

Biologically inspired scaffolds for regenerative medicine

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Abstract:

The microenvironment that surrounds cells plays critical roles in dictating cell fate and tissue regeneration. Biophysical signals, such as extracellular matrix architecture and compliance affect cellular response. In combination with biochemical signals from drugs, growth factors, nucleic acids and/or cells, synergistic effects on directing cell phenotypic changes and tissue regrowth are often seen.

In this talk, we will share our works on designing fiber scaffolds that mimic the size-scale and architecture of the natural extracellular matrix for tissue repair. When presented to appropriate cell types, engineered fibers may also pose as artificial axons. We will discuss our recent findings on the roles of fiber-mediated mechanotransduction on neural cell fate, as well as gene silencing on nerve regeneration and remyelination, using spinal cord injury as a proof-of-principle. We will also share our new developments on enhancing nerve regeneration using nucleic acids- or cell-incorporated 3D-printed scaffolds.

Biography

Dr. Sing Yian CHEW is an Associate Professor at the School of Chemistry, Chemical Engineering and Biotechnology, the Lee Kong Chian School of Medicine and the School of Materials Science and Engineering at Nanyang Technological University, Singapore. She is known for her contributions in designing biomimetic scaffolds to understand and control cell fate. Dr. Chew's most significant contribution is in the field of scaffold-mediated delivery of gene-silencing and biomimicking physical signals for neural tissue regeneration and remyelination. Specifically, her lab engineers bio-functional platforms for long-term delivery of biologics. These scaffolding constructs may be used for understanding and directing neural tissue regeneration after traumatic injuries, stem cell fate and host-implant integration. Since joining NTU, Dr. Chew has continued to embark on scientific learning and exchanges by serving as visiting scholar/professor at Johns Hopkins University, University of Edinburgh, INSERM (U698 and U791); University of Paris 13; University of Nantes; Jinan University in Guangzhou, China; Wyss Institute at Harvard. She is an Associate Editor at ACS Applied Materials & Interfaces. She also serves as the editorial board member of Biomaterials, Experimental Neurology, Tissue Engineering, Journal of Biomedical Materials Research, Part A, Drug Delivery and Translational Research, Journal of Tissue Engineering.