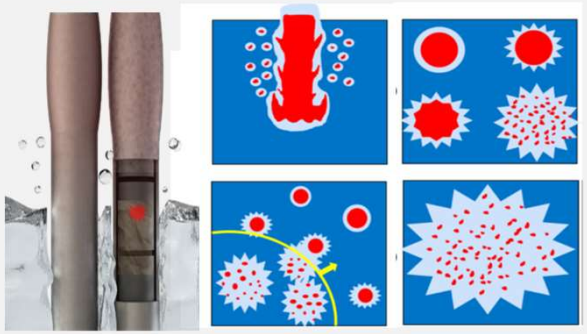


Fig 2. Reactor thermal hydraulic phenomena beyond normal operating conditions

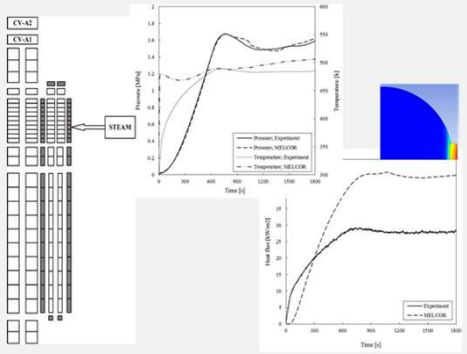
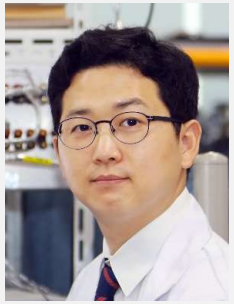


Fig 3. Advanced thermal hydraulic modeling and numerical simulation

Thermal & Energy Lab.



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Mission

We develop materials and devices to convert ubiquitous wasted thermal energy into usable energy. For that, we conduct basic and interdisciplinary research on thermal properties and microscale heat transfer. In doing so, we contribute to alleviating the environmental and energy issues that have recently emerged. In addition, we provide solutions for material development, thermal properties measurement, and thermal management to industrial companies and other research institutions based on the know-how accumulated in our research process.

Research areas

- ○ Solid-state thermal-to-electrical energy conversion
  - Thermoelectric & spin-caloritronic materials & devices
- ○ Solid-state thermal-to-chemical energy conversion
  - Thermochemical H_2 & CO production
  - CO_2-to-fuel conversion
- ○ Thermal energy storage