Hanbat National University
Department of Mechanical Engineering

Curriculum Vitae

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47	15	14
SCI PUBLICATIONS	FIRST / CO-FIRST AUTHOR	JOURNAL COVERS

EDUCATION & RESEARCH BACKGROUND

Sep. 2020 – Aug. 2024	**Ph.D.**, Department of Mechanical Engineering, Korea Advanced Institute of Science and Technology (KAIST), Daejeon, Republic of Korea *(Advisor: Prof. Inkyu Park)*
Sep. 2020 – Aug. 2024	**Student Researcher**, Nano-lithography Center, Korea Institute of Machinery and Materials (KIMM), Daejeon, Republic of Korea *(PI: Dr. Jun-Ho Jeong)*
Mar. 2018 – Feb. 2020	**M.S.**, Department of Mechanical Engineering, Soongsil University, Seoul, Republic of Korea *(Advisor: Prof. Sung-Hoon Park)*
Mar. 2012 – Feb. 2018	**B.S.**, Department of Mechanical Engineering, Soongsil University, Seoul, Republic of Korea

RESEARCH INTEREST

Smart materials designing and optimization for wearable bio-applications

I have researched the design and fabrication optimization of smart materials with diverse geometries and functionalities tailored for wearable bio-applications. My primary research interests lie in fabricating single-polymer or biomaterial-based fibers, as well as creating functionalized composite fibers by blending two or more materials through the electrospinning process. My focus has been on optimizing processes to enhance the functional efficiency of smart materials, thereby maximizing user-required functionalities.

Moreover, I have applied these versatile materials to various wearable healthcare applications, including multifunctional wound dressings (*Adv. Funct. Mater.*, 2316196, 2024 & *Adv. Mater. Technol.*, 8, 2201765, 2023), diagnostic garments for genetic diseases (*Mater. Horiz.*, 10 (10), 4163, 2023), glucose sensing patches by SERS, and photodegradable bactericidal masks utilizing visible light irradiation (*Adv. Funct. Mater.*, 2401404, 2024). I anticipate that these research endeavors will foster the ongoing advancement of the bio industry and contribute to enhancing human quality of life.

Micro/nano structuring and compositing

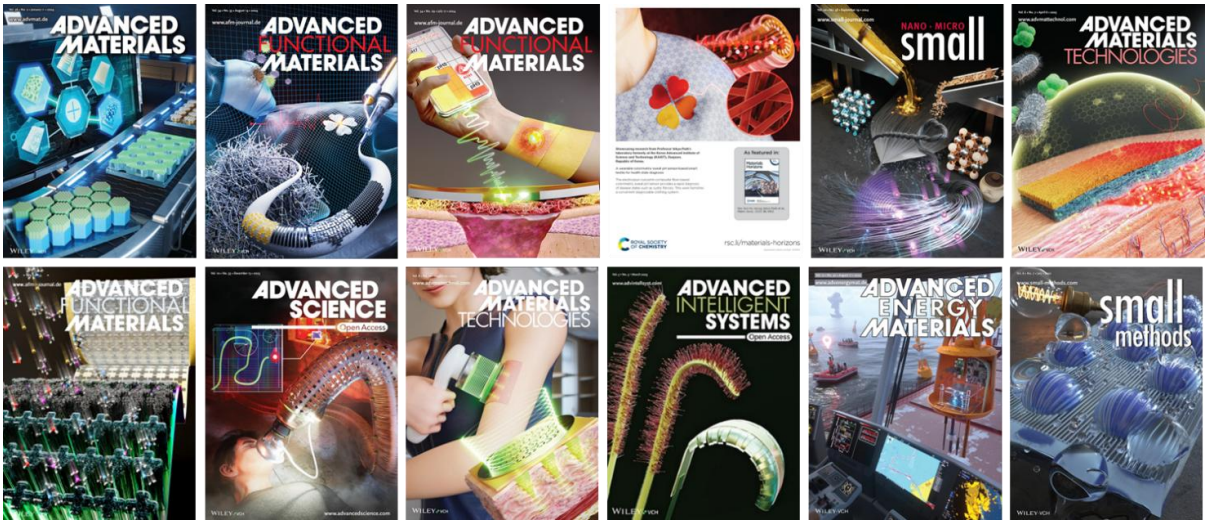
I am also keenly interested in constructing hierarchical structures using materials at the nano/micro scale and advancing functional composite films. I have successfully fabricated diverse micro/nano-scale structures employing MEMS/NEMS processes and nanoimprinting techniques (*Adv. Mater.*, 36, 2300871, 2024). Surface modification and etching were executed through oxygen- and fluorine-based plasma treatments, obviating the necessity for separate adhesives. This breakthrough facilitated the transfer of various micro/nano patterns onto substrates such as wafers, glass, electrospun fibers, and leaves for the first time (*Nat. Commun.*, 14 (1), 833, 2023 & *ACS Nano*, 19, 5935, 2023), allowing us to imbue them with a range of functionalities tailored to user requirements, including superhydrophobic surfaces, formation of conductive networks, modification of optical properties, and energy storage.

Antimicrobial composite with green materials

Antimicrobial properties play a crucial role in disease prevention among humans. I have focused on the development of

antimicrobial textiles and films derived from natural sources to enhance antimicrobial efficacy and ensure safety. For instance, substances rich in polyphenols such as curcumin extracted from turmeric, and lignin derived from wood, exhibit potent antimicrobial properties without compromising safety (*Adv. Mater. Technol.*, 8, 2201765, 2023 & *Mater. Horiz.*, 10 (10), 4163, 2023). My efforts have centered on evaluating the biocompatibility and enhancing the antimicrobial efficacy of these composites for various bio-applications and food preservation.

COVER ARTICLES



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1. S. Cho†, **J.-H. Ha**†, J. Moon, J. Ahn, S. H. Hwang, S. Jeon, Y. Jeong, et al., J.-H. Jeong*, W. Gao*, I. Park*, "Wireless, Battery-Free, Optoelectronic, Multi-Modal Sensor Integrated with Colorimetric Dressing for Diabetic Ulcer Management", *Adv. Funct. Mater.*, 2026, 2532167. (**Cover article**)

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2. **J.-H. Ha**, Y.-W. Lee, S. H. Hwang, D. Kim, B.-H. Kang, Y. J. Song, J. Won, M. Moon, Y. Yoon, S. A. Park, S. Jeon*, W. Kang*, J.-H. Jeong*, "Bee Stinger-Like Wearable Electrospun Web Microneedles for Sustained CNS Drug Delivery", *Adv. Healthc. Mater.*, 2025, 14, 28, 2501371.
3. **J.-H. Ha**, S. Jeon, Y.-W. Lee, S. H. Hwang, B.-H. Kang, Y. J. Song, J.-S. Lim, H. Kim, Y. Yoon, J.-H. Jeong*, "Antibody-Integrated Solid-to-Gel Microfilm for Protection Against Botulinum Neurotoxin Type A", *Gels*, 2025, 11, 777.
4. **J.-H. Ha**, J. Yang, D. Kim, W. Lee, C. Yun, S. H. Hwang, S. Jeon, J. Choi, H. Lim, M. Kim, D. Kim, S. A. Park, S. So*, J. Ahn*, J.-H. Jeong*, "SERS Sensor Integrated in Stretchable and Antimicrobial Wrapper for Food Quality Monitoring and Preservation", *Small*, 2025, 21, 2501808. (**Back Cover**)

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5. J. Ahn†, H. Han†, **J.-H. Ha**†, Y. Jeong, Y. Jung, J. Choi, S. Cho, S. Jeon, J.-H. Jeong*, I. Park*, "Micro-/Nanohierarchical Structures Physically Engineered on Surfaces: Analysis and Perspective", *Adv. Mater.*, 2024, 36, 2300871. (**Inside Front Cover**)
6. S. Cho†, **J.-H. Ha**†, J. Ahn, H. Han, Y. Jeong, S. Jeon, S. Hwang, J. Choi, Y. S. Oh, D. Kim, S. A. Park, D. Lee, J. Ahn, B. Kang, B.-H. Kang, J.-H. Jeong*, I. Park*, "Wireless, Battery-free, Optoelectronic Diagnostic Sensor Integrated Colorimetric Dressing for Advanced Wound Care", *Adv. Funct. Mater.*, 2024, 2316196. (**Back Cover**)
7. **J.-H. Ha**, J. Ko, J. Ahn, Y. Jeong, J. Ahn, S. Hwang, S. Jeon, D. Kim, J. Gu, J. Choi, H. Han, C. Han, B. Kang, B.-H. Kang, S. Cho, Y. J. Kwon, C. Kim, S. A. Park, J.-H. Jeong*, I. Park*, "Nanotransfer Printing of Functional Nanomaterials on Electrospun Fibers for Wearable Healthcare Applications", *Adv. Funct. Mater.*, 2024, 2401404.
8. **J.-H. Ha**†, I. Yang†, J. Ahn†, S. Kang, Z.-J. Zhao, Y. Jeong, J. Cheong, H. Je, S. Hwang, S. Jeon, J.-H. Jeong*, S. Kim*, I. Park*, "Nanotransfer Printing for Synthesis of Vertically Aligned Carbon Nanotubes with Enhanced Atomic Penetration", *Adv. Funct. Mater.*, 2024, 2315028.

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9. **J.-H. Ha**, Y. Jeong, J. Ahn, S. Hwang, S. Jeon, D. Kim, J. Ko, B. Kang, Y. Jung, J. Choi, H. Han, J. Gu, S. Cho, H. Kim, M. Bok, S. A. Park, J.-H. Jeong*, I. Park*, "A wearable colorimetric sweat pH sensor-based smart textile for health state diagnosis", *Mater. Horiz.*, 2023, 10 (10), 4163. (**Back Cover**)
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12. **J.-H. Ha**, H. Song, H. Kim, D. Kim, Y. Jeong, S.-H. Park, “Flexible Thin Carbon Nanotube Web Film for Curved Heating Elements under High Temperature Conditions”, *J. Nanosci. Nanotechnol.*, 2021, 21 (3).

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13. **J.-H. Ha**, S. E. Lee, S.-H. Park*, “Effect of dispersion by three-roll milling on electrical properties and filler length of carbon nanotube composites”, *Materials*, 2019, 12 (23), 10–17.
14. **J.-H. Ha**, S. K. Hong, J. K. Ryu, J. Bae, S.-H. Park*, “Development of multi-functional graphene polymer composites having electromagnetic interference shielding and de-icing properties”, *Polymers*, 2019, 11 (12).

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16. H. Han, H. Kim, S. Cho, D. Lee, J. Moon, C. Kim, **J.-H. Ha**, Y. Jung, Y. S. Oh, J. Choi, I. Park*, “Wireless, battery-free multi-axial sensor for augmented reality-assisted monitoring at skin interfaces”, *npj Flex. Electron.*, 2025, 9, 102.
17. J. Ahn, T. Kim, **J.-H. Ha**, D. Lee, O. Gul, S. Cho, H. Kim, M. Kang, J. Choi, J. Ahn*, I. Park*, “Skin-Conformal Motion Monitoring Film for Deep Learning-Based Immersive Extended Reality”, *Adv. Funct. Mater.*, 2025, 35, 2502568. (**Inside Back Cover**)
18. H. An, Z.-J. Zhao, M. Kim, S. H. Shin, **J.-H. Ha**, J.-H. Jeong, J.-H. Choi, D. G. Choi, E.-J. Gwak, B.-K. Ju, J.-Y. Jung*, “Fabrication of porous Au nanowires on a mirror featuring ultrahigh-density nanogaps via plasma-assisted nanotransfer printing for enhanced SERS”, *Appl. Surf. Sci. Adv.*, 2025, 27, 100780.
19. J. Choi, C. Han, D. Lee, H. Kim, G. Lee, **J.-H. Ha**, Y. Jeong, J. Ahn, H. Park, H. Han, S. Cho, I. Park*, “Thermoforming 2D films into 3D electronics for high-performance, customizable tactile sensing”, *Sci. Adv.*, 2025, 11, eadv0057.
20. Y. Kwon, K. Lee, M. Kang, C. Kim, **J.-H. Ha**, H. Han, S. Yang, D. Yang, J. H. Seo, I. Park*, “Room-temperature rapid oxygen monitoring system in high humidity hydrogen gas environment towards water electrolysis application”, *Sens. Actuators B Chem.*, 2025, 422, 136693.

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23. J. Ko, G. Kim, I. Kim, S. H. Hwang, S. Jeon, J. Ahn, Y. Jeong, **J.-H. Ha**, H. Heo, J.-H. Jeong*, I. Park*, J. Rho*, “Metasurface-Embedded Contact Lenses for Holographic Light Projection”, *Adv. Sci.*, 2024, 11, 2407045.
24. H. Han, H. Park, S. Cho, S.-U. Lee, J. Choi, **J.-H. Ha**, J. Park, Y. Jung, H. Kim, J. Ahn, Y. J. Kwon, Y. S. Oh, M. Je, I. Park*, “Battery-Free, Wireless Multi-Modal Sensor, and Actuator Array System for Pressure Injury Prevention”, *Small*, 2024, 20, 2405493. (**Front Cover**)
25. J. Ahn†, S. Cho†, L. Wu, X. Li, D. Lee, **J.-H. Ha**, H. Han, K. Lee, B. Kang, Y. Kwon, S. H. Hwang, S. Jeon, B. Yu, J. Ahn*, J.-H. Jeong*, I. Park*, “Innovations in self-powered sensors utilizing light, thermal, and mechanical renewable energy”, *Nano Energy*, 2024, 129, 110045.
26. J. Ahn†, S. P. Sasikala†, Y. Jeong†, J. G. Kim, **J.-H. Ha**, S. H. Hwang, J. Choi, B.-H. Kang, J. Ahn, J.-H. Jeong*, S. O. Kim*, I. Park*, “High-Energy-Density Fiber Supercapacitors based on Transition Metal Oxide Nanoribbon Yarns for Comprehensive Wearable Electronics”, *Adv. Fiber Mater.*, 2024, 1–15.
27. J. Ahn†, Y. Jeong†, M. Kang†, J. Ahn, S. P. Sasikala, I. Yang, **J.-H. Ha**, S. H. Hwang, S. Jeon, J. Gu, J. Choi, B.-H. Kang, S. O. Kim, S. Kim, J. Choi, J.-H. Jeong*, I. Park*, “Nanoribbon Yarn with Versatile Inorganic Materials”, *Small*, 2024, 20, 2311736.
28. Y. Jung, J. Gu, J. Yeo, W. Lee, H. Han, J. Choi, **J.-H. Ha**, J. Ahn, H. Cho, S. Ryu, I. Park*, “Highly Sensitive Soft Pressure Sensors for Wearable Applications Based on Composite Films with Curved 3D Carbon Nanotube Structures”, *Small*, 2024, 20, 2303981.

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29. C. Han, Y. Jeong, J. Ahn, T. Kim, J. Choi, **J.-H. Ha**, H. Kim, S. H. Hwang, S. Jeon, J. Ahn, J. T. Hong, J. J. Kim, J.-H. Jeong*, I. Park*, "Recent Advances in Sensor–Actuator Hybrid Soft Systems: Core Advantages, Intelligent Applications, and Future Perspectives", *Adv. Sci.*, 2023, 10, 2302775. (**Back Cover**)
30. J. Ahn, **J.-H. Ha**, Y. Jeong, Y. Jung, J. Choi, J. Gu, S. H. Hwang, M. Kang, J. Ko, S. Cho, H. Han, K. Kang, J. Park, S. Jeon, J.-H. Jeong, I. Park, "Nanoscale three-dimensional fabrication based on mechanically guided assembly", *Nat. Commun.*, 2023, 14 (1), 833.
31. C. Han, J. Choi, J. Ahn, H. Kim, **J.-H. Ha**, H. Han, S. Cho, Y. Jeong, J. Gu, I. Park*, "Spike-based Self-Calibration for Enhanced Accuracy in Self-powered Pressure Sensing", *Adv. Mater. Technol.*, 2023, 8, 2301199.
32. Y. Jeong, H. Kang, M. Bok, S. H. Hwang, S. Jeon, J. Ahn, **J.-H. Ha**, J. Ko, J. W. Park, W. Choi, I. Park, N. Park, J.-H. Jeong*, "A Mobile Two-Dimensional Ultrasound Focusing System for Personalized Healthcare Applications through a Dodecagonal Quasicrystal Patterned Planar Lens", *Adv. Mater. Technol.*, 2023, 8, 2202173. (**Back Cover**)
33. Y. Jeong, J. Ahn, **J.-H. Ha**, J. Ko, S.-H. Hwang, S. Jeon, M. Bok, J.-H. Jeong*, I. Park*, "Biomimetic, Programmable, and Part-by-Part Maneuverable Single-Body Shape-Morphing Film", *Adv. Intell. Syst.*, 2023, 5 (3), 2200293. (**Back Cover**)
34. J. Ahn, J. Gu, Y. Jeong, **J.-H. Ha**, J. Ko, B. Kang, S. H. Hwang, J. Park, S. Jeon, H. Kim, J.-H. Jeong*, I. Park*, "Nanotransfer-on-Things: From Rigid to Stretchable Nanophotonic Devices", *ACS Nano*, 2023, 19, 5935.
35. H. Han, Y. S. Oh, S. Cho, H. Park, S.-U. Lee, K. Ko, J.-M. Park, J. Choi, **J.-H. Ha**, C. Han, Z. Zhao, Z. Liu, Z. Xie, J.-S. Lee, W. G. Min, B.-J. Lee, J. Koo, D. Y. Choi, M. Je, J.-Y. Sun, I. Park*, "Battery-Free, Wireless, Ionic Liquid Sensor Arrays to Monitor Pressure and Temperature of Patients in Bed and Wheelchair", *Small*, 2023, 19, 2205048.

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36. J. Ahn, J.-S. Kim, Y. Jeong, S. Hwang, H. Yoo, Y. Jeong, J. Gu, M. Mahato, J. Ko, S. Jeon, **J.-H. Ha**, H.-S. Seo, J. Choi, M. Kang, C. Han, Y. Cho, C. H. Lee, J.-H. Jeong*, I.-K. Oh*, I. Park*, "All-Recyclable Triboelectric Nanogenerator for Sustainable Ocean Monitoring Systems", *Adv. Energy Mater.*, 2022, 12 (30), 2201341. (**Back Cover**)
37. Y. Jung, J. Ahn, J.-S. Kim, **J.-H. Ha**, J. Shim, H. Cho, Y. S. Oh, Y.-J. Yoon, Y. Nam, I.-K. Oh, J.-H. Jeong*, I. Park*, "Spherical Micro/Nano Hierarchical Structures for Energy and Water Harvesting Devices", *Small Methods*, 2022, 6 (7), 2200248. (**Back Cover**)

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38. J. Gu, J. Ahn, J. Jung, S. Cho, J. Choi, Y. Jeong, J. Park, S. Hwang, I. Cho, J. Ko, **J.-H. Ha**, Z.-J. Zhao, S. Jeon, S. Ryu, J.-H. Jeong*, I. Park*, "Self-powered strain sensor based on the piezo-transmittance of a mechanical metamaterial", *Nano Energy*, 2021, 89, 106447.
39. J. Ko, H. J. Kang, J. Ahn, Z.-J. Zhao, Y. Jeong, S. H. Hwang, M. Bok, S. Jeon, J. Gu, **J.-H. Ha**, J. Rho, J.-H. Jeong*, I. Park*, "Biocompatible nanotransfer printing based on water bridge formation in hyaluronic acid and its application to smart contact lenses", *ACS Appl. Mater. Interfaces*, 2021, 13 (29), 35069–35078.

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