MNTL (MEMS & NanoTechnology Lab) - Professor

Prof. Dong-Weon Lee

Contact

- **Tel:** 062-530-1684
- **Email:** mems@jnu.ac.kr
- **Lab. Homepage**

  http://mems.jnu.ac.kr

Research Area

- Biomedical Micro-Device and System for Personal Healthcare
- Smart Sensors and Actuators for Intelligent Machines
- Functional Structures and Materials for Smart Manufacturing
- Miniaturized Energy Harvesting and Storage System

Project

연구기간	과제명	지원기관	예산
2007.07.01. ~2012.06.30.	질량분석기가 집적화된 다기능 원자현미경 시스템 개발	한국연구재단	1,010,000천원
2009.04.01. ~2013.08.31.	그래핀 기반 나노-바이오 트렌스듀서 개발	한국연구재단	2,770,000천원
2013.11.01. ~2017.10.31.	약물 심장독성 검사 시스템 개발	한국산업 기술진흥원	4,690,000천원
2017.11.01. ~2022.10.31.	생체모방공학 기반 차세대 융·복합 자극/ 센싱 통합시스템 개발	한국연구재단	1,500,000천원
2020.07.01. ~2027.02.28.	심혈관 환자맞춤형 차세대 정밀의료기술 선도연구센터	한국연구재단	15,215,000천원
2022.09.01. ~2027.02.28.	융복합 자극 및 센싱 시스템을 이용한 고효율 약물심장 독성스크리닝 및 3D 심장패치 제조를 위한 의료플랫폼개발	한국연구재단	1,287,139천원

MNTL (MEMS & NanoTechnology Lab) - Members

정윤진
Post Doctoral Fellow
Platform for electro-mechanical stimulation of cells

S.Arunkumar
Post Doctoral Fellow
Tailored nanostructures, gas sensors, bio-sensors

Nomin-Erdene
Post Doctoral Fellow
Biomems, Polymer-based biosensor

Rohini Shinde
Post Doctoral Fellow
LDH based nanomaterials for Gas sensor and Biosensing application

김종윤
Post Doctoral Fellow
Maturation of cardiomyocytes for disease modeling

Biswajit Mahanty
Post Doctoral Fellow
Piezo-, Tribo- & Pyroelectric Nanogenerators/sensors.

Karthikeyan M
Ph.D. course
Microfluidic stretchable wireless pressure sensor

Pooja Kanade
Ph.D. course
MEMS based devices for studying electrophysiology of ardiomyocytes

임대윤
Ph.D. course
MEMS

Thorali Niranjan
Ph.D. course
MEMS based wireless pressure sensors

김도경
M.S. course
Mems based sensor

장우영
M.S. course
MEMS

구홍모
M.S. course
Mems based sensor

Sun Haolan
M.S. course
Biomedical device and system

Wei Jinlinag
M.S. course
Wireless sensor devices for personal health monitoring

Li Longlong
M.S. course
Wireless sensor for personal health monitoring

Wang Lei
M.S. course
Wireless sensor for personal health monitoring

양승진
M.S. course
High sensitive sensor

최우선
Staff

이주은
Staff

양수지
Staff

오정훈
Engineer

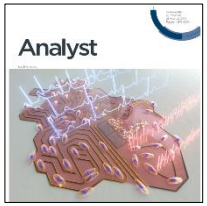
김도하
Staff

서영걸
Staff

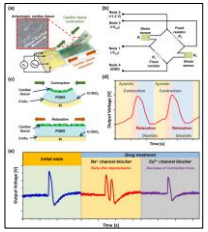
MNTL (MEMS & NanoTechnology Lab) – Research area

Topic 1 Biomedical Device and System

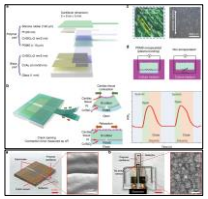
Nomin-Erdene Oyunbaatar, et al. "Real-time Monitoring of Changes in Cardiac Contractility using Silicon Cantilever Arrays Integrated with Strain Sensor." *ACS Sensors 6* (2021) 3556-3563. **[IF: 7.711, JCR: 2.9%]**



Jong Yun Kim, et al. "Enhancement of Cardiac Contractility Using Gold-coated SU-8 Cantilevers and Their Application to Drug-induced Cardiac Toxicity Tests." *Analyst (2021)*. **[IF: 3.978, JCR: 16 %]**

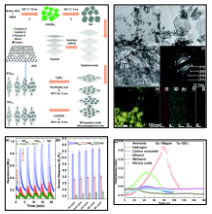


Dong-Su Kim, et al. "64 PI/PDMS Hybrid Cantilever Arrays with an Integrated Strain Sensor for a High-Throughput Drug Toxicity Screening Application." *Biosensors and Bioelectronics 190* (2021) 113380. **[IF: 10.257, JCR: 0.5%]**

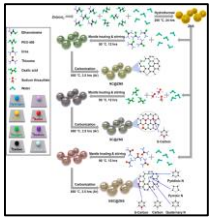


Dong-Su Kim, et al. "Highly durable crack sensor integrated with silicone rubber cantilever for measuring cardiac contractility." *Nature communications* 11 (2020) 1-13. **[IF: 12.121, JCR: 7%]**

Topic 2 Micromachined Sensor & Actuator

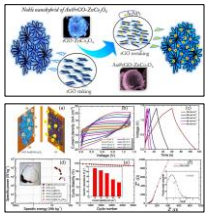


Arunkumar shanmugasundaram, et al. "Hierarchical nanohybrids of B-and N-codoped graphene / mesoporous NiO nanodisks: an exciting new material for selective sensing of H_2S at near ambient temperature." *Journal of Materials Chemistry A* 7 (2019) 9263-9278. **[IF: 11.301, JCR: 7%]**

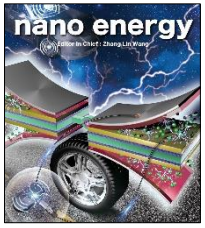


Arunkumar shanmugasundaram, et al. "N-/S-Dual Doped C@ZnO: An Excellent Material for Highly Selective and Responsive NO2 Sensing at Ambient Temperatures " *Chemical Engineering Journal 421* (2021) 127740. **[IF: 10.652, JCR: 2.4%]**

Topic 3 Energy Harvesting & Storage System



Swati J. Patil, et al. "Gold nanoparticles decorated rGO-$ZnCo_2O_4$ nanocomposite: A promising positive electrode for high performance hybrid upercapacitors." *Chemical Engineering Journal* 379 (2020) 122211. **[IF: 10.652, JCR: 3%]**



Jingui Qian, et al. "On-vehicle triboelectric nanogenerator enabled self-powered sensor for tire pressure monitoring." *Nano Energy* 49 (2018) 126-136. **[IF: 16.602, JCR: 5%]**

MNTL (MEMS & NanoTechnology Lab) - Equipment

세포 배양

Clean bench

Optical microscope

Centrifuge

UV exposure system

CO_2 incubator

Shaking incubator

총 10개 장비 보유

제작 공정

Pattern generator

Mask aligner

3D printer

Sputter

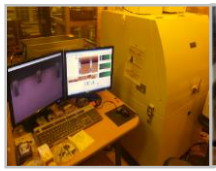
O_2 Plasma asher

RIE

총 40개 장비 보유

형상 측정

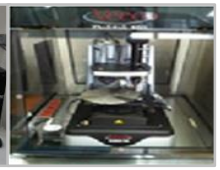
AFM



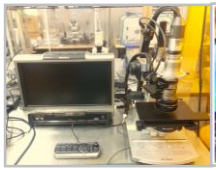
Nano scan

SEM

Surface profiler



Digital 3D microscope

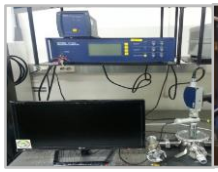


Contact angle

총 14개 장비 보유

특성 평가

Laser vibrometer



NI-PXI

Spectrum analyzer

LCR meter

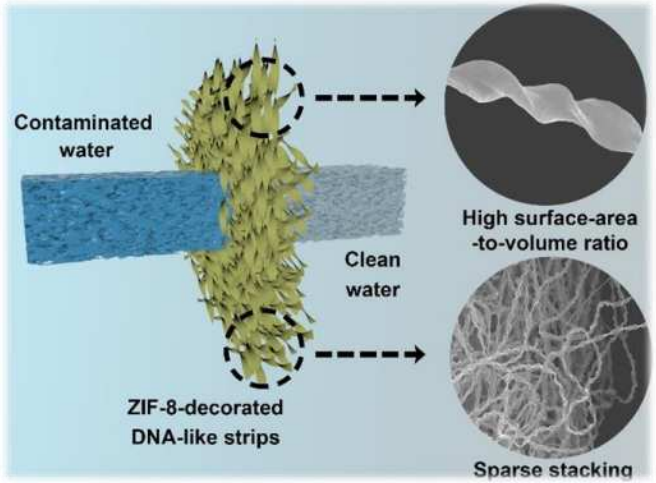
Probe station

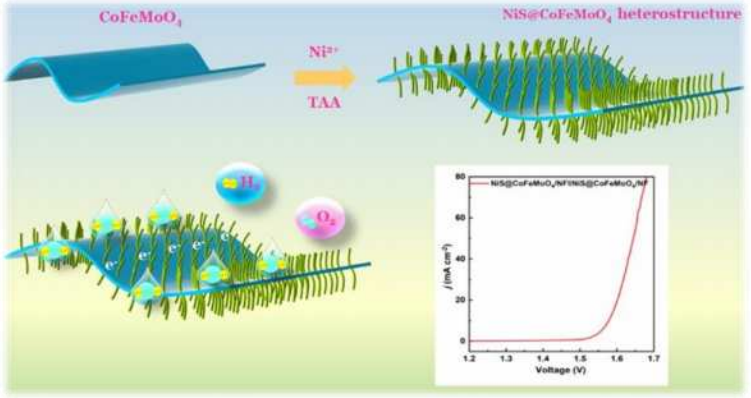
Oscilloscope

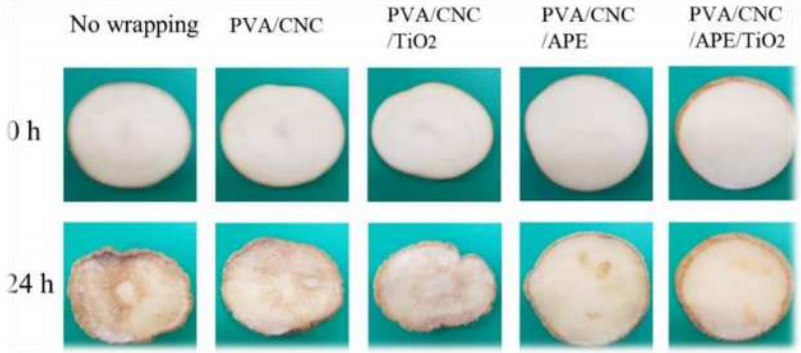
총 41개 장비 보유

Multiscale Molding and Manufacturing (M3) Laboratory @ CNU

School of Mechanical Engineering, College of Engineering
Department of Mechanical Engineering, Graduate School





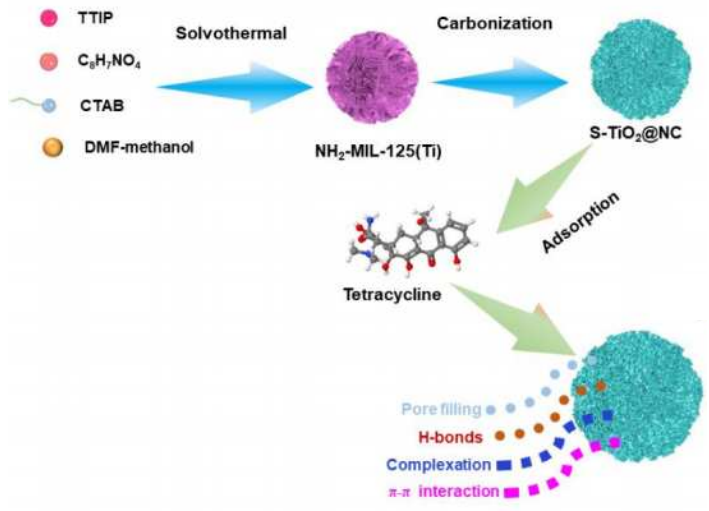


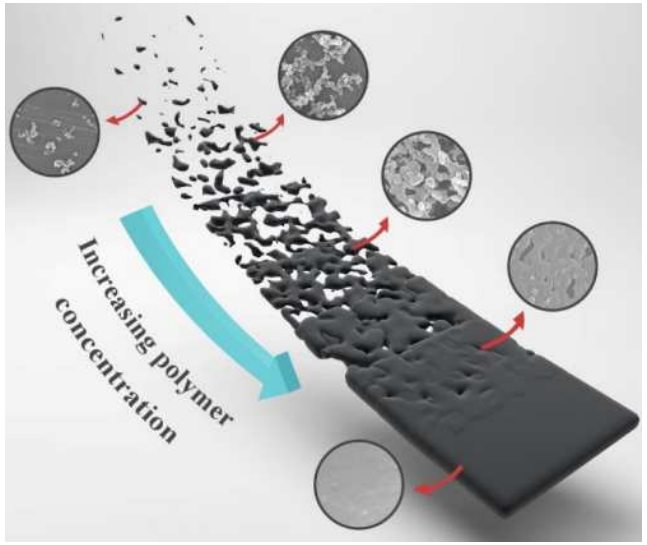
Principal Investigator
Bong-Kee Lee, Ph.D.
Professor, School of Mechanical Engineering
(telephone) +82-62-530-1685
(e-mail) b.lee (at) chonnam.ac.kr

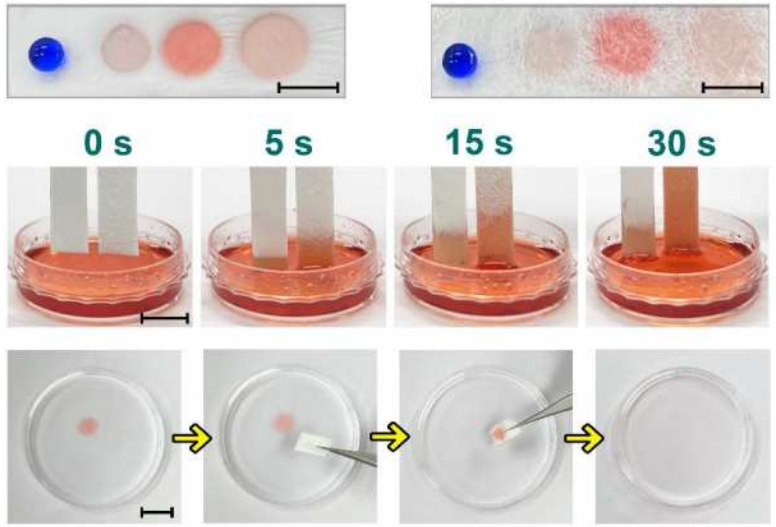
Multiscale Molding and Manufacturing (M3) Laboratory @ CNU

- We are trying to develop innovative manufacturing technologies of precise plastic parts in multiscales based on the fundamental investigations of the relevant physical phenomena.
  - Multiscale polymer molding processes using precisely manufactured mold systems
  - Physical behavior of polymeric materials in multiscales
  - Micro-engineered systems for biomedical, microfluidic, optical, robotic applications
  - Design and optimization of manufacturing processes and products

material → processing → application

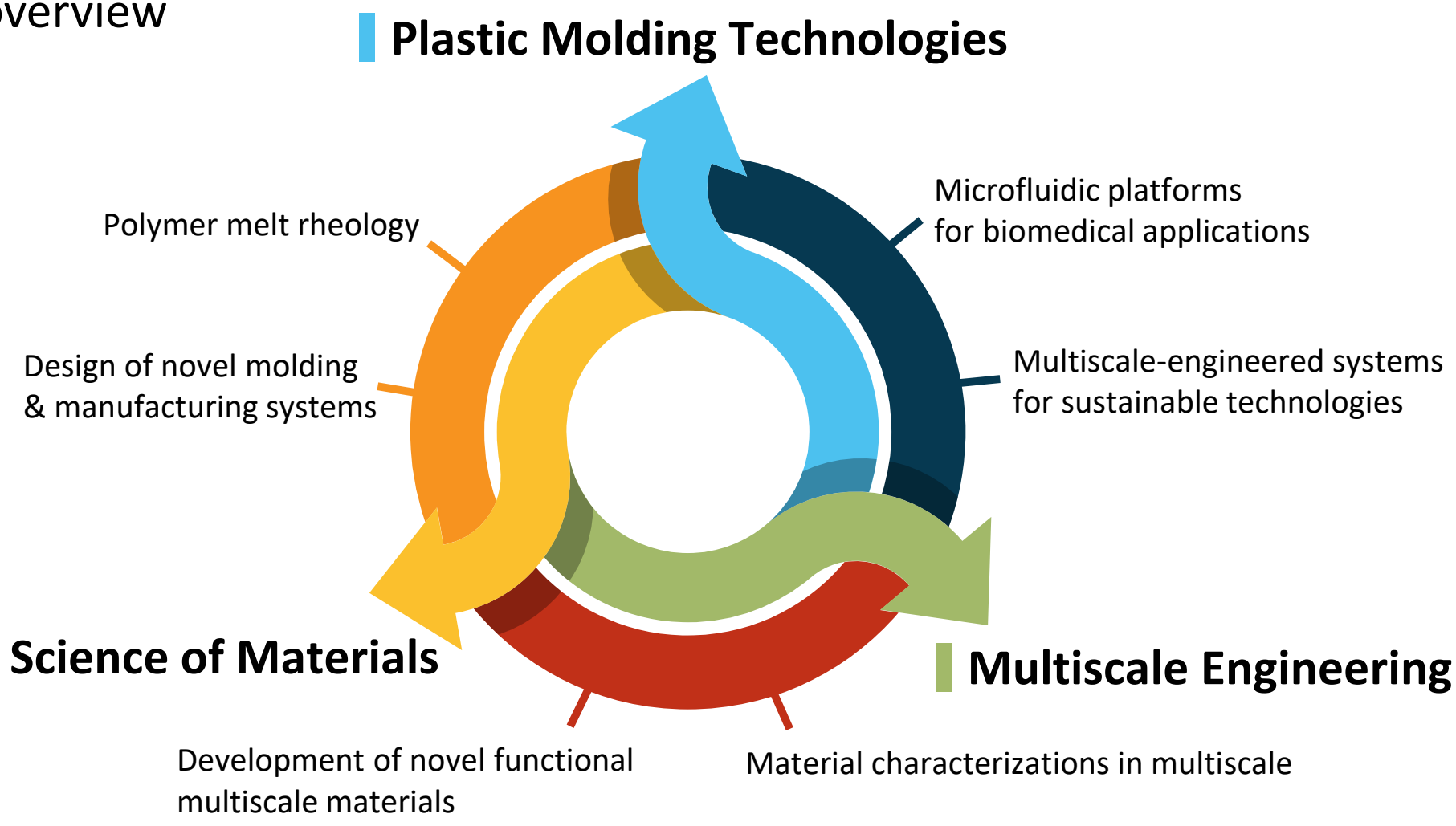






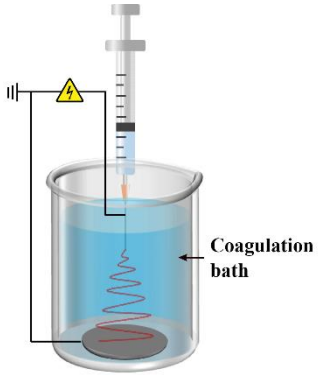
Multiscale Molding and Manufacturing (M3) Laboratory @ CNU

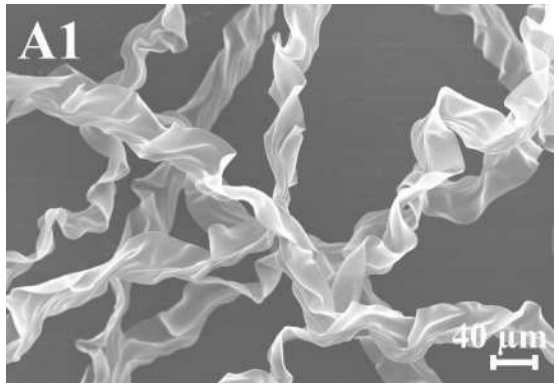
- Research overview



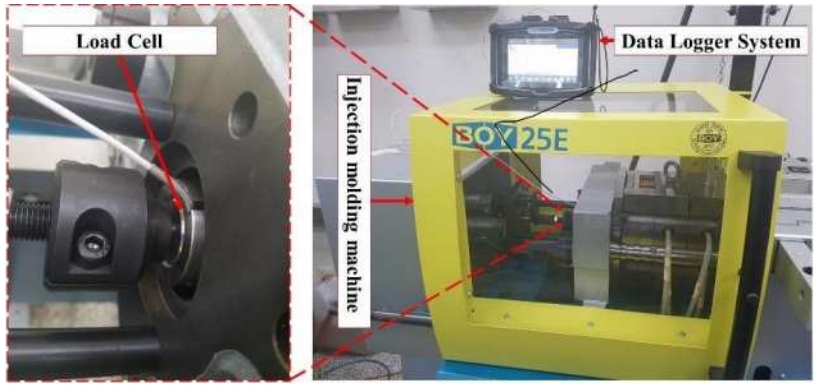
Multiscale Molding and Manufacturing (M3) Laboratory @ CNU

Micro/nanofeatures via electrospinning

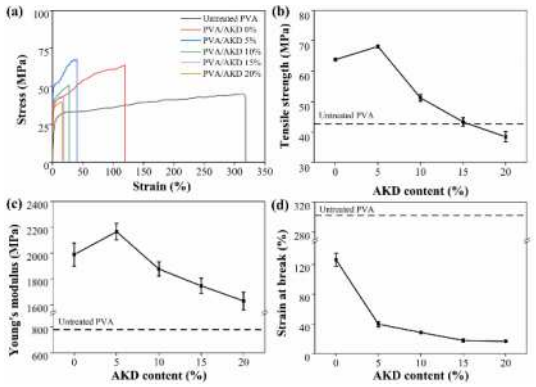




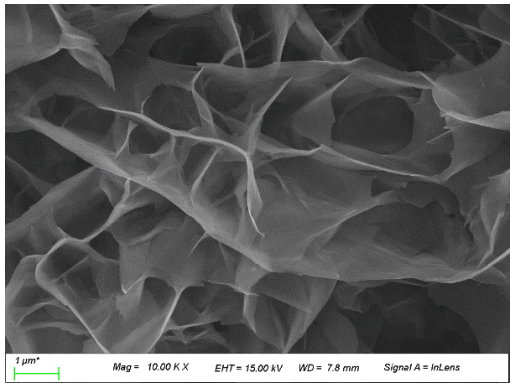
AI-based intelligent injection molding process

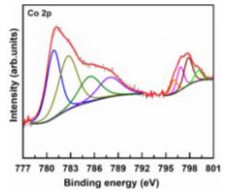


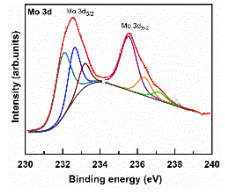
Novel biodegradable polymer nanocomposites



Functional nanomaterials and their applications



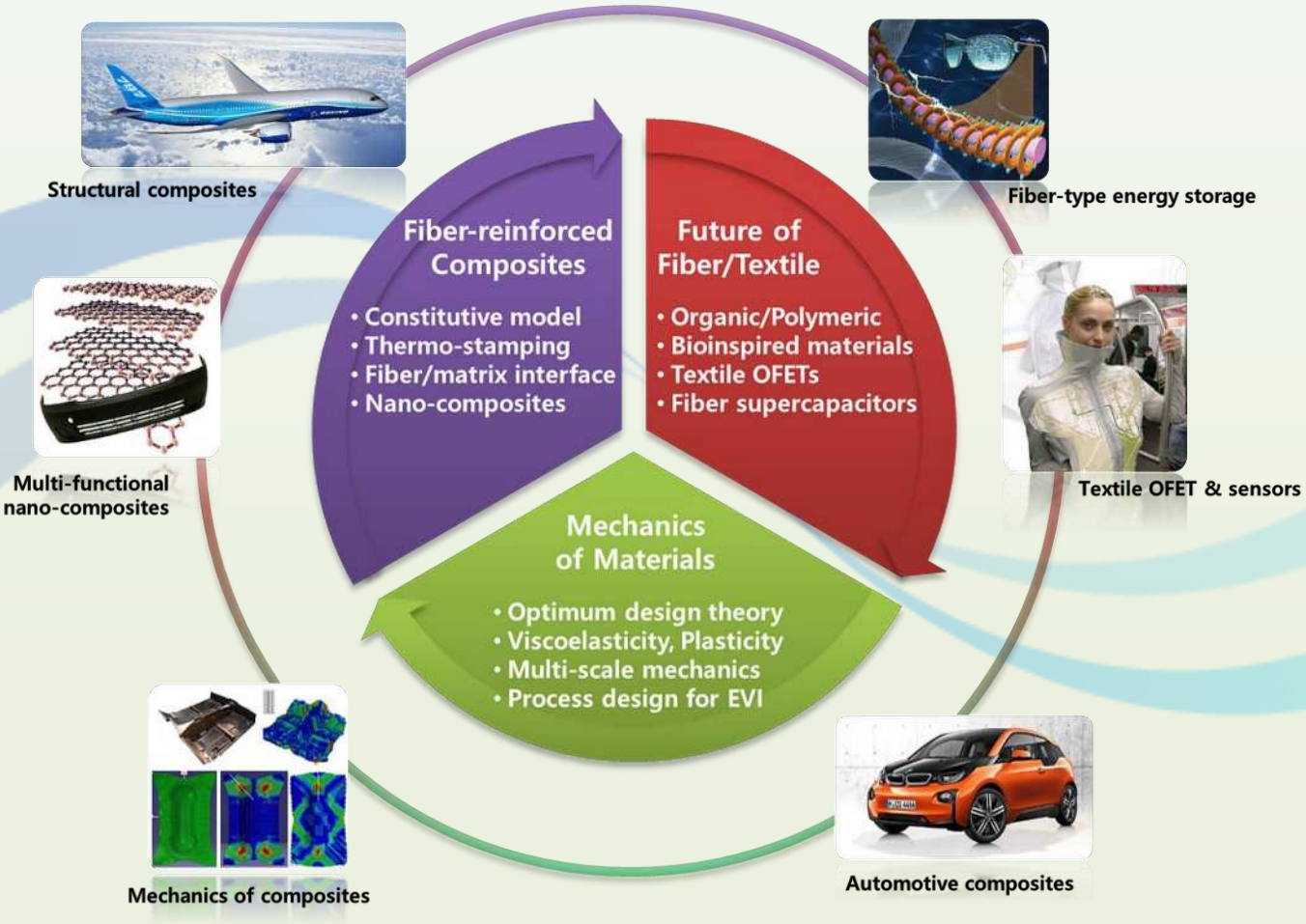




https://sites.google.com/site/m3labsite

COMPOSITES & MECHANICS LAB

Our work focuses on mechanics-based interdisciplinary researches for inelastic materials including metals, organic/polymeric structural materials, fiber-reinforced composites, advanced fiber/textile, and nano-carbon materials.



PROFESSOR

Wonoh Lee, Ph.D.

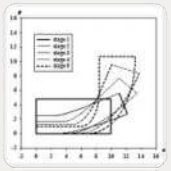
- Professor
- Chair of the School of Mechanical Engineering, Chonnam National University
- Tel: +82-62-530-1682
- E-mail: wonohlee@jnu.ac.kr
- Site: www.volumedeyes.net

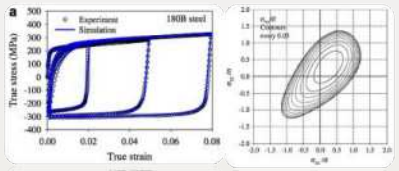
- Adjunct Professor, Department of Intelligent Mobility Convergence
- Manager, Chassis Technology Lab., Automobile Research Center
- Researcher, Alan G. MacDiarmid Energy Research Institute
- Director, JNU - LINC+ Project Group

MEMBER

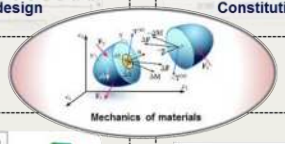
TOPIC

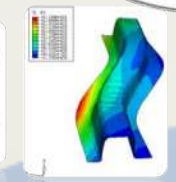

Ideal forming for optimum design

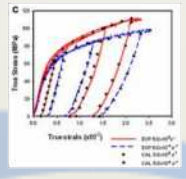


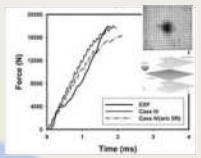


Constitutive modelling & characterization


Mechanics of materials

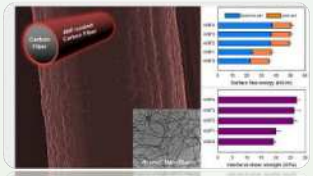

Formability & springback predictions



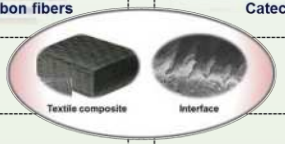


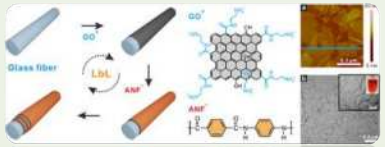
Viscoelastic/plasticity model & impact test

Mechanics of Inelastic Materials

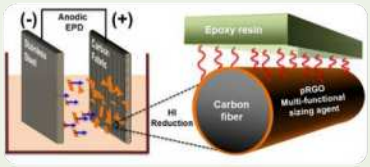

Aramid nanofibers (ANF) for carbon fibers

Catecholamine for high wettability



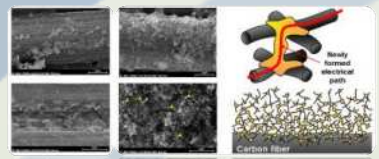


Graphenne/ANF Layer-by-Layer Assembly

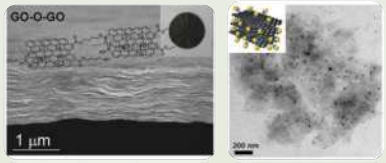


Partially reduced graphene oxide

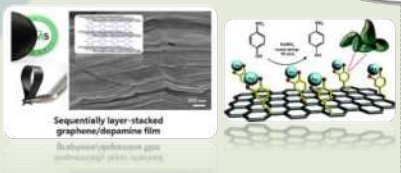
Novel Interface Control



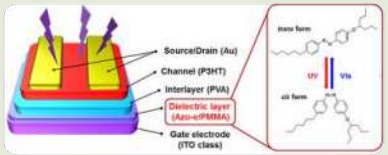
CNT hybrids & novel structure



Graphene hybrids & applications



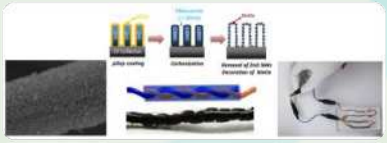
Bioinspired catecholamine (dopamine)

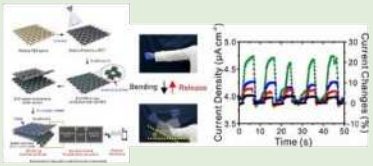


Photochromic molecules & UV sensors

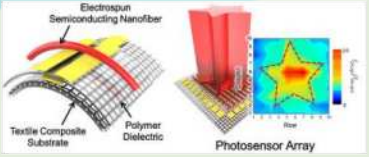
Nano Carbons & Advanced Organics


Graphene fibers & wire-shaped OFET devices


Stretchable wire-shaped supercapacitors



Textile-based piezoelectric strain sensors



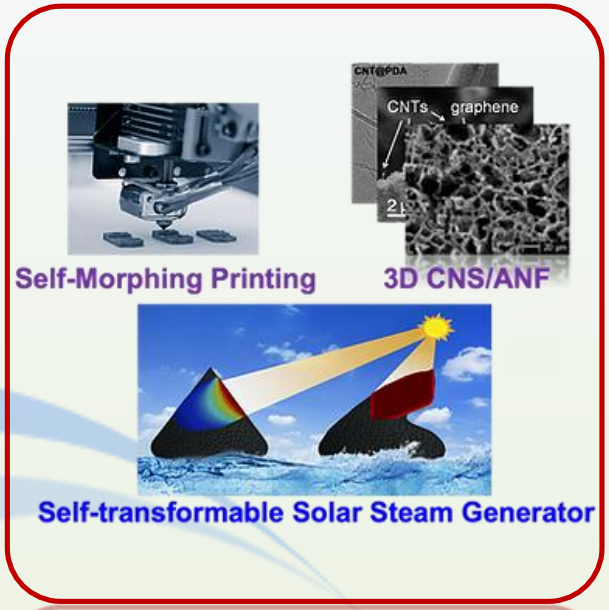
Textile-based OFET photo-sensors

Future of Structural Fibers & Textiles

PROJECT

Textile Electrodes

- Shape-morphing
- Clay-plasticity
- Drapeable deformation
- Core-shell fiber electrode
- Weft/warp design
- Li-based electrode



Solar Steam Generator

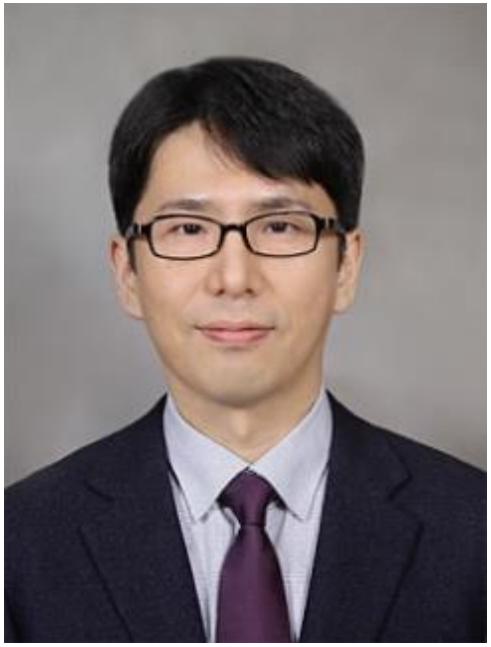
- Self-transformable
- 4D printing
- Gradient seawater absorber
- T-driven shape-morphing
- Phototropic design
- 3D carbon steam generator

Structural Battery

- Fractal graphene
- 3D carbon nanostructure
- Catecholamine anchoring
- Carbon fiber composites
- Solid polymer electrolyte
- Aramid nanofiber

Electrochemical power lab. (ECPL) – Professor

- Founded in 2015 at Chonnman National University, the mission of ECPL is to conduct a fundamental research on electrochemical power systems (batteries and fuel cells) and to apply it to industrial field.
- ECPL seeks interdisciplinary research by conducting both theoretical/computational and experimental works.
- Currently, ECPL is conducting several government, industrial research projects.



Prof. Jung, Seunghun

Education

2010, Ph.D. Pennsylvania State University, Mechanical Engineering
2006, M.S. Seoul National University, Mechanical Engineering
2001, B.S. Seoul National University, Mechanical Engineering

Work experience

2015 - present , Professor, Chonnam National University
2010 - 2015, Team Leader, LG Chem Battery R&D

Research

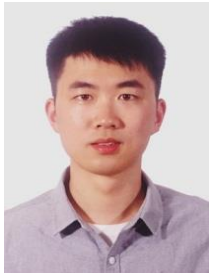
Electric vehicle, Lithium-ion battery, Redox flow battery for ESS, Hydrogen production, Fuel cell

Contact

office : EB 1A-408 (062-530-1665)
email : shjung@jnu.ac.kr
homepage : https://sites.google.com/site/electrochemicalpowerlab

Electrochemical power lab. (ECPL) - Members

- NAM, Junghyeun
- Ph.D. course
- Research area: EV battery system, Lithium-ion battery



- QIAN, Xiao
- Ph.D. course
- Research area: Unitized Regenerative Fuel Cell, multi-physics modeling

- ZOU, Wenjiang
- Ph.D. course
- Research area: EMS of hybrid power system

- ZHAO, Xiaobo
- Ph.D. course
- Research area: BMS of EV and ESS

- KIM, Wonjun
- M.S. course
- Research area: EV HILS and BMS

- SHEN, Kunyang
- Ph.D course
- Research area: Thermo-chemical hydrogen production

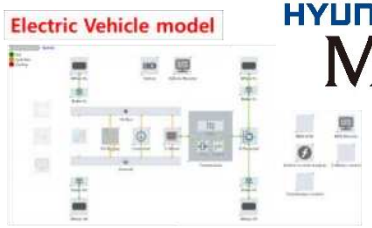
- CHEN, Jiahui
- Ph.D. course
- Research area: Unitized Regenerative Fuel Cell

- LEE, Jaehun
- M.S. course
- Research area: Hybrid power system for drone applications

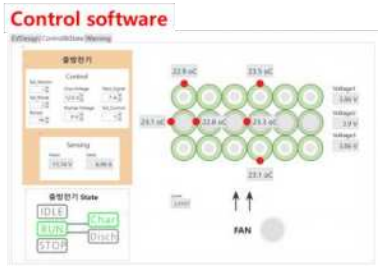
Electrochemical power lab. – Research & Project

ELECTROCHEMICAL POWER LAB

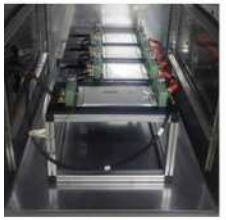
Electric vehicles and battery system

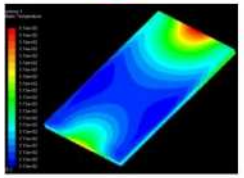


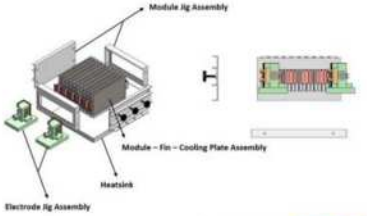
HYUNDAI MOBIS



EV battery system development



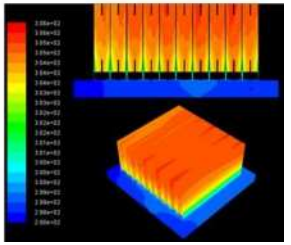




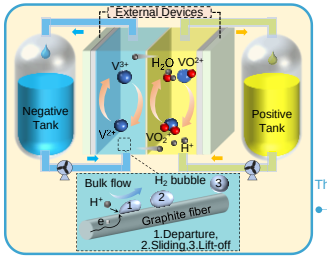
posco

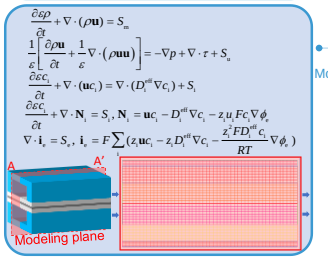
SL Corporation

배터리 모듈(2P10S, 37V/78Ah)



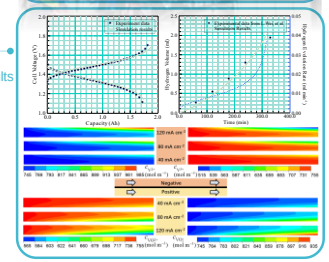
VRFB cell development





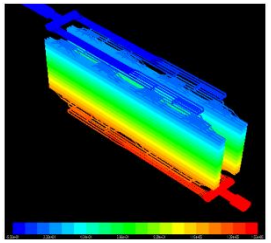
Theory Experiment

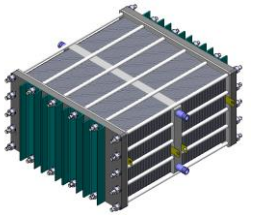
Model Results



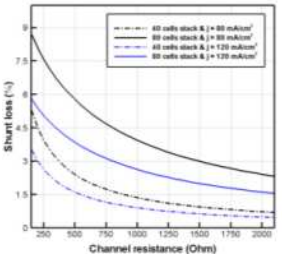
중소기업청

Redox Flow Battery for large-scale energy storage system





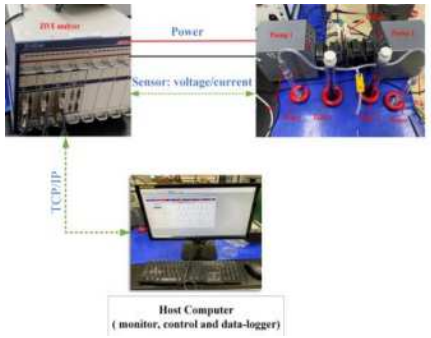
KEPCO

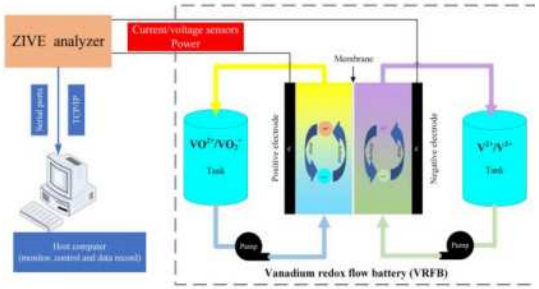


Electrochemical power lab. – Research & Project

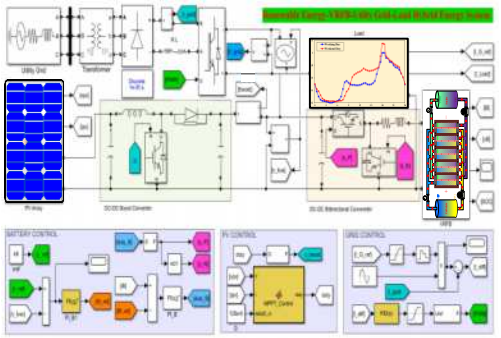
ELECTROCHEMICAL POWER LAB

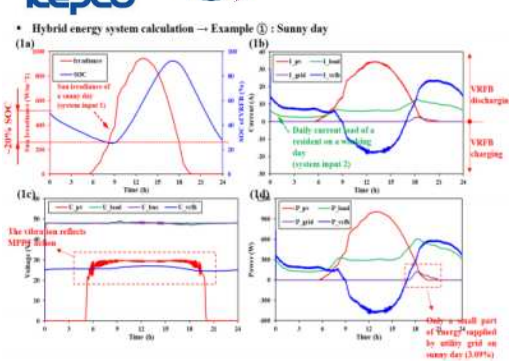
Development of vanadium redox flow battery stack for large-scale energy storage system





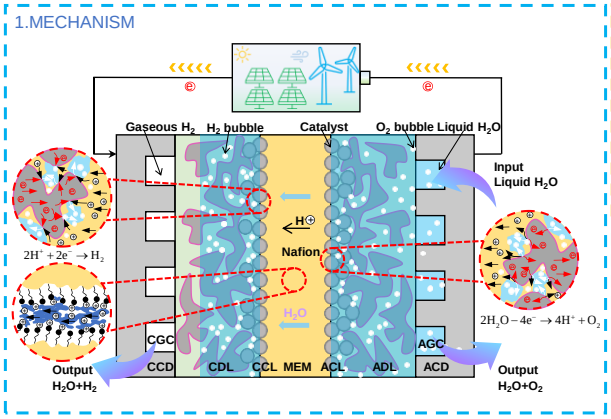
Development of vanadium redox flow battery stack for large-scale energy storage system

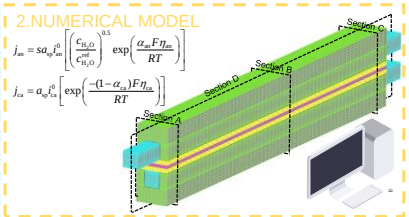


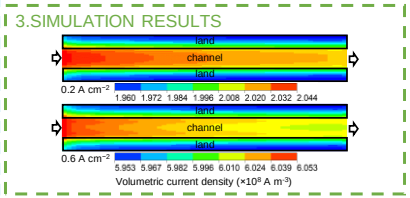


Unitized Regenerative Fuel Cell

국방과학연구소
Agency for Defense Development

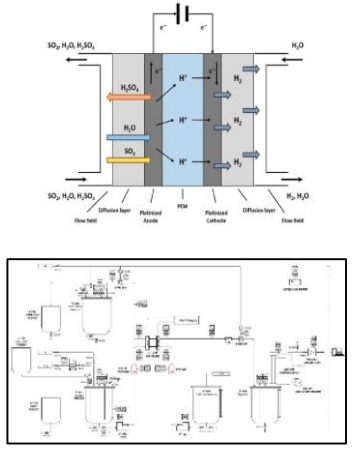






Hybrid thermochemical hydrogen production

NRF 한국연구재단



Introduction to CLVMD (Cha's Lab. for Virtual Molecular Design)

Advisor : Prof. JinHyeok Cha

Contact Points

Phone : 062-530-1674

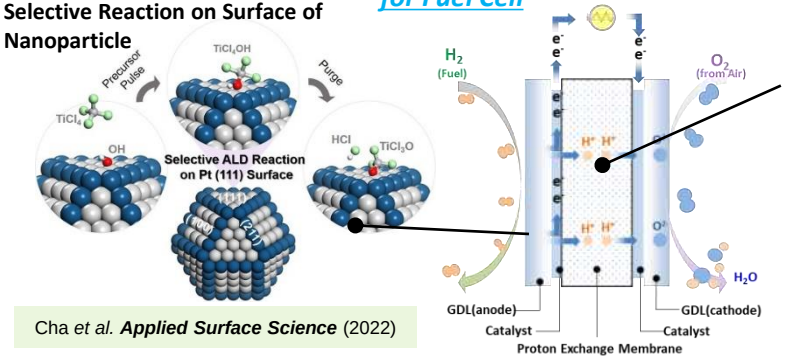
Office : Eng. Bd. 1A-201

Lab. : Eng. Bd. 1B-106

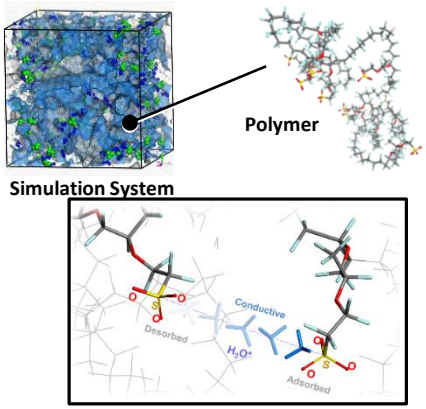
E-mail : jinhyeok.cha@jnu.ac.kr

Computational Molecular Modeling in Nanoscale

Polymer Electrolyte Membrane for Fuel Cell

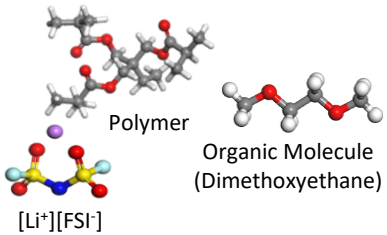


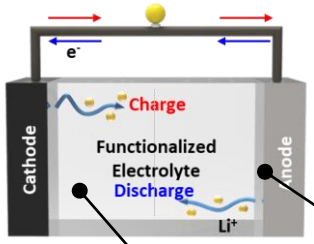
Cha *et al.* ***Applied Surface Science*** (2022)



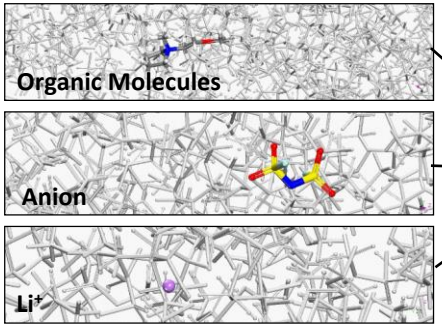
Cha *et al.* ***Scientific Report*** (2020)

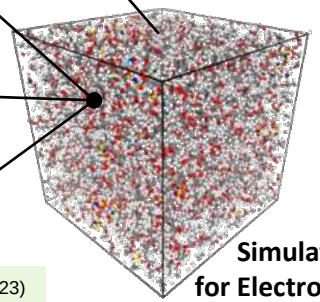
Lithium Metal Battery



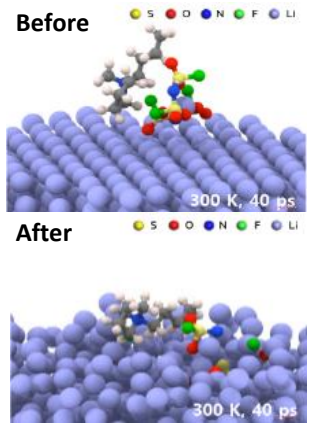


Molecular Behaviors in Electrolyte





Electrolyte Decomposition



Cha *et al.* ***Applied Surface Science*** (2022)

Cha *et al.* ***Journal of Materials Chemistry A*** (2023)

Members

- **Name** : Yeongcheol, Kim
- **Course** : Undergraduate & Graduate
- **E-mail** : 201789@jnu.ac.kr
- **Research Area** : Coorperative Insertion of CO_2 in MOFs Topics

- **Name** : Chungyoung, Heo
- **Course** : Undergraduate
- **E-mail** : chungyoung@jnu.ac.kr
- **Research Area** : Molecular Design of Electrolyte for Solid-state Battery

- **Name** : Juyoung, Park
- **Course** : Undergraduate & Graduate
- **E-mail** : psy011130@jnu.ac.kr
- **Research Area** : Molecular Design of Electrolyte for PEMFC

- **Name** : Daehwan, Shin
- **Course** : Undergraduate
- **E-mail** : sdh20012@naver.com
- **Research Area** : Carbon Capture and Utilization (CCU)

- **Name** : Sichan, Lee
- **Course** : Undergraduate & Graduate
- **E-mail** : 201756@jnu.ac.kr
- **Research Area** : Carbon Capture and Utilization

- **Name** : Yeonho, Cho
- **Course** : Undergraduate
- **E-mail** : shshedj@naver.com
- **Research Area** : Electrolyte and Electrode for Fuel Cell System

Professor

ACADEMIC QUALIFICATIONS

Ph.D. **Korea Advanced Institute of Science & Technology (KAIST), Mechanical Engineering, August 2016.**
- Thesis: A Study on EUV Generation by Plasmonic Field Enhancement using Nanostructures

M.S. **Korea Advanced Institute of Science & Technology (KAIST), Mechanical Engineering, February 2011.**
- Thesis: Design of a Non-thermal Wafer Dicing System using High Power Pulse Laser

B.S. **Korea Advanced Institute of Science & Technology (KAIST), Mechanical Engineering, February 2009.**

EMPLOYMENT HISTORY

Chonnam National University, Republic of Korea

- Assistant Professor | Mar. 2020 ~ Present
[School of Mechanical Engineering]

University of Central Florida, United States

- Postdoctoral Researcher | Sep. 2017 ~ Feb. 2020
[Institute for the Frontier of Attosecond Science and Technology(iFAST) CREOL and Department of Physics]

KAIST, Republic of Korea

- Postdoctoral Researcher | Aug. 2016 ~ Aug. 2017
[Ultrafast Optics for Ultraprecision Group, Department of Mechanical Engineering]

Imperial College London, UK

- Collaborative Researcher | Sep. 2012 ~ Feb. 2013
[Quantum Optics and Laser Science, Department of Physics]
- Research title: Ultrafast dynamics at surfaces and in nano-plasmonic structures

Prof. Seunghwoi Han

Contact

Tel : +82-62-530-5361
H.P. : +82-10-4664-6872
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ULTRA PRECISION OPTICAL ENGINEERING LAB.

Lab. Members

Ph.D. Candidates

Sangseon Lee
M.S. CNU, Feb. 2017.
B.S. MNU, Feb. 2006.

Hyperspectral Imaging for Microplastic Detection

Seungsik Shin
M.S. CSU, Feb. 2019.
B.S. CNU, Feb. 2012.

Wafer-level Optics Development & Optical Measurement

Master Students

Jaeseung Lim
B.S. JBNU, Feb. 2018.

Mechanical Design & Laser Process

Young-gi Jo
B.S. KoreaTech, Feb. 2017.

e-Vehicle & e-mobility

Rakibul Islam
B.S. JBNU, Feb. 2022.

Femtosecond Pulse Laser System

Junseok Heo
B.S. CNU, Feb. 2023.

AI based Autonomous Vehicle & Sensor Fusion

Undergraduate Students

Byeongjun Im

AI based Autonomous Vehicle

Se-eun Ha

AI based Autonomous Vehicle

Sengwon Choi

Femtosecond Pulse Laser System

Sungjae Sin

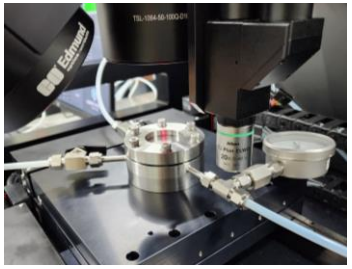
AI based Autonomous Vehicle

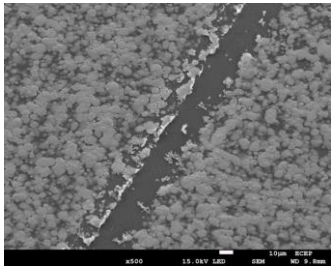
Daeseop Kim

Femtosecond Pulse Laser System

Research Area

Laser Based Semicodncutor/Display Packaging

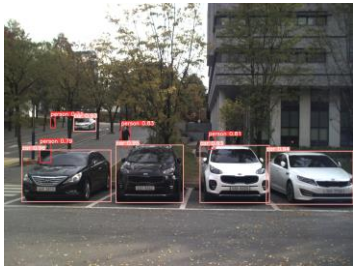




Laser induced packaging

- Laser induced forward transfer of micro-LED chips
- Optical based wiring of nano-material
- Graphene wiring derived from acetylene (C_2H_2) gas
- Wiring of metal particles using fs Laser

AI Based Autonomous Vehicle

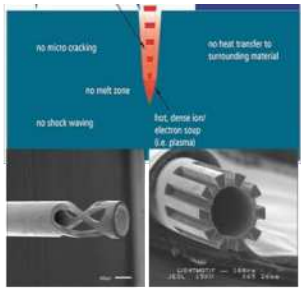


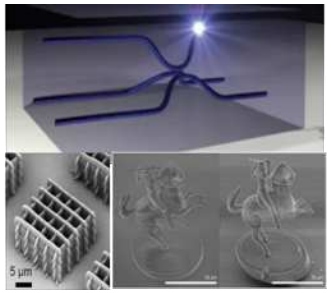
Sensor fusion for object detection

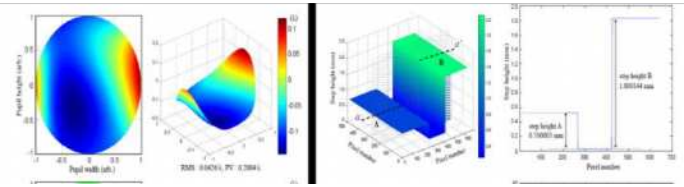
- AI based multi-spectral sensor fusion
- Development of object detection algorithm in harsh weather conditions
- 2D labeling of image data (RGB, LWIR)
- 3D labeling of LiDAR point cloud data
- Noise modeling of sensors in harsh weather conditions

Research Area

Precision Machining and Measurements







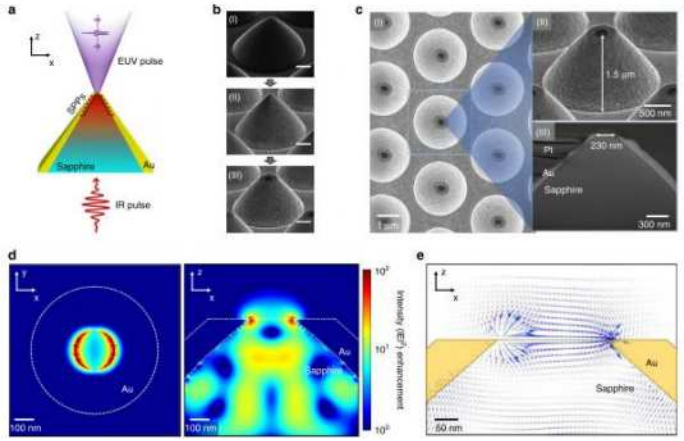
Precision machining system

- Femtosecond Laser machining for flexible/multi-stacked electronics/optics
- 3D printing

Ultraprecision measurement system

- Dimensional metrology of semiconductor, display panel.
- Spectral metrology of atom/molecule/bio (Gas, particle detection)
- Dynamical metrology of ultrafast dynamics of electron, atom, and molecule systems

Precision Optical Devices



Ultrafast coherent EUV/X-ray pulse generation

- Plasmonic high harmonic generation – EUV light sources
- Solid high harmonic generation – EUV light sources
- Nano/Micro-scale EUV/X-ray light sources
- EUV/X-ray beam shaping