

# Jihong Min

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

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## Education

- 09/2018 - 11/2023      Ph.D. 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
- 02/2012 - 05/2014      High School Diploma  
Khartoum American School, Khartoum, Sudan

## Research & Work Experience

- 2024-                      iCMB NIH T32 Postdoctoral Research Fellow, Caltech, USA (Advisor: Prof. Azita Emami)
- 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.
- 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  $\alpha$ -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

- 03/2024                      SPIE Soft Mechatronics and Wearable Systems Best Paper Award
- 03/2024 – 11/2023              iCMB NIH T32 Fellowship
- 09/2018 – 08/2019      MRS Graduate Student Award
- 09/2018 – 08/2019      Andrew and Peggy Cherng Endowment Fellowship

## 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      Spring 2019. Mentored undergraduate student Tara Porter (EE, Caltech)  
Summer 2019. Mentored SURF fellow Kaliden Drango (EE, Caltech)  
Summer 2020. Mentored SURF fellow Nicole Heflin (EE, Caltech)  
Summer 2022. Mentored 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 Communications, ACS Applied Materials & Interfaces, ACS Applied Nano Materials, IEEE Open Journal of Engineering in Medicine and Biology, IEEE International Conference on Flexible and Printable Sensors and Systems, Sensors & Diagnostics.

### Conference Presentations and Poster Sessions

1. Oral Presentation: SPIE Soft Mechatronics and Wearable Systems Conference, Long Beach, CA, Mar 2024 (**Best Paper Award**).
2. Poster Presentation: Caltech Medical Engineering 10th Year Anniversary Symposium.
3. Oral Presentation: MRS Fall Meeting & Exhibit, Boston, MA, Nov 2023 (**Graduate Student Award**).
4. Poster Presentation: IEEE International Flexible Electronics Technology Conference, San Jose, CA, Aug 2023.

### Publications

(21 papers with 8 as first/co-first author, >3100 citations, h-index 14, updated 02/2024) [Google scholar link](https://scholar.google.com/citations?user=T4pVa1UAAAAJ&hl=en)  
(<https://scholar.google.com/citations?user=T4pVa1UAAAAJ&hl=en>)

† indicates equal contributions

#### 2024

1. 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*, <https://doi.org/10.1038/s41928-023-01116-6>.

#### 2023

2. 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>
3. 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.
4. 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.
5. Min, J., Gao, W. (2023). Battery-Free Wearable Electrochemical Sweat Sensors. IEEE International Flexible Electronics Technology Conference (IFETC).
6. 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.
7. Min, J.†, Demchyshyn, S.†, Sempionatto, J. R., Song, Y., Hailegnaw, B., Xu, C., Yang, Y., Solomon, S., Putz, C., Lehner, L., Schwarz, J. F., Schwarzingler, 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.
8. 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.

9. 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.
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.  
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

11. Min, J., Song, Y., & Gao, W. (2022). Microcracked conductors for wearable sensors. *Nature Electronics*, 5(11), 717-718.
12. Wang, M.<sup>†</sup>, Yang, Y.<sup>†</sup>, Min, J.<sup>†</sup>, 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.
13. 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

14. Min, J.<sup>†</sup>, Sempionatto, J. R.<sup>†</sup>, Teymourian, H.<sup>†</sup>, Wang, J., & Gao, W. (2021). Wearable electrochemical biosensors in North America. *Biosensors and Bioelectronics*, 172, 112750.

## 2020

15. 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.
16. 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.
17. 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.
18. 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.
19. Song, Y.<sup>†</sup>, Min, J.<sup>†</sup>, 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.
20. Min, J., Yang, Y., Wu, Z., & Gao, W. (2020). Robotics in the gut. *Advanced Therapeutics*, 3(4), 1900125.

## 2019

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