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. Mechinical 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. Mechinical 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*** (2025)

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*** (2025)

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 GRC for Micro and Nanoscale Phase Change Phenomena*, United States, January 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 GRC for Micro and Nanoscale Phase Change Phenomena*, United States, January 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 GRC for Micro and Nanoscale Phase Change Phenomena*, January 12-17, 2025.

6) **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.

7) 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.

8) 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.

9) 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.

10) 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 Winter Conference*, Korea, December 10-12, 2025.

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