

Jihong Min

Presidential Young Professor, Department of Biomedical Engineering
National University of Singapore
Email: jihong.min@nus.edu.sg
Google Scholar

Education

2024 - 2026 iCMB NIH T32 Postdoctoral Research Fellow in Medical and Electrical Engineering

California Institute of Technology & UCLA

Advisor: Prof. Azita Emami, Prof. Wei Gao, Prof. Tzung Hsiai

2018 - 2023 Ph.D. in Medical Engineering
California Institute of Technology

Advisor: Prof. Wei Gao

2014 - 2017 B.S. in Electrical Engineering
University of Illinois at Urbana-Champaign

Advisor: Prof. Joseph Lyding

Research & Work Experience

2024-2026 iCMB NIH T32 Postdoctoral Research Fellow, Caltech and UCLA Medicine, USA
(Advisors: Prof. Azita Emami, Prof. Wei Gao, Prof. Tzung Hsiai)

Development of ingestible electronic systems with electrochemical sensors based on aptamers and enzymes for real time monitoring of metabolites and neurotransmitters in the gastrointestinal tract.

Development of a wearable Electrical Impedance Tomography (EIT) belt for accessible liver screening, targeting early detection of non-alcoholic fatty liver disease (NAFLD) with a flexible and fully autonomous system incorporating a conductive polymer hydrogel and a micro-electrode array.

2018-2023 Graduate Researcher, Caltech, USA (Advisor: Prof. Wei Gao)
Development of robust and cost efficient wearable triboelectric nanogenerator and a flexible solar cell based on a quasi-2D perovskite layer with α -methylbenzylamine (MBA) as an additive for efficient and sustainable powering of wearables.

Development of novel electrochemical sensors based on enzymes, ion-selective electrodes, antibodies tagged with gold nanoparticles, and molecularly imprinted polymers on laser printed graphene (LEG) and inkjet printed carbon/gold electrodes for sensitive and selective molecular detection in biofluids.

Design of miniaturized and low-power wearable/ingestible electronic systems and integration of energy harvesting modules and electrochemical sensors for wireless monitoring of physiochemical biomarkers.

2016-2017 Undergraduate Researcher, UIUC, USA (Advisor: Prof. Joseph Lyding)
Self-assembly of centimeter scale polystyrene microsphere monolayers using Langmuir Blodgett transfer.

Fabrication of gold-graphene-gold bowtie structure for exploration of large scale plasmonic field enhancements.

2016-2016 Summer Undergraduate Researcher, GIST, South Korea (Advisor: Prof. Jae-Hyung Jang)

Fabrication of the Metal-Insulator-Metal structure ReRAM devices.

Honors & Awards

- 02/2026. NUS Presidential Young Professorship
- 09/2024. Nature and Health Conference Best Poster Award
- 08/2024. NextProf Nexus Fellow
- 03/2024. MIT Technology Review 35 Innovators Under 35 Semi-finalist
- 03/2024. iCMB NIH T32 Fellowship, Caltech
- 03/2024. SPIE Soft Mechatronics and Wearable Systems Best Paper Award
- 11/2023. MRS Graduate Student Award
- 09/2018. Andrew and Peggy Cherng Endowment Fellowship, Caltech
- 12/2017. Graduated with High Honors, UIUC

Selected Publications

(27 papers with 9 as first/co-first author, >7000 citations, h-index 23, updated 02/2026)

1. **Min, J.**[†], Ahn, H.[†], Lukas, H., Ma, X., Bhansali, R., Sunwoo, S.-H., Wang, C., Xu, Y., Yao, R., Kim, G., Li, Z., Hsiai, T. K., Emami, A., Jung, H.-T., & Gao, W. (2025). Continuous biochemical profiling of the gastrointestinal tract using a multiparametric ingestible capsule. *Nature Electronics*, 8, 844-855. Featured on Journal Cover
2. Heng, W., Yin, S., **Min, J.**, Wang, C., Han, H., Shirzaei Sani, E., Li, J., Song, Y., Rossiter, H. B., & Gao, W. (2024). A smart mask for exhaled breath condensate harvesting and analysis. *Science*, 385, 954-961.
3. **Min, J.**[†], Demchyshyn, S.[†], Sempionatto, J. R., Song, Y., Hailegnaw, B., Xu, C., Yang, Y., Solomon, S., Putz, C., Lehner, L., Schwarz, J. F., Schwarzwinger, C., Scharber, M., Shirzaei Sani, E., Kaltenbrunner, M., & Gao, W. (2023). An autonomous wearable biosensor powered by a perovskite solar cell. *Nature Electronics*, 6, 630-641. Featured on Journal Cover
4. **Min, J.**[†], Tu, J.[†], Xu, C.[†], Lukas, H.[†], Shin, S., Yang, Y., Solomon, S. A., Mukasa, D., & Gao, W. (2023). Skin-interfaced wearable sweat sensors for precision medicine. *Chemical Reviews*, 123, 5049-5138. Featured on Journal Cover
5. Tu, J., **Min, J.**, Song, Y., Xu, C., Li, J., Moore, J., Hanson, J., Hu, E., Parimon, T., Wang, T.-Y., Davoodi, E., Chou, T.-F., Chen, P., Hsu, J. J., Rossiter, H. B., & Gao, W. (2023). A wireless patch for the monitoring of C-reactive protein in sweat. *Nature Biomedical Engineering*, 7, 1293-1306.
6. **Min, J.**, Song, Y., & Gao, W. (2022). Microcracked conductors for wearable sensors. *Nature Electronics*, 5(11), 717-718.
7. Wang, M.[†], Yang, Y.[†], **Min, J.**[†], Song, Y., Tu, J., Mukasa, D., Ye, C., Xu, C., Heflin, N., McCune, J. S., Hsiai, T. K., Li, Z., & Gao, W. (2022). A wearable electrochemical biosensor for the monitoring of metabolites and nutrients. *Nature Biomedical Engineering*, 6, 1225-1235. Featured on Journal Cover
8. **Min, J.**[†], Sempionatto, J. R.[†], Teymourian, H.[†], Wang, J., & Gao, W. (2021). Wearable electrochemical biosensors in North America. *Biosensors and Bioelectronics*, 172, 112750.
9. Song, Y.[†], **Min, J.**[†], Yu, Y., Wang, H., Yang, Y., Zhang, H., & Gao, W. (2020). Wireless battery-free wearable sweat sensor powered by human motion. *Science Advances*, 6(40), eaay9842.
10. **Min, J.**, Yang, Y., Wu, Z., & Gao, W. (2020). Robotics in the gut. *Advanced Therapeutics*, 3(4), 1900125.

Other Publications

1. Shin, S., Liu, R., Yang, Y., Lasalde-Ramírez, J. A., Kim, G., Won, C., **Min, J.**, Wang, C., Fan, K., Han, H., Uwakwe, C., Heng, W., Hsiai, T. K., Li, Z., FitzGerald, J. D., & Gao, W. (2025). A bioinspired microfluidic wearable sensor for multiday sweat sampling, transport, and metabolic analysis. *Science Advances*, 11(33), eadw9024.
2. Wang, C., Fan, K., Shirzaei Sani, E., Lasalde-Ramírez, J. A., Heng, W., **Min, J.**, Solomon, S. A., Wang, M., Li, J., Han, H., Kim, G., Shin, S., Seder, A., Shih, C.-D., Armstrong, D. G., & Gao, W. (2025). A microfluidic wearable device for wound exudate management and continuous in situ analysis of wound biomarkers. *Science Translational Medicine*, 17(795), eadt0882.
3. Tu, J., Yeom, J., Chaj Ulloa, J., Solomon, S. A., **Min, J.**, Heng, W., Kim, G., Dao, J., Vemu, R., Pang, M., Wang, C., Kim, D.-H., & Gao, W. (2025). Stressomic: A wearable microfluidic biosensor for dynamic profiling of multiple stress hormones in sweat. *Science Advances*, 11(32), eadx6491.
4. Wang, M., Ye, C., Yang, Y., Mukasa, D., Wang, C., Xu, C., **Min, J.**, Solomon, S. A., Tu, J., Shen, G., Tang, S., McCune, J. S., Hsiai, T. K., Li, Z., & Gao, W. (2024). Printable molecule-selective core-shell nanoparticles for wearable and implantable sensing. *Nature Materials*, 24, 589-598.
5. Xu, C., Song, Y., Sempionatto, J. R., Solomon, S. A., Yu, Y., Nyein, H. Y. Y., Tay, R. Y., Li, J., Heng, W., **Min, J.**, Lao, A., Hsiai, T. K., Sumner, J. A., & Gao, W. (2024). A physicochemical-sensing electronic skin for stress response monitoring. *Nature Electronics*, 7, 168-179.
6. Ye, C., Wang, M., **Min, J.**, Tay, R. Y., Lukas, H., Sempionatto, J. R., Li, J., Xu, C., & Gao, W. (2024). A wearable aptamer nanobiosensor for non-invasive female hormone monitoring. *Nature Nanotechnology*, 19, 330-337.
7. Song, Y., Tay, R. Y., Li, J., Xu, C., **Min, J.**, Shirzaei Sani, E., Kim, G., Heng, W., Kim, I., & Gao, W. (2023). 3D-printed epifluidic electronic skin for machine learning-powered multimodal health surveillance. *Science Advances*, 9(37), eadi6492.
8. **Min, J.**, Gao, W. (2023). Battery-Free Wearable Electrochemical Sweat Sensors. *IEEE IFETC*.
9. Choi, Y., Ho, D. H., Kim, S., Choi, Y. J., Roe, D. G., Kwak, I. C., **Min, J.**, Han, H., Gao, W., & Cho, J. H. (2023). Physically defined long-term and short-term synapses for the development of reconfigurable analog-type operators capable of performing health care tasks. *Science Advances*, 9(27), eadg5946.
10. Shirzaei Sani, E., Xu, C., Wang, C., Song, Y., **Min, J.**, Tu, J., Solomon, S. A., Li, J., Banks, J. L., & Armstrong, D. G. (2023). A stretchable wireless wearable bioelectronic system for multiplexed monitoring and combination treatment of infected chronic wounds. *Science Advances*, 9(12), eadf7388.
11. Mukasa, D., Wang, M., **Min, J.**, Yang, Y., Solomon, S. A., Han, H., Ye, C., & Gao, W. (2023). A Computationally Assisted Approach for Designing Wearable Biosensors toward Non-invasive Personalized Molecular Analysis. *Advanced Materials*, 35(35), 2212161.
12. Yu, Y., Li, J., Solomon, S. A., **Min, J.**, Tu, J., Guo, W., Xu, C., Song, Y., & Gao, W. (2022). All-printed soft human-machine interface for robotic physicochemical sensing. *Science Robotics*, 7(67), eabn0495. Featured on Journal Cover
13. Torrente-Rodríguez, R. M., Lukas, H., Tu, J., **Min, J.**, Yang, Y., Xu, C., Rossiter, H. B., & Gao, W. (2020). SARS-CoV-2 RapidPlex: a graphene-based multiplexed telemedicine platform for rapid and low-cost COVID-19 diagnosis and monitoring. *Matter*, 3(6), 1981-1998. Featured on Journal Cover
14. Torrente-Rodríguez, R. M., Tu, J., Yang, Y., **Min, J.**, Wang, M., Song, Y., Yu, Y., Xu, C., Ye, C., & IsHak, W. W. (2020). Investigation of cortisol dynamics in human sweat using a graphene-based wireless mHealth system. *Matter*, 2(4), 921-937.
15. Yang, Y., Song, Y., Bo, X., **Min, J.**, Pak, O. S., Zhu, L., Wang, M., Tu, J., Kogan, A., & Zhang, H. (2020). A laser-engraved wearable sensor for sensitive detection of uric acid and tyrosine

- in sweat. *Nature Biotechnology*, 38(2), 217-224.
16. Yu, Y., Nassar, J., Xu, C., **Min, J.**, Yang, Y., Dai, A., Doshi, R., Huang, A., Song, Y., & Gehlhar, R. (2020). Biofuel-powered soft electronic skin with multiplexed and wireless sensing for human-machine interfaces. *Science Robotics*, 5(41), eaaz7946.
 17. Song, Y., **Min, J.**, & Gao, W. (2019). Wearable and implantable electronics: moving toward precision therapy. *ACS Nano*, 13(11), 12280-12286.

Teaching and Mentoring

Teaching Assistant:

- Spring 2018. Theory and Fabrication of Integrated Circuits. ECE 444, UIUC

Guest Lecturer:

- Spring 2020. New Frontiers in Medical Technologies. MedE 205, Caltech
- Winter 2021. Sensors in Medicine. MedE 202, Caltech
- Winters 2023, 2024. Sensors in Medicine. MedE 202, Caltech
- Summer 2024. Crash Course on Wearables for DIVE Veteran Students, Caltech

Research Mentor at Caltech (7 female students):

- Ahyeon Cho (ChemE), Visiting Graduate Student
- Yonglin Chen (MedE), Graduate Student
- Hyehyun Kim (MSE), Visiting Graduate Student
- Hyunah Ahn (ChemE), Visiting Graduate Student
- Wenzheng Heng (MedE), Graduate Student
- Rinni Bhansali (EE), Amgen Fellow
- Nicole Heflin (EE), SURF Fellow
- Tara Porter (EE), Undergraduate Student
- Kaliden Drango (EE), SURF Fellow

Conference Presentations, Poster Sessions, Invited Talks, and Workshops

Oral Presentation: MRS Fall Meeting & Exhibit, Boston, MA, Nov 2025.

(Invited) Oral & Poster Presentation: Nature and Health Conference, Brown University, Providence, RI, September 2024 (Best Poster Award).

Workshop: NextProf Nexus, University of Michigan, Ann Arbor, MI, August 2024.

(Invited) Seminar: Caltech's DIVE (Diversification Initiative through Veteran Education) program, Pasadena, CA, August 2024.

(Invited) Seminar: Korea Advanced Institute of Science and Technology (KAIST), Chemical Engineering, Daejeon, South Korea, July 2024.

(Invited) Seminar: Gwangju Institute of Science and Technology (GIST), Mechanical Engineering, Gwangju, South Korea, July 2024.

Oral Presentation: SPIE Soft Mechatronics and Wearable Systems Conference, Long Beach, CA, Mar 2024 (Best Paper Award).

Poster Presentation: Caltech Medical Engineering 10th Year Anniversary Symposium, Pasadena, CA, May 2024.

Oral Presentation: MRS Fall Meeting & Exhibit, Boston, MA, Nov 2023 (Graduate Student Award).

Poster Presentation: IEEE International Flexible Electronics Technology Conference, San Jose, CA, Aug 2023.

Academic Service

Reviewer for Journals and Conferences:

Science Robotics, Nature Communications, Nature Sensors, Biosensors and Bioelectronics, ACS Photonics, ACS Applied Nano Materials, npj Flexible Electronics, npj Flexible Materials, npj Biomedical Innovations, Electroanalysis, Scientific Reports, Analytical Chemistry, Talanta, IEEE Consumer Electronics Magazine, Electrochemistry Communications, ACS Applied Materials & Interfaces, IEEE Open Journal of Engineering in Medicine and Biology, Sensors & Diagnostics, Electroanalysis.

Volunteer (Lab Tour), Southern California Science Olympiad, 2025.

Judge, Orange County Science and Engineering Fair (OCSEF), 2025.

Judge, Summer Undergraduate Research Fellowships (SURF) Perpall Speaking Competition, Caltech, 2024.

Instructor, Crash Course on Wearable and Ingestible Sensors for DIVE Veteran Students, Caltech, 2024.

Proposal Writing Experience

Principal Investigator (PI):

- NUS PYP startup grant (Funded)
- ICMB NIH T32 Training Grant proposal (Funded) - T32EB023858
- Merkin Institute for Translational Research Spark Grant proposal

Grant Writing Assistance:

- NIH NIDCD Research Project Grant (R01) proposal (Funded) - R01DC021461
- Office of Naval Research (ONR) proposal (Funded) - N00014-21-1-2483

Patents

"Systems and Methods for Powering Autonomous Sweat Sensor," W. Gao, J. Min, 2023, US Patent Application No. 18/077,846.

"Wearable Autonomous Biomimetic Sweat Sensor for Precision Nutrition," W. Gao, M. Wang, Y. Yang, J. Min, 2022, US Patent Application No. 17/824,798.