

## Wearable Bioelectronics for Personalized Healthcare

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### Abstract

In daily life, human natural physiological processes generate a diverse range of biophysical, biochemical, and electrophysiological signals that can be acquired and quantified with multimodal biosensors, providing critically insightful information for health status, qualifying human performance by predictive analytics, and establishing bidirectional communication channels for biotic-abiotic interfaces. The rising research on wearable bioelectronics enables active disease monitoring and remote health management, profoundly impacting the development of personalized healthcare. To facilitate the biomedical applications of early diagnosis, real-time monitoring, and precision therapy, I adopted a bottom-up approach, from the innovation of manufacturing schemes and material properties, preparation of sensitive biosensors, integration of high-efficient energy harvesters, incorporation of artificial intelligence models, to successful development of multimodal biosensing platforms. My talk on wearable bioelectronics for personalized healthcare mainly include, 1) skin-interfaced sweat biosensors for monitoring a wide spectrum of biomarkers (metabolites, electrolytes, proteins, hormones), 2) wireless battery-free bioelectronics powered by flexible perovskite solar cells, biofuel cells, and triboelectric nanogenerators, and 3) machine learning-powered health management towards precision nutrition, behavior prediction, and stress assessment. The developed wearable bioelectronics demonstrates promising prospects in at-home diagnosis, therapeutic drug monitoring, and personalized healthcare.

### Biography

Dr. Yu Song is currently a postdoctoral scholar in Prof. Wei Gao's group at California Institute of Technology. He received his Ph.D. in Microelectronics and Solid-State Electronics at Peking University under the supervision of Prof. Haixia (Alice) Zhang. His research interests focus on bioelectronics, wearable sensors, advanced manufacturing, and digital medicine. In the related fields, he has authored over 70 publications (20 as first/co-first author) including *Nature Biotechnology*, *Nature Electronics*, *Nature Biomedical Engineering*, *Science Robotics*, and *Science Advances*, with over 5400 citations and h-index of 34, applied 18 US & China patents, and served as guest editor and independent reviewer for several journals. Dr. Song has been recognized as World's Top 2% Scientist 2022 & 2023 (Stanford University & Elsevier Scopus) and received over 30 awards, including Leadership Scholarship (Committee of 100) and 2020 Excellent Doctoral Dissertation by Chinese Institute of Electronics and China Education Society of Electronics.

