

Hansol Lee

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RESEARCH INTERESTS

Electro-thermal co-design and co-optimization of 2.5D/3D heterogeneous integration / Advanced MEMS fabrication / Thermal and power delivery management in advanced semiconductor packaging

EDUCATION

Korea Advanced Institute of Science and Technology (KAIST) <i>M.S. Mechanical Engineering GPA: 4.26/4.3</i>	Mar. 2022 – Feb. 2024 <i>Advisor: Prof. Sung Jin Kim</i>
Korea Advanced Institute of Science and Technology (KAIST) <i>B.S. Mechanical Engineering GPA: 3.81/4.3</i>	Mar. 2015 – Feb. 2022 <i>Advisor: Prof. Wang-Yuhl Oh</i>

AWARDS & HONORS

Outstanding Master's Research Award (Top 3 Graduates) <i>Department of Mechanical Engineering at KAIST</i>	Nov. 2024
Outstanding Achievement Award (Top 10 Undergraduates) <i>Department of Mechanical Engineering at KAIST</i>	Mar. 2021
Scientific Writing Competition - <i>Encouragement Award</i> <i>KAIST</i>	Mar. 2021
National Science & Technology Scholarship <i>Korea Student Aid Foundation (KOSAF)</i>	Mar. 2015 – Aug. 2021

RESEARCH EXPERIENCE

Applied Heat Transfer Lab KAIST <i>Research Intern & Graduate Research Assistant (Advisor: Prof. Sung Jin Kim)</i>	Jan. 2021 – Present
<ul style="list-style-type: none">Thermal-hydraulic modeling of manifold microchannel (MMC) heat sinks: Developed an analytical thermal-hydraulic model of MMC heat sinks for embedded cooling in ultra-high heat flux(>1kW/cm²) electronics. [Publication and presentations based on this work: (J1), (C1)-(C2)]Multi-objective performance optimization of MMCs: Performed multi-objective optimization of MMCs, achieving record-high thermal performance with uniform flow distribution through multi-fidelity surrogate modeling. [Publication based on this work: (J2)]Thermal reliability verification of 2.5D/3D Processing-In-Memory (PIM) heterogeneous packages: Developed a compact thermal model for 2.5D/3D PIM heterogeneous packages, reducing the computational cost by 98%. Invented TSV embedded manifold microchannels. [Patent based on this work: (P1)]Hands-on experience in IR thermometry and pool boiling heat transfer analysis: Led a project on the analysis of phase change heat transfer during pool boiling using IR thermometry and numerical analysis techniques.	
Thermal Radiation Laboratory KAIST <i>Undergraduate Research Assistant (Advisor: Prof. Bong Jae Lee)</i>	Dec. 2017 – Feb. 2018
<ul style="list-style-type: none">Explored and applied machine learning techniques to efficiently solve complex inverse heat conduction problems.	

JOURNAL PUBLICATIONS

- (J1) **H. Lee***, Y. J. Lee*, S. J. Kim, One-dimensional model of manifold microchannel heat sinks: Prediction of thermal performance and flow non-uniformity, *International Communications in Heat and Mass Transfer*. (2022 JCR: 4.7%, IF: 7.0) [\[Link\]](#)
- (J2) Y. J. Lee*, **H. Lee***, C. Hwang*, I. Lee, S. J. Kim, Multi-objective thermal-hydraulic performance optimization of manifold microchannels for embedded cooling based on multi-fidelity surrogate modeling. (*In preparation*)

*First co-author

PATENTS

- (P1) Embedded manifold microchannel heat sink utilizing through silicon via (TSV) for electrical communication as a heat dissipation structure in a 2.5D/3D packages, Y. J. Lee, **H. Lee**, S. J. Kim (South Korea, Application No.P2024-0824-KR01)

CONFERENCES

- (C1) One-dimensional modeling of embedded manifold microchannels with plate fins for prediction of thermal performance and flow non-uniformity, ***Korean Society Mechanical Engineering Thermal Engineering Division (2024 KSME-TED)***, Apr. 2024, Jeju, Republic of Korea
- (C2) Thermal performance prediction of liquid-cooled manifold microchannel (MMC) heat sinks with plate fins, ***Korean Society Mechanical Engineering Thermal Engineering Division (2023 KSME-TED)***, Apr. 2023, Gyeongju, Republic of Korea
- (C3) One-dimensional model of Z-type manifold microchannels and experimental validation, ***24th Intersociety Conference on Thermal and Thermomechanical Phenomena in Electronic Systems (ITherm2025)***.
(Abstract submitted)

PROJECTS

- 3D Multiporous Cooling System for Ultra-high Heat Flux Applications** Mar. 2022 – Feb. 2024
National Research Foundation of Korea (NRF) PI: Prof. Sung Jin Kim
- Conducted an analytical thermal-hydraulic modeling of 3D structured monoporous coolers with various types of manifold. Optimized its performance and contributed to the development of cooling solutions for ultra-high heat flux electronics.
- Thermal Reliability Verification of 2.5D/3D PIM Heterogeneous Package** Mar 2023 – Feb. 2024
Electronics and Telecommunications Research Institute (ETRI) PI: Prof. Sung Jin Kim
- Developed a compact thermal model of a PIM heterogeneous package to verify thermal reliability. Invented the embedded manifold microchannels utilizing through-silicon vias (TSV) for both electrical communication and heat dissipation. (see patent above)

PROFESSIONAL EXPERIENCE

- Thermal/Research Engineer** July. 2024 – Dec. 2024
Koolmicro Inc. Hwaseong, Republic of Korea
- Optimized the thermal performance of a liquid cooling module for large-die-size ($> 2\text{cm} \times 2\text{cm}$) chiplets, specifically for data centers and high performance computing (HPC) systems. Designed a thermal test section for evaluating the thermal performance of the liquid cooling module.
- Research Intern** Jun. 2018 – Feb. 2019
Beflex Inc. Daejeon, Republic of Korea
- Developed algorithms in biomechanical running trackers for measuring ground impact and GPS paths of runners. Conducted a user experience study for earphone-type running trackers.

EXTRACURRICULAR ACTIVITIES

- Student Press - Editor in ME Newsletter** Apr. 2022 – May. 2023
Department of Mechanical Engineering in KAIST
- Drafted, edited, and published articles introducing monthly research highlights in the ME department. Interviewed professors and researchers in the ME department.
- Vice President of KAIST Entrepreneurs** Mar. 2018. – Feb. 2019
KAIST K-School
- Developed a student-oriented social network connecting student startup teams via KE party. Interviewed and published articles introducing alumni entrepreneurs.

TEACHING

- Physics tutoring for Gifted Education** Sep. 2021 – Feb. 2022
KAIST Center for Gifted Education
- Taught physics to gifted middle school students and conducted regular mentoring sessions.
- International Freshman Tutoring - General Physics I** Mar. 2021 – Jun. 2021
KAIST
- Tutored international freshmen in general physics in English.

SKILLS

Programming languages: MATLAB, Python, C
Commercial software: ANSYS Fluent, Icepack, SpaceClaim, Inventor, AutoCAD, Illustrator
English proficiency: TOEFL 108 (R/L/S/W - 30/26/24/28)

MILITARY SERVICE

Capital Artillery Brigade	March. 2019 – Oct. 2020
<i>Army Sergeant, Honorable Discharge, Administration Specialist</i>	<i>Gimpo, Republic of Korea</i>