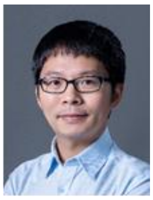
香港大學 機械工程系
Department of Mechanical Engineering
THE UNIVERSITY OF HONG KONG

Symposium on Neural Tissue Engineering

Chair & Organizer: Prof. Min Wang
The University of Hong Kong (HKU)

Co-Chair: Prof. Xuemin Du
Shenzhen Institutes of Advanced Technology (SIAT), Chinese Academy of Sciences (CAS)

Date: Friday Aug. 21, 2026

Venue: Rooms 7-34 and 7-35, Haking Wong Building, HKU

Also online via Zoom:
https://hku.zoom.us/j/95887440363?pwd=B7eJAg9pBVQJmO6aXGaQn0XQOHjiGb.1
Meeting ID: 958 8744 0363 Passcode: 318873

Symposium Programme:

Time	Title	Speaker
13:50 pm	Welcome & Introduction	Prof. Min Wang
14:00 – 14: 40 pm	Neuron-Inspired Ferroelectric Bioelectronics	Prof. Xuemin Du
14:40 – 15: 20 pm	Bionic Anisotropic Topological Functionalized Nerve Grafts for Peripheral Nerve Regeneration	Prof. Guicai Li
15:20 – 15:30 pm	Break	
15:30 – 16:10 pm	3D Bioprinting of Brain Organoids with Blood-brain Barrier Function and Neural Tissue Engineering Scaffolds	Prof. Chong Wang
16:10 – 16:50 pm	Multifunctional Bioelectronic Interfaces for Nerve Modulation and Regeneration	Prof. Qilong Zhao
16:50 – 17:30 pm	3D/4D Bioprinting of Conductive Bioinks for Neural Tissue Engineering	Dr. Jiahui Lai
17:30 pm	Concluding Remarks	Prof. Xuemin Du Prof. Min Wang

Invited Speakers:

(1) Prof. Xuemin Du, Institute of Biomedical and Health Engineering, Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, Shenzhen, China
(2) Prof. Guicai Li, Key Laboratory of Neuroregeneration of Ministry of Education at Nantong University, Nantong, China
(3) Prof. Chong Wang, School of Mechanical Engineering, Dongguan University of Technology, Dongguan, Guangdong, China
(4) Prof. Qilong Zhao, Associate Professor, Institute of Biomedical and Health Engineering, Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, China
(5) Dr. Jiahui Lai, Research Fellow, Department of Biomedical Engineering, The Chinese University of Hong Kong, Hong Kong SAR

For enquiry, please contact Prof. Min Wang (memwang@hku.hk, 3917 7903).

World Ranking of The University of Hong Kong (HKU):
11th by Quacquarelli Symonds (QS): https://www.topuniversities.com/world-university-rankings
33rd by Times Higher Education: https://www.timeshighereducation.com/world-university-rankings/latest/world-ranking#
40th by US. News & World Report: https://www.usnews.com/education/best-global-universities/rankings

Neuron-Inspired Ferroelectric Bioelectronics

Professor Xuemin Du
Institute of Biomedical and Health Engineering
Shenzhen Institutes of Advanced Technology
Chinese Academy of Sciences, Shenzhen, China

Abstract

Implantable bioelectronics, which are essential to neuroscience studies, neurological disorder treatment, and brain-machine interfaces, have become indispensable communication bridges between biological systems and the external world through sensing, monitoring, or manipulating bioelectrical signals. However, conventional implantable bioelectronic devices face key challenges in adaptive interfacing with neural tissues due to their lack of neuron-preferred properties and neuron-similar behaviors. Here, we report innovative neuron-inspired ferroelectric bioelectronics (FerroE) that consists of biocompatible photothermal-responsive particles, ferroelectric poly(vinylidene fluoride-*co*-trifluoroethylene) copolymer, and cellular-scale topographies, imparting adaptive interfacing with neural systems. These FerroE not only achieve neuron-preferred flexible and topographical properties, but also offer neuron-similar behaviors including highly efficient and stable light-induced polarization change, superior capability of producing electric signals, and seamless integration & adaptive communication with neurons. Moreover, the FerroE allows for adaptive interfacing with both peripheral and central neural networks of mice, enabling regulation of their motion behavior, immune system, and vision in a wireless, non-genetic, and non-contact manner. Notably, the FerroE demonstrates unprecedented structural & functional stability and negligible immune response even after long-term implantation in vivo. We can envision that such bioinspired FerroE would open new opportunities for next-generation brain-machine interfaces, tissue engineering materials, and biomedical devices.

Bio

Xuemin Du is a full professor at Shenzhen Institutes of Advanced Technology (SIAT), Chinese Academy of Sciences (CAS), where he is also the Director of Center for Intelligent Biomedical Materials and Devices (IBMD). He received the 2023 Nano Research Young Innovators (NR45) Award. He is currently Deputy Editor of *Research* and *Advanced Bionics*. His research interests mainly focus on intelligent polymers, bio-adaptive interfaces, and smart wearable and implantable devices, including bioelectronics, tissue engineering scaffolds, soft sensors & actuators. He has published high-impact papers in *Science Advances*, *Matter*, *Advanced Materials*, *Device*, etc.

Bionic Anisotropic Topological Functionalized Nerve Grafts for Peripheral Nerve Regeneration

Professor Guicai Li
Key Laboratory of Neuroregeneration of Ministry of Education
Co-innovation Center of Neuroregeneration
NMPA Key Lab for Research & Evaluation of Tissue Engineering Technology Products
Nantong University, 226001, Nantong, China

Abstract

Peripheral nerve injury represents a major clinical challenge with a large number of new cases annually worldwide. Autologous nerve grafting remains the gold standard but is limited by donor shortages, donor site morbidity, and incomplete functional recovery. Based on the platform of the Key Lab of Neuroregeneration of Ministry of Education at Nantong University, this study focuses on the construction of biomimetic anisotropic topological nerve grafts to enhance nerve regeneration and functional reconstruction. We developed a series of biomimetic nerve grafts with anisotropic micro–nano composite topography, including chitosan-based nerve conduits, anisotropic hydrogels, and smart responsive grafts modified with bioactive peptides. These grafts can effectively guide the oriented growth of Schwann cells, promote axon extension, myelination, and vascularization, and accelerate nerve regeneration via multiple signaling pathways such as Wnt/β-catenin, ERK/MAPK, and PI3K-Akt. Furthermore, we integrated intelligent responsiveness including photothermal, magnetic, and piezoelectric properties to realize on-demand regulation. The work provides new strategies and biomaterials for peripheral nerve defect repair.

Bio

Guicai Li is a full professor at the Key Lab of Neuroregeneration, Ministry of Education, Nantong University. His research interests focus on smart biomaterials, tissue engineering, and peripheral nerve regeneration, particularly the design, fabrication and translational application of biomimetic anisotropic topological functionalized nerve grafts. He has published high-impact articles in *Science Advances, Bioactive Materials, Advanced Functional Materials, etc*. He is the PI of four research grants of *National Science Foundation of China and two research grants of Jiangsu Province*, and awarded Young and Middle-Aged Academic Leader of Jiangsu Higher Education "Qinglan Project", and the Candidate of Nantong 226 Talents Project. Currently, he serves as a Council Member of the Chinese Society of Biomaterials, Vice Chairman of the Neural Repair Materials Branch, and Member of the Tissue Engineering and Regenerative Medicine Branch of the Chinese Society of Biomedical Engineering. He is also the Editorial Board Member/Young Editor of *Nano Materials Science, Burns & Trauma, Military Medicine Research*, etc.

3D Bioprinting of Brain Organoids with Blood-brain Barrier Function and Neural Tissue Engineering Scaffolds

Professor Chong Wang
School of Mechanical Engineering
Dongguan University of Technology
Dongguan, Guangdong, China

Abstract

3D bioprinting has emerged as a versatile biofabrication technology for creating tissue engineering scaffolds and cell-laden constructs that recapitulate the architecture and function of native tissues. Towards the functional brain organoid, we fabricated a perfusable, porous PCL/PLGA microfluidic network that served as a vasculature system by using a sacrificial 3D printed hydrogel template. The perfusable construct, seeded with endothelial cells at the lumen side and filled with collagen hydrogel containing neural stem cell-derived neurons, astrocytes, and pericytes in the macroscopic pores, successfully reconstituted functional blood-brain barrier properties, enabling high-throughput drug permeability screening. Towards neural tissue regeneration, we developed an injectable embryonic stem cell-laden composite hydrogel system, which were induced to initiate differentiation along the motor neuron lineage for minimally invasive spinal cord injury (SCI) treatment. This system integrated shape-memory electrospun nanofibers within a gelatin-based double network supramolecular matrix, allowing for structural recovery of scaffolds after injection and providing topographical guidance that enhanced oriented neurite extension during motor neuron differentiation, ultimately promoting motor function recovery. We further fabricated aligned PCL microfiber (via near-field direct write electrospinning)-reinforced hydrogels comprising supramolecular hydrogel and decellularized extracellular matrix from spinal cord tissue, in which WAY-316606 was loaded to activate Wnt/β-catenin signaling. This scaffold promoted endogenous neural stem cell recruitment, guided axonal regeneration, and significantly improved the recovery of motor function in a rat SCI model.

Bio

Chong Wang is a full professor in the School of Mechanical Engineering, Dongguan University of Technology. He received his PhD at the Department of Mechanical Engineering of The University of Hong Kong in 2013. His research focuses on tissue engineering, biomaterials, additive manufacturing and biomanufacturing. He has published more than 50 SCI papers, with many of them appearing in high-impact journals such as *Nature Communications*, *Bioactive Materials*, *Biomaterials*, and *Biofabrication*. Two of them are ESI 1% highly cited papers. He was awarded the Best Reviewer Award for *Biofabrication* by IOP in 2019 and Best Paper Award by *Bioactive Materials* in 2021. He earned Champion of the Best Student Paper Competition, Best Student Paper Award, and STAR Award at international conferences. He is in the World's Top 2% Scientists list for three consecutive years (2023–2025).

Multifunctional Bioelectronic Interfaces for Nerve Modulation and Regeneration

Professor Qilong Zhao
Associate Professor
Institute of Biomedical and Health Engineering
Shenzhen Institutes of Advanced Technology
Chinese Academy of Sciences, Shenzhen, China

Abstract

Convergence of implantable bioelectronics and body tissues present a new trend in brain-computer interfaces and regenerative medicine. However, traditional devices suffer from geometric mismatch, suture-related trauma, and high electrochemically oxidative stress, significantly undermining their long-term biosafety and efficacy. Here, we present multifunctional ferroelectric bioelectronic interfaces (FBI) that integrate unprecedented synergistic functions, including self-rolling geometric matching, strong interfacial adhesion that eliminates the need for suturing, and biomimetic polarization-change-induced bioelectrical signals with minimal associated reactive oxygen species. Under near-infrared irradiation, FBI can effectively modulate cellular response and neural functions. In addition, FBI avoids nerve compression, minimizes focal inflammation, and maintains persistent modulation efficacy during long-term implantation, enabling regulation of cellular behaviors and neural functions as wanted *in vivo* in a sustained manner. By integrating precise geometric adaptability, seamless bioadhesive fixation, bioelectrical biomimicry, and robust biosafety, the FBI platform offers a new paradigm for next-generation implantable bioelectronics for durable nerve modulation and regenerative medicine.

Bio

Qilong Zhao is an Associate Professor at the Shenzhen Institute of Advanced Technology, Chinese Academy of Sciences, and a member of the CAS Youth Innovation Promotion Association. His research focuses on biointerface, bioelectronics, biomanufacturing, tissue engineering, and regenerative medicine. He has published over 50 papers on high-impact journals including *Matter*, *Advanced Materials*, *etc.*, and holds 10 authorized patents. He was recognized as Fellow of the Institute of Materials, Minerals & Mining (FIMMM) UK and 2023 Nanoscale Emerging Investigator by Royal Society of Chemistry (RSC). He currently serves on editorial broad of *IET Nanobiotechnology* and early-career editorial broad of *Materials Letters*.

3D/4D Bioprinting of Conductive Bioinks for Neural Tissue Engineering

Dr. Jiahui Lai
Research Fellow
Department of Biomedical Engineering
The Chinese University of Hong Kong (CUHK)
Shatin, N.T., Hong Kong SAR, China

Abstract:

Bioprinting has emerged as a versatile biofabrication technology for creating cell-laden constructs that recapitulate the architecture and function of native tissues. However, developing bioinks that combine excellent printability with neural tissue-relevant functionality, particularly electrical conductivity and programmable shape morphing, remains a significant challenge. Here, we present our recent work on developing conductive nanocomposite bioinks based on gelatin/gelatin methacryloyl (GG) hydrogels for 3D and 4D bioprinting applications in neural tissue engineering. First, graphene oxide (GO) was incorporated into GG hydrogels to create electroactive bioinks for 3D bioprinting. The addition of GO significantly enhanced electrical conductivity while providing a UV shielding effect that improved cell viability during UV-crosslinking. Second, MXene-reinforced GG hydrogels were developed for 4D bioprinting of programmable shape-morphing constructs. A facile thickness-controlled strategy enabled both unidirectional and bidirectional curvatures through a single UV exposure, with finite element analysis guiding the design and reliably predicting shape transformations. Cell-laden 4D bioprinted constructs demonstrated high cell viability and supported neural cell growth and differentiation. Together, these conductive and programmable bioinks represent a promising platform for advancing dynamic neural tissue engineering and regenerative medicine.

Bio

Jiahui Lai is a research fellow in the Department of Biomedical Engineering at The Chinese University of Hong Kong (CUHK). He received his Ph.D. in Mechanical Engineering from The University of Hong Kong in 2023 and his M.Eng. and B.Eng. in Biomedical Engineering from Shandong University. His research focuses on developing novel smart bioinks and advanced biofabrication strategies, particularly 3D/4D bioprinting of programmable tissue engineering scaffolds. His research work has been published in high-impact journals such as *Advanced Science*, *Bioactive Materials*, *Applied Physics Reviews*, and *Biofabrication*.