



CONTACT

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Skills

Piezoelectric Resonator
Microfabrication
Process Monitoring
Planarization & 3D Integration
Heat Transfer
Fracture Mechanics

References

Prof. Hoe Joon Kim
Daegu Gyeongbuk Institute of Science and Technology (DGIST)
Email: joonkim@dgist.ac.kr
Ph.D. Advisor

Prof. Liwei Lin
University of California, Berkeley
Email: lwlin@berkeley.edu
Postdoc Advisor

Dr. Sang Bok Kim
Korea Institute of Machinery and Materials (KIMM)
Email: sbkim@kimm.re.kr
Postdoc Advisor

Il Ryu Jang, Ph. D.

Postdoctoral Fellow in PRISM-AI Center
Korea Advanced Institute Science & Technology (KAIST)



EDUCATION

Ph.D. (Mar 2018 – Feb 2024) (**Advisor: Hoe Joon Kim**)
in Robotics and Mechatronics Engineering
Daegu Gyeongbuk Institute of Science & Technology

< **Fabrication and Application of Piezoelectric Resonant Sensors for Environmental Monitoring** >

B.S. (Mar 2012 – Feb 2018) (*Summa cum laude*)
in Mechanical Engineering
Kumoh National Institute of Technology, South Korea



PROFESSIONAL EXPERIENCE

Postdoc – AMSE Lab, PRISM-AI Center (**Advisor: Sanha Kim**)
Korea Advanced Institute Science & Technology (Sep 2025 - Present)

< **Eddy Current Sensor based Thickness Monitoring System for the Chemical Mechanical Polishing (CMP) Process** >
< **Reinforced Polymer for Advanced Hybrid Bonding** >

Postdoc - Lin Group, Berkeley Sensor & Actuator Center (BSAC), Molecular Foundry (**Advisor: Liwei Lin**)
- Daegu Gyeongbuk Institute of Science & Technology (Aug 2024 – Aug 2025)
- University of California, Berkeley (Sep 2024 – Aug 2025)
- Lawrence Berkeley National Laboratory (Jan 2025 – Aug 2025)

< **Piezoelectric Resonant Fabrication** >
< **Particle Sensor Calibration Algorithm Development** >

Postdoc – Urban Environment Research group (**Advisor: Sang Bok Kim**)
Korea Institute of Machinery and Materials (Mar 2024 – Jul 2024)

< **Designing Sensor Modules** >
< **Building Data Acquisition and Processing System** >

Research Trainee - Digital Health Care Group (**Advisor: Hohyun Keum**)
Korea Institute of Industrial Technology (May 2021 – Feb 2024)

< **Transfer Printing Development** >
< **Wearable Field Effect Transistor based biosensing** >



HONORS & AWARDS

- **InnoCORE Global Postdoctoral Fellowship** \$63,000/year, Ministry of Science and ICT Grant (2025)
- **Sejong Science Fellowship** Overseas Training Track, \$50,000/year, National Research Foundation of Korea (NRF) Grant (2024)
- KSME-Thermal Engineering Division **Outstanding Thesis Award** (2024)
- Korean Society for Indoor Environment (KOSIE) **Best Paper Award** (2023)
- PAAN Scholar Cultural **Foundation** (2023) – \$1,400
- Korean Association for Particle and Aerosol Research Conference (KAPAR) **Best Poster/Paper Award** (2019, 2021, 2022)
- DGIST **Outstanding Researcher Award** (2022)
- KSME-SEMES Open Innovation Challenge **Encouragement Award** (2022)
- Korean Sensor Society Conference **Best Paper Award** (2021)



PATENTS (KR 8, PCT 3, US 2)

1. H.J. Kim, I.R. Jang, "Device and system and method for measuring concentration"
✓ **PCT** KR2020-014588 (Oct 2020) **Korea Patent** 10-2267984 (June 2021)
2. H.J. Kim, S.I. Jung, I.R. Jang, "Multi-material Surface Acoustic Wave Measuring Apparatus"
✓ **Korea Patent** 10-2629642 (Jan 2024)
3. H.J. Kim, S.I. Jung, I.R. Jang, "Material Instrumentation Sensor, Material Instrumentation System, and Material Instrumentation Method"
✓ **US Patent** 0159709 A1 (May 2024) **PCT** KR2021-017590 (Nov 2021) **Korea Patent** 10-2511788 (March 2023)
4. H.J. Kim, I.R. Jang, "Particle Measuring Apparatus and Manufacturing Method Thereof"
✓ **US Patent** 0151629 A1 (May 2024) **PCT** KR2022-06221 (May 2022) **Korea Patent** 10-2500857 (Feb 2023)
5. H. Keum, I.R. Jang, "Transfer Method using Autogenous Shrinkage"
✓ **Korea Patent** 10-2783768 (Mar 2025)
6. H.J. Kim, I.R. Jang, "Highly Reliable Gas Sensor and Manufacture Method Thereof"
✓ **Korea Patent** 10-2024-0042252 (Mar 2024)
7. H.-U. Kim, W.S. Kang, I.R. Jang, S.H. Kim, M.J. Kang, D.W. Kim, G.U. Eom, "End Point Detection Measurement System of Plasma Etching Process"
✓ **Korea Patent** 10-2024-0071155 (May 2024)

8. H.J. Kim, I.R. Jang, "Particle Abatement System for Particle Measurement from Semiconductor Manufacturing Process and Measurement Method Thereof"

✓ **Korea Patent** 10-2891767 (Nov 2025)



SELECTED CONFERENCE PRESENTATION

1. I.R. Jang, K. J. Park, H. J. Kim, "Heated Quartz Crystal Microbalance for Ultra-reliable Humidity Sensing", **Korean Society for Indoor Environment**, Jeju, Korea (Sep 2023) – **Best Paper Award**
2. I.R. Jang, S. Hajra, R. Sahu, H.J. Kim, "A Self-calibration Method via Microheater for Ultra-reliable Quartz Crystal Microbalance based Humidity Sensor", **IEEE NEMS**, Jeju, Korea (May 2023)
3. I.R. Jang, H.-U. Kim, J. Kim, M. Kweun, H.J. Kim, "Development of Particle Monitoring System in a Vacuum Condition", **Korea Association for Particle and Aerosol Research Conference (KAPAR)**, Pyeongchang, Korea (June 2022) – **Best Paper Award**
4. S.I. Jung, I.R. Jang, H. Lim, H.J. Kim, "Facile and Area-Controlled Integration of Graphene Oxide onto AlN-SAWR for Stable Humidity Detection", **Korean Sensors Society**, Gangneung, Korea (Oct 2021) – **Best Paper Award**
5. I.R. Jang, S.I. Jung, I. Park, S.B. Kim, H.J. Kim, "AlN based Surface Acoustic Wave Humidity Sensor using Electrospray", **Korea Association for Particle and Aerosol Research Conference (KAPAR)**, Pyeongchang, Korea (July 2021) – **Best Paper Award**
6. I.R. Jang, J. Park, H.J. Kim, "High Precision Mass sensing of In-Liquid Particles using CNT coated Quartz Crystal Microbalance", **IEEE Sensors**, Montreal Canada (Oct 2019)
7. I.R. Jang, J. Park, H.J. Kim, "QCM-CNT Hybrid Sensor for Ultra-Sensitive Salinity Monitoring", **Korea Association for Particle and Aerosol Research Conference (KAPAR)**, Pyeongchang, Korea (Jul 2019) – **Best Poster Award**
8. I.R. Jang, J. Park, S.B. Kim, H.J. Kim, "QCMs with Carbon Nanotubes for a High Precision Liquid Salinity Monitoring", **International Workshop in Nanomechanical Sensing (NMC)**, Lausanne, Swiss (June 2019)



JOURNAL PUBLICATIONS (8 FA/CA, 5 CA) * Equally contributed

1. M.G. Seo, K.J. Park, S.J. Yoo, I.R. Jang^{*} H.J. Kim^{*}, "Single-Chip Decoupling of Temperature and Humidity via Dual-Mode SAW Sensing on X-Cut LiNbO₃", **Sensors and Actuators B - Chemical** (2025) **Submitted**

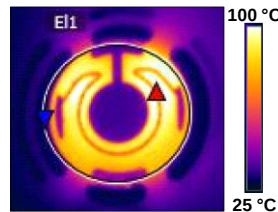
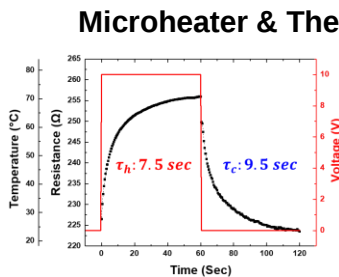
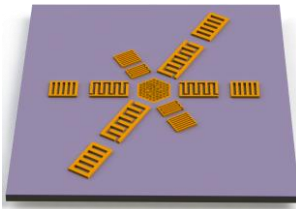
2. I.R. Jang*, H.-U. Kim*, T. Kim, M. Kweun, G.W. Eom, I.Y. Park, S. Lee, S. Kim, M. Kang, K.J. Park, W. Kang*, H.J. Kim*, "Direct monitoring of generated particles in plasma enhanced chemical vapor deposition process using temperature compensating quartz crystal microbalance", **Sensors and Actuators A - Physical** (2025) (IF: 4.1, JCR: Top 20.4%)
3. I.R. Jang, J. Yea, K.J. Park, U. Kim, K.I. Jang, N. Kim, S. Kim, H.J. Kim, H. Keum, "Heterogeneous Material Integration via Autogenous Transfer Printing using Graphene Oxide Release Layer", **ACS Applied Nano Materials** (2023) (IF: 5.9, JCR: Top 28.3%)
4. I.R. Jang, S. Hajra, R. Sahu, H.J. Kim, "Heated Quartz Crystal Microbalance with Highly Controlled Integration of ZIF-67 for Ultra-reliable Humidity Sensing", **Sensors and Actuators B - Chemical** (2023) (IF: 8.4, JCR: Top 0.8%)
5. S.I. Jung*, I.R. Jang*, C. Ryu, J. Park, A.M. Padhan, H.J. Kim, "Graphene Oxide Decorated Multi-frequency Surface Acoustic Wave Humidity Sensor for Hygienic Applications", **Scientific Reports** (2023) (IF: 4.6, JCR: Top 29.5%)
6. I.R. Jang, J. Park, C. Ryu, S.I. Jung, H.N. Kim, S.B. Kim, H.J. Kim, "High Precision Liquid Salinity Sensing using a CNT coated Quartz Crystal Microbalance", **IEEE Sensors Journal** (2022) (IF: 4.3, JCR: Top 23%)
7. I.R. Jang*, S.I. Jung*, J. Park, C. Ryu, I. Park, S.B. Kim, H.J. Kim, "Direct and Controlled Device Integration of Graphene Oxide on Quartz Crystal Microbalance via Electrospray Deposition for Stable Humidity Sensing", **Ceramics International** (2022) (IF: 5.2, JCR: Top 8.6%)
8. I.R. Jang, S.I. Jung, G. Lee, I. Park, S.B. Kim*, H.J. Kim*, "Quartz Crystal Microbalance with Thermally-controlled Surface Adhesion for an Efficient Fine Dust Collection and Sensing", **Journal of Hazardous Materials** (2022) (IF: 13.6, JCR: Top 3.5%)
9. S.A. Behera, H.G. Kim, I.R. Jang, S. Hajra, S. Panda, N. Vittayakorn, H. J. Kim, P.G.R. Achary, "Triboelectric Nanogenerator for Traffic Monitoring", **Materials Science and Engineering: B** (2024) (IF: 3.6, JCR: Top 33.55%)
10. J. Park, C. Ryu, I.R. Jang, S.I. Jung, H.J. Kim, "A Study of Strain Effect on Stretchable Carbon Nanotube Gas Sensors", **Materials Today Communications** (2022) (IF: 3, JCR: Top 42.8%)
11. C. Ryu, J. Park, S.I. Jung, I.R. Jang, H.J. Kim, "Measurement of Pulsating Flow Using a Self-Attachable Flexible Strain Sensor Based on Adhesive PDMS and CNT", **Chemosensors** (2022) (IF: 4.2, JCR: Top 26.2%)
12. C. Ryu, S. Hajra, M. Sahu, S.I. Jung, I.R. Jang, H.J. Kim, "PVDF-Bismuth Titanate Based Self-Powered Flexible Tactile Sensor for Biomechanical Applications", **Materials Letters** (2022) (IF: 3, JCR: Top 42.8%)
13. J. Park, I.R. Jang, K. Lee, H.J. Kim, "High Efficiency Crumpled Carbon Nanotube Heaters for Low Drift Hydrogen Sensing" **Sensors** (2019) (IF: 3.275, JCR: Top 29.4%)



Advanced Manufacturing and Process Monitoring for Next-generation Semiconductor Industry

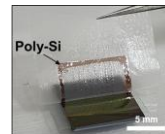
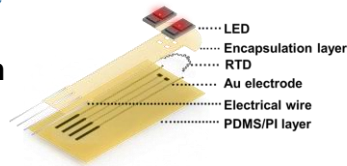
Device Fabrication: Semiconductor Manufacturing Expertise

Piezoelectric Resonator Design and Fabrication

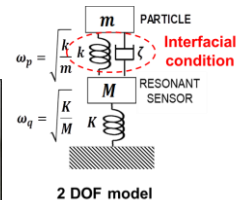


Microheater & Thermal Operation

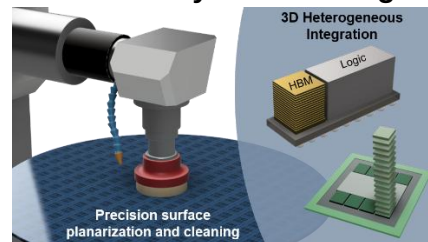
Transfer Printing & Flexible Electronics



Damping Analysis



CMP & Hybrid Bonding

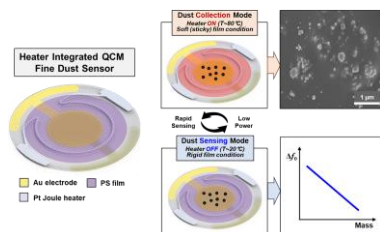


Skills: AutoCAD, COMSOL, SolidWorks, Semiconductor Manufacturing Equipment

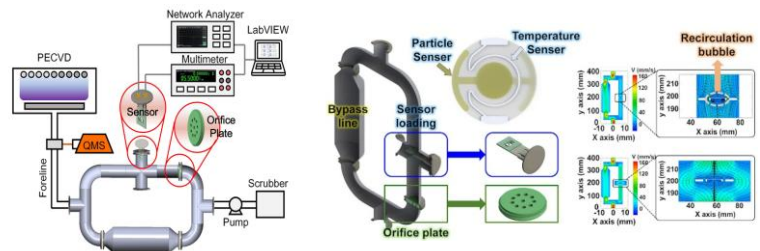
Specialty: Piezo Sensor, Fracture Mechanics, Electrospray, Damping Analysis, Flexible Electronics

Sensing Application: Semiconductor Process Monitoring Expertise

Environmental Sensor (Particle & Gas)



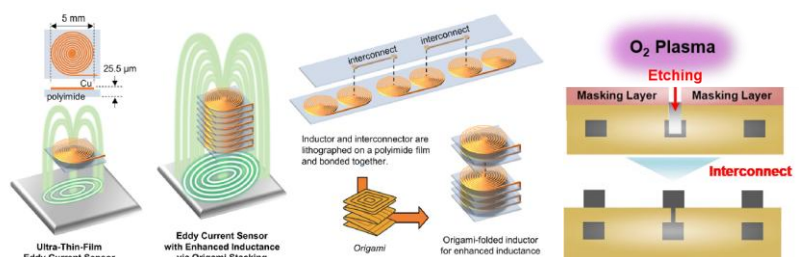
Monitoring Contaminant Particles in PECVD Processes



Ion Impurities Detection in Wafer Cleaning Systems



Monitoring Thickness in CMP Processes



Skills: LabVIEW, Vector Network Analyzer, Particle Analyzer, Infrared Thermometer

Specialty: Aerosol, Electrostatic Precipitator, Thermal Operation of MEMS Devices, RF Resonator