

Donghyeong Lee

- Ph.D course
- Department of Mechanical Engineering
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- Research interest:
 1. Phase change heat transfer
 2. Computer vision-based analysis



Academic Experiences

Korea Advanced Institute of Science and Technology (KAIST) Feb. 2024 – present
Ph.D Mechanical Engineering

Korea Advanced Institute of Science and Technology (KAIST) Mar. 2023 – Feb. 2024
M.S. Mechanical Engineering

- Thesis: Analysis of Dynamic Droplet Behavior for Predicting Condensation Mass and Heat Transfer Using Computer Vision (Advisor: Prof. Youngsuk Nam)

Kyung Hee University Mar. 2019 – Feb. 2023
B.S. Mechanical Engineering

- Thesis: Studies on Energy Conserving by Using Hybrid Desiccant System (Advisor: Prof. Hiki Hong)

Journal Publications

- 1) Jun Soo Kim*, Seokwan Roh*, Kihwoon Shim*, **Donghyeong Lee***, Choongyeop Lee, and Youngsuk Nam, "Toward Long-Lasting Slippery Surfaces for Condensation and Icephobicity: From Lubricant-Infused to Liquid-Like Surfaces", ***Advanced Materials Interfaces***, Vol. 12, No. 24, e00791 (2025).
*Equal contribution (co-first authors).
- 2) **Donghyeong Lee**, Seokwan Roh, Jaewoo Jeong, Kuk-Jin Yoon, Jungchul Lee, and Youngsuk Nam, "Analysis of Multiscale Condensation Phenomena Using a Zero-Shot Computer Vision Framework", ***Advanced Science***, Vol. 13, No. 10, e21372 (2026).
- 3) Jun Soo Kim, Minjeong Kang, Seokwan Roh, **Donghyeong Lee**, Wontae Jang, Sung Gap Im, and Youngsuk Nam, "Rational design of polymer film morphology

via structure-performance linkage for enhanced condensation performance”, ***Nature Communications***, Accepted.

- 4) HyeonSoo Baek*, **Donghyeong Lee***, Young-su Ko, Youngsuk Nam, and Choongyeop Lee, “Quantitative Characterization of Droplet Splashing on Superhydrophobic Surfaces using Deep Learning-Based Machine Vision”, ***International Communications in Heat and Mass Transfer***, Accepted.

*Equal contribution (co-first authors).

Conference

- 1) Seokwan Roh, Jun Soo Kim, Kihwoon Shim, Jaehwan Shim, **Donghyeong Lee**, Jungchul Lee, and Youngsuk Nam, “Measuring the Initial Stage of Dropwise Condensation using Atomic Force Microscopy”, *KSME Fall Conference*, Korea, November 1-3, 2023.
- 2) **Donghyeong Lee**, Seokwan Roh, Kuen Tae Park, and Youngsuk Nam “Analysis of Dynamic Droplet Behavior for Quantifying Condensation Mass Using Computer Vision”, *KSME Spring Conference*, Korea, April 24-27, 2024.
- 3) **Donghyeong Lee**, Seokwan Roh, and Youngsuk Nam, “Deep learning-based dynamic condensation behavior analysis and condensation rate prediction under various environmental conditions”, *2025 Gordon Research Conference (GRC) on Micro and Nanoscale Phase Change Phenomena*, Pomona, USA, Jan 12-17, 2025.
- 4) Seokwan Roh, Jaehwan Shim, Jun Soo Kim, Kihwoon Shim, **Donghyeong Lee**, and Youngsuk Nam, “Analyzing the Effect of Nanoscale Coating Uniformity on Dropwise Condensation Using Atomic Force Microscopy”, *2025 Gordon Research Conference (GRC) on Micro and Nanoscale Phase Change Phenomena*, Pomona, USA, Jan 12-17, 2025.
- 5) Jun Soo Kim, Seokwan Roh, Minjeong Kang, **Donghyeong Lee**, Sung Gap Im, and Youngsuk Nam, “Tailoring nanoscale polymer film deposited via initiated chemical vapor deposition (iCVD) for dropwise condensation”, *2025 Gordon Research Conference (GRC) on Micro and Nanoscale Phase Change Phenomena*, Pomona, USA, Jan 12-17, 2025.
- 6) HyeonSoo Baek, Young-Su Ko, **Donghyeong Lee**, Youngsuk Nam, and Choongyeop Lee, “Machine Vision- based Quantitative Analysis of Droplet Splash on Superhydrophobic Micro-Patterned Surfaces”, *KSME Spring Conference*, Korea, April 3, 2025.
- 7) **Donghyeong Lee**, Seokwan Roh, and Youngsuk Nam, “Deep learning-based condensation droplet tracking and heat transfer analysis techniques”, *KSME Spring Conference*, Korea, April 23-26, 2025.

- 8) Seokwan Roh, Jaehwan Shim, Jun Soo Kim, Kihwoon Shim, **Donghyeong Lee**, Jungchul Lee, and Youngsuk Nam, "Analysis of Initial Dropwise Condensation Characteristics Using Watermark on Hydrophobic Coating with Atomic Force Microscopy", *KSME Spring Conference*, Korea, April 23-26, 2025.
- 9) Junyeong Park, Kihwoon Shim, **Donghyeong Lee**, Seokwan Roh, and Youngsuk Nam, "Analysis of the influence of surface charge induced by corona charging on the initial dropwise condensation behavior of water", *KSME Spring Conference*, Korea, April 23-26, 2025.
- 10) HyeonSoo Baek, Young-Su Ko, **Donghyeong Lee**, Youngsuk Nam, and Choongyeop Lee, "Quantitative Analysis of Droplet Splashing on Superhydrophobic Surfaces via Deep Learning-Based Machine Vision", *ACFM*, Korea, September 10-13, 2025.
- 11) HyeonSoo Baek, Young-Su Ko, **Donghyeong Lee**, Youngsuk Nam, and Choongyeop Lee, "Machine Vision- based Quantitative Analysis of Droplet Splash on Superhydrophobic Micro-Patterned Surfaces", *KSME Fall Conference*, Korea, December 10-12, 2025.
- 12) Junyeong Park, Kihwoon Shim, **Donghyeong Lee**, Seokwan Roh, and Youngsuk Nam, "Analysis of droplet condensation and coalescence behavior induced by surface charge", *KSME Spring Conference*, Korea, April 22-25, 2026.

Award

- 1) "Gold Award" from *KSME-LG Future Home Tech. Challenge*, Korea, November 2, 2023.
- 2) "Encouragement Award" from *KSME-SEMES Open Innovation Challenge*, Korea, December 11, 2025.

Patent

- 1) Computer vision-based droplet segmentation and quantification program, C-2024-055077, December 24, 2024.

Research Topics

- 1) Phase change heat transfer
- 2) Computer vision-based analysis

