Curriculum Vitae

Personal Information

- Namkyu Lee, Postdoctoral position, Institute of Biological Information Processing-4, Forschungszentrum Jülich
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Work history:

- Sep. 2019 – Present — Postdoctoral position, Forschungszentrum Jülich
- Aug. 2018 – Aug. 2019 — Research Associate, Yonsei University

Education:

- Mar. 2013 – Aug. 2018 — **Ph. D., in Mechanical Engineering, Yonsei University**
  Title: Heat Transfer Control using Thermal Metamaterials for Camouflage and Energy Conversion
  Research Advisor: Hyung Hee Cho (ASME Fellow)
  GPA: 4.15 / 4.3
- Mar. 2007 – Feb. 2013 — Bachelor, Mechanical Engineering, Yonsei University
  GPA: 3.76 / 4.3

Research Experience:

- Jun. 2013 – Aug. 2019. — "Green Energy Technology (GET)- Future research for gas turbine hot components" Supported by Korea Institute of Energy Technology Evaluation
- Sep. 2017 – Dec. 2018 — "Research on Advanced Thermal Metamaterials" Supported by National Research Foundation of Korea
- Jan. 2017 – Feb. 2017 — "Novel cooling design for advanced divertor for nuclear fusion reactor" (Co-Advisor: B.E. Ghidersa, KIT (Karlsruhe Institute for Technologie) Supported by National Research Foundation of Korea
- Mar. 2014 – May. 2017 — "Nano bi-metal and smart surface technology for enhancing heat transfer" Supported by National Research Foundation of Korea
- Nov. 2015 – Mar. 2016 — "Research proposal of Fabrication of ceramic sponge possibly used for extreme environmental condition by multidimensional/multifunctional procedure" Supported by National Research Foundation of Korea
- Sep. 2014 – Feb. 2015 — "Study of cooling solution for mobile device" Supported by LG Electronics.
- Jul. 2014 – Oct. 2014 — "Analysis of thermal-fluidic behavior in CVD Chamber during process" Supported

by TES Inc.

- Jun. 2013 – Dec. 2013 "Heat transfer control of rapid thermal CVD chamber" Supported by TES Inc.
- Aug. 2012 – Dec. 2013 "A Study on Characteristics of Boundary Layer Variation by Secondary Injection" Supported by Agency of Defense Development

Awards and Scholarship:

- Sep. 2019 – Present Post-Doc Overseas Training funded by National Research Foundation
  Program name: Development of a thermophoretic trap for accumulation of colloidal particles and bio-molecules
- Sep. 2018 – Aug. 2019 Post-Doctorate Researcher Supporting Program funded by Yonsei Univ.
  Project name: Investigation on transparent selective emitter for simultaneous visible/infrared camouflage
- Jun. 2017 Best Paper award, 2016 Korean Society of Mechanical Engineers
- Aug. 2013 – Aug. 2016 BK21 (Brain Korea project) Participation Scholarship from National Research Foundation
- Mar. 2013 – Aug. 2016 Research Assistant Scholarship, from Yonsei University
- Dec. 2015 Best Presentation award, 2015 Korean Society for Fluid Machinery winter conference
- Oct. 2012 Best Post award, 5th International Symposium on Fluid Machinery and Fluids Engineering
- Feb. 2008 High Honors, Yonsei University

Complete list of publications

Monograph:

1. **Lee, N.** (2018): Heat Transfer Control using Thermal Metamaterials for Camouflage and Energy Conversion. Yonsei University. (Doctoral dissertation)

2. Cho, H. H., Kim, S. H., Kim, B. K., Wu, S. J., Hwang, S. D., Hong, S. K., Choi, G., **Lee, N.** (2017): Cooling Techniques for Hot Components of Gas Turbine HIvision. (ISBN: 8991209858)

Journal:

1. **Lee, N.**†, Yoon, B.†, Bae, J.-Y., Kim, T., Cho, H. H.*: Multiple Resonance Metamaterial Emitter for Deception of Infrared Emission with Enhanced Energy Dissipation. In: ACS Applied Materials & Interfaces (†: Equally contribution on paper), 2020, 12, 7, 8862-8869.

2. Choi, S., Moon, H., **Lee, N.**, Kim, K., Park, Y.-K., Cho, H. H.*: Thermal Design of Dual Circulating Fluidized Bed Reactors for A Large-Scale CO2 Capture System. Submitted to: Applied Thermal Engineering, Accepted

3. Lee, D., **Lee, N.**, Hsu, W.-T., Yun, M., Cho, H. H.*: Enhanced boiling heat transfer on micro-structured surfaces via ultrasonic actuation. Submitted to: International Communications on Heat and Mass Transfer, Accepted

4. **Lee, N.,** Kim, T., Lim, J.-S., Chang, I., Cho, H. H.* (2019): Metamaterial selective emitter for maximizing infrared camouflage performance with energy dissipation. In: ACS Applied Materials & Interfaces, 11(23), 21250-21257.

5. **Lee, N.**, Kim, B. S., Moon, H., Lim, J.-S., Cho, H. H.* (2019): Heat-absorbing capacity of high-heat-flux components in nuclear fusion reactors. In: Energies, 12, 3771

6. Kim, B. S†., **Lee, N**†., Thota, S., Gemming, T., Cho, H. H.* (2019): Effects of radiative local heating on metal solidification during selective laser melting for additive manufacturing. In: Applied Surface Science, 496, 143594 (†: Equally contribution on paper)

7. Kim, T., Bae, J.-Y., **Lee, N.**, Cho, H. H.* (2019): Hierarchical Metamaterials for Multi-Spectral Camouflage of Infrared and Microwaves. In: Advanced Functional Materials, 1807319 (Selected inside cover image)

8. Lee, D., Lim, J.-S., **Lee, N.**, Cho, H. H.* (2019): Enhanced thermal uniformity and stability in pool boiling heat transfer using ultrasonic actuation. In: International Communications in Heat and Mass Transfer, 106, 22-30

9. Eom, H.-O., Bae, J.-Y., **Lee, N.**, Kim, J., Nam, J., Jo, H., Cho, H. H.* (2019): Intake Performance Characteristics according to S-duct Cross-section Shape in UAV. In: Journal of the Korean Society of Propulsion Engineers, 23(5), 107-114 (Korean domestic journal)

10. Chang, I., Bae, J.-Y., **Lee, N.**, Kwak, H., Cho, H. H.* (2019): Variation of human thermal radiation characteristics applying different clothing materials. In: Journal of the KIMST, 22(5), 644-653 (Korean domestic journal)

11. Chang, I., Bae, J.-Y., **Lee, N.**, Kwak, H., Cho, H. H.* (2019): Thermal signature characteristics of clothed human considering thermoregulation effects. In: Journal of the computational structural engineering institute of korea, 32(2), 109-116 (Korean domestic journal)

12. Lee, D.†, **Lee, N.**†, Shim, D.-I., Kim, B. S., Cho, H. H.* (2018): Enhancing thermal stability and uniformity in boiling heat transfer using micro-nano hybrid surfaces (MNHS). In: Applied Thermal Engineering, 130, 710-721 (†: Equally contribution on paper)

13. **Lee, N.**, Lim, J.-S., Ghidersa, B. E., Cho, H. H.* (2018): Nozzle-to-target distance effect on the cooling performances of a jet-impingement helium-cooled divertor. In: Fusion Engineering and Design, 136, 803-808

14. Lee, D., Kim, B. S., Moon, H., **Lee, N.**, Shin, S., Cho, H. H.* (2018): Enhanced boiling heat transfer on nanowire-forested surfaces under subcooling conditions. In: International Journal of Heat and Mass Transfer, 120, 1020-1030

15. Lim, J.-S., **Lee, N.**, Ghidersa, B. E., Cho, H. H.* (2018): Enhancement of cooling performance of a helium-cooled divertor through the addition of rib structures on the jet-impingement area. In: Fusion Engineering and Design, 136, 655-660

16. Maremi, F., **Lee, N.**, Choi, G., Kim, T., Cho, H. H.* (2018): Design of Multilayer Ring Emitter Based on Metamaterial for Thermophotovoltaic Applications. In: Energies, 11(9), 2299

17. Lee, D., **Lee, N.**, Choi, G., Cho, H. H.* (2018): Heat Transfer Characteristics of a Focused Surface Acoustic Wave (F-SAW) Device for Interfacial Droplet Jetting. In: Inventions 3(2), 38

18. Yoon, B., **Lee, N.**, Bae, J.-Y., Tolessa, F., Cho, H. H.* (2018): Metal-dielectric-metal selective emitter with circular hole patterns for thermo-photovoltaic. In: Transactions of the Korean Society of Mechanical Engineers, B 42 (5), 357-363 (Korean domestic journal)

19. **Lee, N.**, Kim, B. S., Kim, T., Bae, J.-Y., Cho, H. H.* (2017): Thermal design of helium-cooled divertor for reliable operation. In: Applied Thermal Engineering, 110, 1578-1588

20. Shim, D.-I., Choi, G., **Lee, N.**, Kim, T., Kim, B. S., Cho, H. H.* (2017): Enhancement of Pool Boiling Heat Transfer Using Aligned Silicon Nanowire Arrays. In: ACS Applied materials & interfaces, 9(20), 17595-17602

21. Kim, B. S., Lee, B.-I., **Lee, N.**, Choi, G., Gemming, T., Cho, H. H.* (2017): Nano-inspired smart interfaces: fluidic interactivity and its impact on heat transfer. In: Scientific Reports, 7, 45323

Patents

1. Cho, H. H., Kim, T., Bae, J.-Y., **Lee, N.**, Lee, H., Kim, T. (2019): Structure for Radar and Infrared Compatible Technology by Controlling Absorptivity and Emissivity. Korea Patent (Patent No. 10-1927491).

2. Cho, H. H., Kim, T., Lee, H., Bae, J.-Y., **Lee, N.**, Kim, T. (2019): COMPOSITE STRUCTURE FOR CONTROLLING ABSORPTIVITY OF RADAR AND EMISSIVITY OF INFRARED REGIONS. USA Patent (Patent No.: US10439294B2)

International and Domestic Conferences

1. **Lee, N.**, Lim, J.-S., Chang, I., Bae, H. M., Nam, J., Cho, H. H.* (2019): Suggestion of integrated factor of selective emitter for IR camouflage performance with energy dissipation, 2019 NANO KOREA, KINTEX, Ilsan, Korea, July 2019.

2. **Lee, N.**, Lim, J.-S., Chang, I., Cho, H. H.* (2018): Application of Large-scale Flexible Selective Emitter for Deception of IR detector. 2018 MRS Fall meeting, Boston, USA, Nov. 2019.

3. **Lee, N.,** Lim, J.-S., Ghidersa, B.-E., Cho, H. H.* (2018): Nozzle-to-Target Distance Effect on the Cooling Performances of a Jet-Impingement Helium-Cooled Divertor. The 13th International Symposium on Fusion Nuclear Technology, Kyoto, Japan, Sep. 2018.

4. **Lee, N.**, Lim, J.-S., Choi, S., Chang, I., Cho, H. H.* (2018): Thermal Characteristics of Divertor in Nuclear Fusion Reactor by Heat Generation of Neutron Wall Load, 2018 Korea Society for Fluid Machinery summer conference (Korean domestic conference)

5. **Lee, N.**, Yoon, B., Chang, I., Lim, J.-S., Cho, H. H.* (2018): Flexible Thermal Emitter with Multi-Resonance Peak for 8~12 um Wavelength Camouflage. 2018 NANO KOREA, KINTEX, Ilsan, Korea, July 2018.

6. **Lee, N.**, Lee, D., Lim, J.-S., Choi, S., Choi, G., Cho, H. H.* (2017): Heat Transfer Characteristics of pool boiling by 37.8 kHz ultrasonic wave actuation. 2017 Korean Society for Fluid Machinery winter conference (Korean domestic conference)

7. **Lee, N.**, Lim, J.-S., Choi, G., Ghidersa, B. E., Cho, H. H.* (2017): Heat Transfer Characteristics of Helium-cooled Divertor with the change of Nozzle-to-Target Distance, 2017 Fall conference of Korean Society of Mechanical Engineers (Korean domestic conference)

8. **Lee, N.**, Lee, D., Kim, B. S., Choi, G., Cho, H. H.* (2017): Heat Transfer Characteristics of Critical Heat Flux on Micro-Nano Hybrid Structure, 2017 Korean Society for Fluid Machinery summer conference (Korean domestic conference)

9. **Lee, N.**, Lim, J.-S., Choi, G., Shim, D.-I., Cho, H. H.* (2017): Thermal analysis of helium-cooled divertor changed by operating variables in nuclear fusion reactor. 2017 Spring conference in Energy and Power division of Korean Society of Mechanical Engineers (Korean domestic conference)

10. **Lee, N.**, Kim, B. S., Lee, B.-I., Choi, G., Cho, H. H.* (2017): Heat Transfer Characteristics of Single-Phase Liquid Impingement Jet on Nanowire Coated Surface, 4th International Workshop on Heat Transfer, Las Vegas, USA, Apr. 2017.

11. **Lee, N.**, Lee, D., Kim, B. S., Choi, G., Cho, H. H.* (2016): Effects of surface wettability on critical heat flux through surface manipulation, 7th International Symposium on Fluid Machinery and Fluids Engineering, Jeju, Korea, Oct. 2016.

12. **Lee, N.**, Kim, B. S., Choi, G., Shim, D.-I., Cho, H. H.* (2016): Analysis of thermal stress changed by surface modification in boiling heat transfer, 2016 Spring conference in Energy and Power division of Korean Society of Mechanical Engineers (Korean domestic conference)

13. **Lee, N.**, Bae, J.-Y., Kim, T., Kang, Y. G., Ham, H., Cho, H. H.* (2015): Effects of jet peneration around hole in the supersonic flowfield. The Asian Symposium on Computational Heat Transfer and Fluid Flow, Busan, Korea, Nov. 2015.

14. **Lee, N.**, Lee, H., Kim, B. S., Lim, J.-S., Cho, H. H.* (2015): A study on critical heat flux with diameter change of structure on surface. 2015 Korean Society for Fluid Machinery winter conference (Korean domestic conference)

15. **Lee, N.**, Kim, B. S., Cho, H. H.* (2015): Effect of Heat Generation by Neutron Wall load on Divertor module. 12th International Symposium on Fusion Nuclear Technology, Jeju, Korea, Sep. 2015

16. **Lee, N.**, Lee, H., Kim, B. S., Choi, G., Shim, D.-I., Cho, H. H.* (2015): Evaluation of wicking performance with heat transfer on nanopillar surface. The 26th International Symposium on Transport Phenomena, Leoben, Austria, Oct. 2015.

17. **Lee, N.**, Bae, J.-Y., Song, J., Kang, Y. G., Ham, H., Cho, H. H.* (2014): Numerical study on the flowfield for nozzle erosion and performance with asymmetric secondary injection. 2014 Korean Society for Aeronautical & Space Sciences Fall conference (Korean domestic conference)

18. **Lee, N.**, Bae, J.-Y., Kim, T., Kang, Y. G., Cho, H. H.* (2014): Analysis of flow characteristics in the supersonic flowfield with secondary injection with respect to mach number. 2014 Korean Society of Propulsion Engineers Fall conference (Korean domestic conference)

19. **Lee, N.**, Song, J., Bae, J.-Y., Kang, Y. G., Jung, D., Cho, H. H.* (2014): Analysis of flow characteristics by direction of nozzle expansion with secondary injection in the supersonic flowfield. 2014 Korea Institute of Military Science and Technology conference (Korean domestic conference)

20. **Lee, N.**, Song, J., Bae, J.-Y., Kang, Y. G., Ham, H., Bae, J. C., Cho, H. H.* (2014): Heat transfer near injection hole by shock and boundary layer interaction in the supersonic flowfield. 15th International Heat Transfer Conference, Kyoto, Japan, Aug. 2014.

21. **Lee, N.**, Bae, J.-Y., Kim, T., Ham, H., Kang, Y. G., Cho, H. H.* (2014): Effect of Chemical Reaction on Supersonic Flow Interaction with Secondary Jet Injection. The 7th Asian Joint Conference on Propulsion and Power 2014, Jeju, Korea, Mar. 2014.

22. **Lee, N.**, Bae, J.-Y., Song, J., Kim, T., Kang, Y. G., Cho, H. H.* (2014): Thermal Analysis by Shock and Boundary Layer Interaction in the Supersonic Flow with Penetration Jet. 15th International Symposium on Transport Phenomena and Dynamics of Rotating Machinery, Honolulu, HI, USA, Feb. 2014.

23. **Lee, N.**, Bae, J.-Y., Song, J., Kim, T., Kang, Y. G., Cho, H. H.* (2013): Numerical simulation of performance and heat load at the system of secondary injection. 2013 Korea Institute of Military Science and Technology conference (Korean domestic conference)

24. **Lee, N.**, Bae, J.-Y., Song, J., Kim, T., Kang, Y. G., Cho, H. H.* (2013): Analysis of analogy between flat plate and circular nozzle with secondary injection in supersonic flow field using numerical simulation. 2013 Korean Society of Propulsion Engineers Spring conference (Korean domestic conference)

25. **Lee, N.**, Song, J., Lee, J. J., Bae, J.-Y., Kang, Y. G., Bae, J. C., Cho, H. H.* (2013): Thermal stress analysis around secondary injection hole along with momentum ratio and cooling condition. 2012 Korean Society of Propulsion Engineers Spring conference (Korean domestic conference)

26. **Lee, N.**, Song, J., Bae, J.-Y., Kang, Y. G., Bae, J. C., Cho, H. H.* (2012): Thermal Stress Analysis in the Secondary Injection at the Flat Plate. 5th International Symposium on Fluid Machinery and Fluids Engineering, Jeju, Korea, Oct. 2012.