

Jihong Min

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Postdoctoral researcher in Medical Engineering, with a concentration in Wearable and Ingestible Sensors

Research Interests

Wearable Electronics, Ingestible Sensors, Wearable Sensors, Energy Harvesting

Education

- 09/2018 - 11/2023 Ph.D. in Medical Engineering
California Institute of Technology, Pasadena, CA, USA
Advisor: Prof. Wei Gao
- 09/2018 - 06/2019 M.S. in Medical Engineering
California Institute of Technology, Pasadena, CA, USA
Advisor: Prof. Wei Gao
- 08/2014 - 12/2017 B.S. in Electrical Engineering
University of Illinois at Urbana-Champaign, IL, USA
Advisor: Prof. Joseph Lyding

Research & Work Experience

- 2023- **Postdoctoral Research, Gao Research Group, Caltech**
- Development of ingestible sensor system for real time monitoring of metabolites and neurotransmitters in the gastrointestinal tract
- 2018-2023 **Graduate Researcher, Gao Research Group, Caltech**
- Design of miniaturized and low-power wearable/ingestible electronic systems for wireless monitoring of physiochemical biomarkers
- Development and system integration of energy harvesting modules for sustainably powering wearable/ingestible devices
- Development of novel electrochemical sensors for sensitive molecular detection in biofluids
- 2016-2017 **Undergraduate Researcher, Lyding Group, UIUC**
- 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, MIDAS Group, GIST, South Korea**
- Fabrication of the Metal-Insulator-Metal structure ReRAM devices

Teaching

- Teaching Assistant Spring 2018. Theory and Fabrication of Integrated Circuits. ECE 444, UIUC
Spring 2020. New Frontiers in Medical Technologies. MedE 205, Caltech
Winter 2021. Sensors in Medicine. MedE 202, Caltech
- Guest Lecturer Winter 2023. Sensors in Medicine. MedE 202, Caltech
- Undergraduate Supervisor Summer 2019. Supervised SURF fellow Kaliden Drango (EE, Caltech)
Summer 2020. Supervised SURF fellow Nicole Heflin (EE, Caltech)
Summer 2022. Supervised Amgen fellow Rinni Bhansali (EE, Stanford)

Professional Activities

Reviewer of international Journal: Biosensors and Bioelectronics, ACS Photonics, ACS Applied Nano Materials, Scientific Reports, Analytical Chemistry, Talanta, IEEE Consumer Electronics Magazine, Electrochemistry

Publications (21 papers with 8 as first/co-first author, >2700 citations, h-index 13, updated 11/2023) [Google scholar link](https://scholar.google.com/citations?user=T4pVa1UAAAAJ&hl=en) (https://scholar.google.com/citations?user=T4pVa1UAAAAJ&hl=en)

† indicates equal contributions

2023

1. Ye, C., Wang, M., **Min, J.**, Tay, R. Y., Lukas, H.; Sempionatto, J. R., Li, J., Xu, C., Gao, W. (2023). A wearable aptamer nanobiosensor for non-invasive female hormone monitoring. *Nature Nanotechnology*, <https://doi.org/10.1038/s41565-023-01513-0>
2. 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.
3. 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.
4. **Min, J.**, Gao, W. (2023). Battery-Free Wearable Electrochemical Sweat Sensors. *IEEE International Flexible Electronics Technology Conference (IFETC)*.
5. 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.
6. **Min, J.†**, Demchyshyn, S.†, Sempionatto, J. R., Song, Y., Hailegnaw, B., Xu, C., Yang, Y., Solomon, S., Putz, C., Lehner, L., Schwarz, J. F., Schwarzinger, 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.
7. **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.
8. 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*, *14*, 15.
9. 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.
Highlighted in Caltech News, The Guardian, New Scientist, Materials Today, UPI, The Daily Beast, Tech Briefs, Le Monde, Business Insider, VOA News, Physics Today, The Hindu, CEP (AICHE), etc.

2022

10. **Min, J.**, Song, Y., & Gao, W. (2022). Microcracked conductors for wearable sensors. *Nature Electronics*, *5*(11), 717-718.
11. Wang, M.†, Yang, Y.†, **Min, J.†**, Song, Y., Tu, J., Mukasa, D., Ye, C., Xu, C., Heflin, N., & McCune, J. S. (2022). A wearable electrochemical biosensor for the monitoring of metabolites and nutrients. *Nature Biomedical Engineering*, *6*, 1225–1235.
Featured on Journal Cover.
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.

2021

13. **Min, J.**[†], Sempionatto, J. R.[†], Teymourian, H.[†], Wang, J., & Gao, W. (2021). Wearable electrochemical biosensors in North America. *Biosensors and Bioelectronics*, 172, 112750.

2020

14. 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.
15. Torrente-Rodríguez, R. M., Tu, J., Yang, Y., **Min, J.**, Wang, M., Song, Y., Yu, Y., Xu, C., Ye, C., & IsHak, W. (2020). Investigation of cortisol dynamics in human sweat using a graphene-based wireless mHealth system. *Matter*, 2(4), 921-937.
16. 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.
17. 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.
18. 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.
19. **Min, J.**, Yang, Y., Wu, Z., & Gao, W. (2020). Robotics in the gut. *Advanced Therapeutics*, 3(4), 1900125.

2019

20. Song, Y., **Min, J.**, & Gao, W. (2019). Wearable and implantable electronics: moving toward precision therapy. *ACS nano*, 13(11), 12280-12286.