

Songji Eun

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Research Interests

I aim to advance semiconductor microfabrication techniques for biomedical applications, developing high-precision bioelectronic interfaces and microfluidic systems to enhance diagnostic and therapeutic technologies.

Education

- **Korea Advanced Institute of Science and Technology (KAIST)** Mar. 2021 – Present
B.S. Electrical Engineering, Minor in Computer Science, *GPA: 3.98/4.3 (Major : 4.26/4.3)*
- **Georgia Institute of Technology** Aug. 2024 – Aug. 2025
Exchange Student, Electrical and Computer Engineering, *GPA: 4.0/4.0*
- **Busan Il Science Highschool** Feb. 2018 – Jan. 2021
High school for the gifted in science and mathematics, and I majored in biology

Publications

"Buffered-Oxide-Etch Recessing for Reliable Electrode-Integrated Microfluidics" (*In progress*), A. Rostamzadeh[†], **S. Eun**, A K M. Arifuzzman, N. Asmare, A. F. Sarioglu*

"Solvent-Free Micrometer-Scale Electrode Fabrication on Embossed Polycarbonate Substrates" (*In progress*), A. Rostamzadeh[†], **S. Eun**[†], A K M. Arifuzzman, N. Asmare, A. F. Sarioglu*

Research Experiences

Biomedical Microsystems Laboratory, Georgia Tech Aug. 2024 – Aug. 2025
Undergraduate Researcher & Research Intern (PI: Prof. A. Fatih Sarioglu)

- **Fabrication of Plastic-Based Microfluidic Devices for Low-Cost, Scalable Analytical Systems**
 - Develop microfluidic chip fabrication workflow transitioning from PDMS to plastic to improve scalability, biocompatibility, and enable easier surface functionalization
 - Optimized hot embossing to yield high-precision, reproducible microfluidic channels on PC substrates
 - Developed a deposition–etch electrode fabrication process for lift-off–incompatible plastics, enabling Coulter counter electrodes on plastics
 - Established bio-functionalization on plastic for Annexin V based capture, validating apoptotic Jurkat cells
 - Demonstrated selective CD4⁺ T-cell capture on functionalized plastic chips for immunophenotyping
- **A New Generation of Coplanar Electrodes Enabling Large Electrical Networks in Microfluidics**
 - Explored fabrication of recessed electrode structures for improved field leveling and reduced fringe effects
 - Optimized process parameters to achieve reliable embedding of interdigitated electrodes in oxide trenches
 - Validated electric field distribution and signal-to-noise improvements through COMSOL simulations
- **SU-8 Patterned Lateral Electrodes for Microfluidic Electrical Spectroscopy**
 - Designed and implemented lateral electrode architecture to improve integration within microfluidic channels
 - Developed fabrication strategies to mitigate shorting and enhance reliability of lateral electrode structures
 - Developed multiple shadow mask approaches, including etched Si, SU-8/OmniCoat, and laser-cut films

Brain/Biomedical Microsystems Laboratory, KAIST Jun. 2023 – Aug. 2023
Undergraduate Researcher (PI: Prof. Hyeonjoo Jenny Lee)

- **Optimization of ACF Bonder Parameters for Biomedical Applications**
 - Optimized of bonding conditions of ACF bonder for microelectrode arrays and flexible ECoG devices, refining parameters such as temperature, pressure, and time

- Conducted impedance tests to evaluate the bonding quality, and identified optimal bonding conditions that minimize electrode resistance while ensuring stable electrical connections
- Packaged bonded microelectrode array device using an ACF bonder and detected organoid/brain signals

Work Experiences

Research Internship in Barreleye(Start-up Company)

Dec. 2023 – Mar. 2024

AI Team Intern (Advisor: Dr. Oh)

- **AI-based Breast Ultrasound Image Analysis Solution**
 - Developed a body-marker extraction tool for breast ultrasound images using Python/Computer Vision
 - Implemented contour detection and ellipse fitting with exception handling to improve robustness
 - Validated performance on large clinical datasets, including noisy and incomplete images

Honors & Awards

- **Undergraduate Research Spring Symposium** | [\[Plastic Microfluidic Devices\]](#) Apr. 2025
- **Best Interdisciplinary Award, Capstone Design Expo** | [\[Tree Tap Project\]](#) Dec. 2024
- **2024 Spring, 2023 Fall KAIST Dean’s List** Sep. 2024, Mar 2024
- **Korea-U.S. Student Exchange Program Scholarship** Aug, 2024 – Aug, 2025
- **Korea Electric Power Corporation Scholarship** May, 2024 – May, 2025
- **Excellence Award, AI-based Library Service Idea Contest** Nov, 2023

Technical Skills

- **Programming Languages:** Matlab, Java, Python, C, Verilog, Javascript
- **Tools:** COMSOL Multiphysics, KiCAD, AutoCAD, AutoFusion, SolidWorks, Git, React, VS Code
- **Language:** English(Proficient, TOEFL : 106), Chinese(Intermediate, HSK 5), Korean(Native)

Clean Room Experience

- **Independent and proficient in microfabrication processes**
- **Tools :** STS Pegasus ICP, STS ICP, Vision RIE, Oxford End-point RIE, Denton Explorer - E-beam Evaporator, Unifilm Sputterer, CHA E-beam Evaporator, Denton Discovery - RF/DC Sputterer, ADT 7100 Dicing Saw, Heidelberg MLA 150, Heidelberg MLA 300, SUSS MicroTec Mask Aligner

Projects

- **Tree Tap: Solar-Powered Mesh Communication for Emergency Response in National Parks**
 - Conducted customer discovery with rangers, hikers, and SAR teams to assess communication needs
 - Built low-power mesh network using LoRa/BLE for SOS and group messaging in parks
 - Developed hardware integrating PCB design, solar harvesting, and rugged enclosure
- **Advanced NMOS Process Simulation** | NMOS device simulation with ATHENA & ATLAS

Extracurricular Activities

- **Young Engineers Honor Society(YEHS) Junior member**
 - Led hands-on engineering activities for elementary students and advised high schoolers on electronics
- **Vice President of KAIST Volunteer Club**
 - Provided academic support to children and organized community activities at local welfare centers
- **KAIST Orchestra 2nd Violin**
- **2023, 2024 KAIST Buddy Program**