Distinguished Seminar

Materials Science and Engineering

Melbourne Centre for Nanofabrication (MCN)

"Body-Interfaced Biosensors"

Thursday, 6 November 2025

10.00am - 11.00am AEDT (Melbourne)

G29/G30, Ground Floor, New Horizons - 20 Research Way, Clayton

Professor Wei Gao

California Institute of Technology, USA

Abstract: The rise of personalized medicine is reshaping traditional healthcare, enabling predictive analytics and tailored treatment strategies. In this talk, I will discuss our progress in developing wearable, implantable, and ingestible electrochemical biosensors for real-time molecular analysis. These bioelectronic systems autonomously access and sample diverse body fluids—including sweat, interstitial fluid, gastrointestinal fluid, wound exudate, and exhaled breath condensate—enabling continuous monitoring of key biomarkers such as metabolites, nutrients, hormones, proteins, and drugs during various activities. To facilitate scalable, cost-effective manufacturing of these high-performance, nanomaterial-based sensors, we employ laser engraving, inkjet printing, and 3D printing techniques. The clinical utility of our biosensors is being evaluated in human and animal studies, focusing on applications such as stress and mental health assessment, precision nutrition, chronic disease management, and personalized drug monitoring. Additionally, I will highlight our efforts in energy harvesting from both the body and the environment, opening the door to battery-free, wireless biosensing technologies. By integrating electrochemical biosensing with advanced bioelectronics, we aim to revolutionize personalized healthcare, offering new possibilities for diagnostics, continuous monitoring, and therapeutic interventions.

Bio: Wei Gao is a Professor of Medical Engineering and Heritage Medical Research Institute Investigator at the California Institute of Technology. He earned his Ph.D. from the University of California, San Diego in 2014, followed by a postdoctoral fellowship at the University of California, Berkeley from 2014 to 2017. He is an Associate Editor of Science Advances, npj Flexible Electronics, Biosensors and Bioelectronics, and Sensors & Diagnosis. He is a recipient of NSF Career Award, ONR Young Investigator Award, IAMBE Early Career Award, Sloan Research Fellowship, Pittcon Achievement Award, IEEE EMBS Early Career Achievement Award, IEEE EMBS Technical Achievement Award, IEEE Sensor Council Technical Achievement Award, MIT Technology Review 35 Innovators Under 35, and Falling Walls Breakthrough of the Year in Engineering and Technology. He is a World Economic Forum Young Scientist, a Highly Cited Researcher (Web of Science). He is an elected Fellow for AIMBE and RSC. His research interests include wearable biosensors, digital medicine, bioelectronics, flexible electronics, additive manufacturing, and micro/nanorobotics. For additional information about Gao's research, please visit **www.gao.caltech.edu.**

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