

Young-Jun Kim, Ph.D.

G110 Jorgenson Laboratory, California Institute of Technology, Pasadena, CA, 91125

kimyjun@caltech.edu, [Google Scholar Profile](#), [Website](#), [ORCID](#)

RESEARCH FOCUSES

- Biocompatible materials for human health
- Neuromodulation, neurostimulation, nerve conduction block
- Wireless energy transfer for implantable medical devices
- Pathogen control with static electricity
- Energy harvesting for sensor applications

DEGREE & EDUCATION

| | |
|----------------------------------------------------------------------------------------------------------------------------------|----------------------------|
| Postdoctoral Fellow in Medical Engineering | Sep 2025 – |
| California Institute of Technology (Caltech), Advisor: Prof. Wei Gao | |
| Postdoctoral Fellow in Advanced Functional Polymers Research Center | Sep 2023 – Jul 2025 |
| Korea Research Institute of Chemical Technology (KRICT), Advisor: Dr. Yun Ho Kim | |
| Ph.D in Advanced Material Science & Engineering | Mar 2019 – Aug 2023 |
| Sungkyunkwan University (SKKU), Advisor: Prof. Sang-Woo Kim | |
| * Ph.D. thesis title: Design and Development of Triboelectric Nanogenerator for Pathogen Control and Powering Implantable Device | |
| B.S. in Mechanical Engineering | Mar 2013 – Feb 2019 |
| Hanyang University (HYU), Advisor: Prof. Se-Jin Yook | |

AWARD & HONORS

- **Sejong Science Fellowship** (Domestic Track, 2024-2029, **100,000,000 KRW/year**)
- PSK-INNOX Young Researcher Award by the Korea Polymer Society of Korea (2024)
- Samsung Humantech Silver Medal (2023)
- The Best Outstanding Master/Ph.D Student Award, BK21 Program (2022)
- Best Presentation Award (NCC 2022)
- Excellent Student Presentation Award (ECS 242nd Meeting, 2022)
- SKKU Research Matters (2021)
- SKKU Best Paper Award (2021)
- Best Paper Award (PVSEC-30 & GPVC 2020)
- Energy Technology Innovation Ideas (Ministry of Commerce Industry and Energy, 2019)
- Outstanding Poster Presentation Award (12th TBIS, 2019)

PUBLICATIONS

PEER-REVIEWED JOURNALS

Notes: # indicates equally contributing authors. * indicates the corresponding author(s).

First Authored Papers

1. **Y.-J. Kim#**, Y. Chung#, J.-H. Hwang, J.-M. Jeong, B. Kim, D. Kang, B.-O. Choi, H.-J. Yoon*, S.-W. Kim*, Acoustic Impedance Mismatching for Efficient Ultrasound Energy Harvesting Using Triboelectric Nanogenerators, *Advanced Energy Materials*, *in press*
2. **Y.-J. Kim#**, S.-H. Kim#, B.-J. Park#, J. Jeon, D. Kang, Y. Chung, J.-H. Hwang, H.-J. Yoon, K. H. Lee*, B.-O. Choi*, S.-W. Kim*, Wireless and bioresorbable triboelectric nerve block system for postoperative pain control, *Nature Biomedical Engineering* (2026), *Covered by ScienMag, Bioengineer, and domestic news*
3. I.-Y. Suh, **Y.-J. Kim#**, S.-W. Kim*, Portable hand-powered nanocatalysis for clean water, *Nature Nanotechnology* (2025)
4. **Y.-J. Kim#**, J. Hwang#, B.-J. Park, Y. Chung, S. H. Choi, S.-H. Kim, D. H. Park, Y. Lee, S. Yoo, J. Park, J. C. Won, S. H. Nam, B.-O. Choi, S.-W. Kim*, Y. H. Kim*, Nanoparticle-Stabilized Porous Composite Architectures for Ultrasound-Driven Triboelectric Energy Harvesters in Soft Implantable Electronics, *ACS Nano* 19, 40994–41003 (2025)
5. N. G. Kim#, J. M. Jang#, **Y.-J. Kim#**, J. Y. Kim, D. Kang, J. Park, J. C. Won, S.-W. Kim, D. W. Kim, S. J. Kim, Y. H. Kim, Scalable and Eco-friendly Production of Flexible, Hierarchical Porous MXene/Polyimide Composites with Superior Electromagnetic Interference Shielding, *Composites Part B: Engineering* 304, 112805 (2025)
6. Y. Chung#, H. Yuan#, Z. Wang, J.-M. Jeong, B.-J. Park, J.-H. Hwang, S.-J. Suh, B.-O. Choi, H. Park, **Y.-J. Kim***, K. Dai*, S.-W. Kim*, Acoustic Tunable Battery-Free Implants Based on Sustainable Triboelectric Nanogenerators with Metal-Polymer Intermixing Layers, *Advanced Energy Materials* 15, 2403712 (2025), *selected as a cover image of the journal issue*
7. **Y.-J. Kim#**, Z.-Y. Huo#*, H. Dai, D.-M. Lee, I.-Y. Suh, J.-H. Hwang, Y. Chung, H. Y. Lee, Y. Du, W. Ding, X. Wang, S.-W. Kim*, Body-coupled energy enabling unrestricted microbial disinfection using polymer nanorods, *Nature Water* 2, 360-369 (2024), *Covered by News & Views in Nature Water, Highlighted in Nature* 628, 693 (2024)
8. **Y.-J. Kim#**, J. Lee#, J.-H Hwang#, Y. Chung, B. J. Park, J. Kim, S.-H. Kim, H.-J. Yoon, S.-M. Park*, S.-W. Kim*, High-performing and capacitive-matched triboelectric implants driven by ultrasound, *Advanced Materials* 36, 2307194 (2024), *Covered by Forbes, Parkinson's News Today, News-medical, etc.*
9. I.-Y. Suh#, **Y.-J. Kim#**, B.-Q. Chen, P. Zhao, D. S. Cho, M. Kang, Z.-Y. Huo*, S.-W. Kim*, Self-powered microbial blocking textile driven by triboelectric charges, *Nano Energy* 110, 108343 (2023)
10. **Y.-J. Kim#**, H. T. Kim#, J. H. Lee#, I.-Y. Suh, S.-W. Kim*, Self-powered Fine Dust Filtration System Using Triboelectrification Induced Electric Field, *Nanoscale Research Letters* 17, 1-9 (2022)
11. M. Kang#, N.-Y. Jang#, **Y.-J. Kim#**, H.-J. Ro#, D. Kim, Y. Kim, H. T. Kim, H. M. Kwon, J.-H. Ahn, B.-O. Choi, N.-H. Cho*, and S.-W. Kim*, Virus blocking textile for SARS-CoV-2 using human body triboelectric energy harvesting, *Cell Reports Physical Science* 3, 100813 (2022)
12. Z.-Y. Huo#, **Y.-J. Kim#**, I.-Y. Suh, D.-M. Lee, J. H. Lee, Y. Du, S. Wang, H.-J. Yoon, and S.-W. Kim*, Triboelectrification induced self-powered microbial disinfection using nanowire-enhanced localized electric field, *Nature Communications* 12, 1-11 (2021) *Covered by domestic news (Dong-A Ilbo, etc.)*

Contributing Authored Papers

13. Y. Lee, **Y.-J. Kim**, D. H. Park, I. Park, D. Kim, S. B. Kim, Compact electroaerodynamic dust removal through integrated ion transport mechanisms, *Separation and Purification Technology* 386, 136559 (2026)
14. Y. Chung, S. Choudhury, **Y.-J. Kim**, I.-Y. Suh, K. Dai, S.-W. Kim, Ultrasound-Powered, Battery-Free

Implants via Triboelectric Energy Harvesting, *Advanced Materials Technologies* early view, e01451 (2025)

15. Z.-Y. Huo, **Y.-J. Kim**, S.-W. Kim, Contact electrification-induced personal sanitation, *Nature Reviews Clean Technology* (2025)
16. D. Kim#, Y. Kwon#, Y. So, **Y.-J. Kim**, S. W. Park, H. Park, J. Hwang, J. Park, C. Kim, J. C. Won, J. H. Kim*, Y. H. Kim*, Water-Borne Fluorinated Polyimide Dielectric for Large-Area IGZO Transistors and Logic Gates, *ACS Applied Materials & Interfaces* 16, 68328-68335 (2024)
17. Y. Chung#, J.-M. Jeong#, J.-H. Hwang#, **Y.-J. Kim**, B.-J. Park, D. S. Cho, Y. Cho, S. J. Suh, B.-O. Choi, H. Park*, H.-J. Yoon*, S.-W. Kim*, Gigantic triboelectric power generation overcoming acoustic energy barrier using metal-liquid coupling, *Joule* 8, 1-15 (2024)
18. M. Kang#, H. Yum#, H. T. Kim#, B. J. Park, Y. Choi, H. J. Kim, Y. Cho, **Y.-J. Kim**, D.-M. Lee, D.-G. Lee, H.-C. Song, S. H. Nam, J. H. Lee*, B.-O. Choi*, S.-W. Kim*, Self-Powered Electrical Bandage Based on Body-Coupled Energy Harvesting, *Advanced Materials* 36, 2402491 (2024)
19. I.-Y. Suh#, Z.-Y. Huo#*, J.-H. Jung#, D. Kang, D.-M. Lee, Y.-J. Kim, B. Kim, J. Jeon, P. Zhao, J. Shin, S. Kim, S.-W. Kim*, Highly efficient microbial inactivation enabled by tunneling charges injected through two-dimensional electronics, *Science Advances* 10, eadl5067 (2024)
20. J. Kim#, D.-M. Lee#, H. Ryu, **Y.-J. Kim**, H. Kim, H.-J. Yoon, M. Kang, S. S. Kwak*, S.-W. Kim*, Triboelectric Nanogenerators for Battery-Free Wireless Sensor System Using Multi-Degree of Freedom Vibration, *Advanced Materials Technologies* 9, 2301427 (2024)
21. D. Kang#, J.-H. Hwang#, **Y.-J. Kim**, Z. Pin, H. Y. Lee, J. Kim, M. S. Shin, S. Jeon, S. Kim, S.-W. Kim*, Contact electrification controlled by material deformation-induced electronic structure changes, *Materials Today* 72, 109-116 (2023)
22. B. Kim#, H.-J. Yoon#, **Y.-J. Kim**, B.-J. Park, J.-H. Jung, S.-W. Kim*, Ultrasound-Driven Triboelectric Nanogenerator with Biocompatible 2-Hydroxyethyl Methacrylate, *ACS Energy Letters* 8, 3412 (2023)
23. Z.-Y. Huo, **Y.-J. Kim**, Y. Chen, Y. Du, D. Xia, S.-W. Kim*, Q. Yuan*, Hybrid energy harvesting systems for self-powered sustainable water purification by harnessing ambient energy, *Frontiers of Environmental Science & Engineering* 17, 118 (2023) (review articles)
24. X. Meng#, X. Xiao#, S. Jeon, D. Kim, B.-J. Park, **Y.-J. Kim**, N. Rubab, S. Kim, S.-W. Kim*, An Ultrasound-Driven Bioadhesive Triboelectric Nanogenerator for Instant Wound Sealing and Electrically Accelerated Healing in Emergencies, *Advanced Materials* 35, 2209054 (2023)
25. I. M. Imani#, B. Kim#, X. Xiao, N. Rubab, B.-J. Park, **Y.-J. Kim**, P. Zhao, M. Kang, S.-W. Kim*, Ultrasound-Driven On-Demand Transient Triboelectric Nanogenerator for Subcutaneous Antibacterial Activity, *Advanced Science* 10, 2204801 (2023)
26. B.-G. Park#, C. Lee#, **Y.-J. Kim**, J. Park, H. Kim, Y. Jung, J. S. Ko, S.-W. Kim, J.-H. Lee*, H. Cho*, Toxic micro/nano particles removal in water via triboelectric nanogenerator, *Nano Energy* 100, 107433 (2022)
27. M. Kang#, M. S. B. Khusrin#, **Y.-J. Kim**, B. Kim, B.-J. Park, I. Hyun, I. M. Imani, B.-O. Choi, S.-W. Kim*, Nature-derived highly tribopositive α -carrageenan-agar composite-based fully biodegradable triboelectric nanogenerators, *Nano Energy* 100, 107480 (2022)
28. Z.-Y. Huo#, D.-M. Lee#, J.-M. Jeong#, **Y.-J. Kim**, J. Kim, I.-Y. Suh, P. Xiong, S.-W. Kim*, Microbial Disinfection with Supercoiling Capacitive Triboelectric Nanogenerator, *Advanced Energy Materials* 12, 2103680 (2022)
29. D.-M. Lee#, N. Rubab#, I. Hyun, W. Kang, **Y.-J. Kim**, M. Kang, B. O. Choi*, S.-W. Kim*, Ultrasound-mediated triboelectric nanogenerator for powering on-demand transient electronics, *Science Advances* 8, eabl8423 (2022)
30. Z.-Y. Huo, D.-M. Lee, **Y.-J. Kim**, and S.-W. Kim*, Solar-induced hybrid energy harvesters for advanced oxidation water treatment, *iScience* 24, 102808 (2021) (review articles)
31. Z.-Y. Huo, D.-M. Lee, S. Wang, **Y.-J. Kim**, and S.-W. Kim*, Emerging Energy Harvesting Materials and Devices for Self-Powered Water Disinfection, *Small Methods* 5, 2100093 (2021) (review articles)

32. H.-J. Yoon#, D.-M. Lee#, **Y.-J. Kim**, S. Jeon, J.-H. Jung, S. S. Kwak, J. Kim, S. Kim, Y. Kim, and S.-W. Kim*, **Mechanoreceptor-Inspired Dynamic Mechanical Stimuli Perception based on Switchable Ionic Polarization**, *Advanced Functional Materials* 31, 2100649 (2021)

PATENTED TECHNOLOGY TRANSFER

1. KR Application No. 10-2020-0062731, No. 10-2020-0140031, **SEMS Co., Ltd., (85,000,000 KRW)**
2. KR Application No. 10-2020-0099247, **SEMS Co., Ltd., (58,000,000 KRW)**
3. KR Application No. 10-2020-0056913, US Application No. 17/110,673, **SEMS Co., Ltd., (79,000,000 KRW)**
4. KR Application No. 10-2020-0145170, US Application No. 17/510,675 **Energymining Co., Ltd., (300,000,000 KRW)**
5. KR Application No. 10-2024-0137352, No. 10-2023-0159093, **Edge Foundry Co. Ltd., (55,000,000 KRW)**

PATENTS:

| | Application (KOREA) | Registration (KOREA) | Application (US) | Registration (US) |
|------------|------------------------|-------------------------|---------------------|----------------------|
| Patent (#) | 6 | 24 | 7 | 5 |

REFERENCES:

Prof. Sang-Woo Kim, Ph.D. (Ph.D. supervisor)

Yonsei University (Yonsei World-Class Fellow)

Director, Center for Human-oriented Triboelectric Energy Harvesting (Research Leader Program, NRF Korea)

Director, Center for National Core Materials Research (Piezoelectric 2D Materials, NRF Korea)

Department of Materials Science and Engineering

Gangnam Severance Hospital

50 Yonsei-ro, Seodaemun-gu, Seoul 03722, Republic of Korea

Tel: +82-31-290-7352, Cp: +82-10-3191-3930

E-mail: kimsw1@yonsei.ac.kr, Homepage: <http://ehl.yonsei.ac.kr>

Prof. Wei Gao, Ph.D. (Postdoctoral fellow supervisor)

Professor of Medical Engineering

Investigator, Heritage Medical Research Institute

Division of Engineering and Applied Science

California Institute of Technology, Pasadena, CA

139 Keck Laboratory, MC 138-78.

Tel: +1-(626) 395-2958

Email: weigao@caltech.edu, Homepage: <https://www.gao.caltech.edu>

Dr. Yun Ho Kim, Ph.D. (Postdoctoral fellow supervisor)

Principal Researcher / Head

Advanced Functional Polymers Research Center

Korea Research Institute of Chemical Technology (KRICT)

141 Gajeong-ro, Yuseong-gu, Daejeon, Republic of Korea

Phone: +82-42-860-7274; Fax: +82-42-861-4151

E-mail: yunho@kRICT.re.kr, Homepage: <https://sites.google.com/view/kRICT-polymer>

Prof. Joohoon Kang, Ph.D. (Ph.D. co-supervisor)

Assistant Professor

Yonsei University

Department of Chemical and Biomolecular Engineering

50 Yonsei-ro, Seodaemun-gu, Seoul 03722, Republic of Korea

Tel: +82-2-2123-2759

E-mail: joochoon@yonsei.ac.kr, Homepage: <http://mfmp.yonsei.ac.kr>