

UCSD NANO & CHEMICAL ENGINEERING
SPECIAL SEMINAR

Wednesday, November 15th, 2023

Seminar Presentation: 11:00am – 12:00pm

SME Room 248



“Bio-inspired nanostructures for targeted delivery of macromolecules and thermally stable RNA vaccine formulations”

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Abstract: Biomacromolecules represent a powerful new class of vaccines and therapies with potential for treatment of a wide variety of previously intractable human diseases, such as the recent COVID-19 pandemic. However, there remain two major challenges to maintaining their stability and ensuring efficient delivery to a target site. There is a need to better understand the mechanisms of delivery across extracellular and intracellular barriers in order to design optimal delivery systems for biological molecules. On the one hand, this would open up significant opportunities to protect and deliver potent macromolecular drugs and vaccines to positively impact human health.

This talk will cover our efforts on design, synthesis, in-vitro and in-vivo evaluation of novel bio-inspired polymer/lipid-based nanostructures. The nanostructures can be manipulated to control their interactions with the lipid membrane, cell, tissue and animal models at different length scales. It has been demonstrated that the nano-formulations can display favourable in-vivo biodistribution, enhanced three-dimensional tissue penetration, and efficient delivery of various payloads, including peptides, proteins and nucleic acids such as RNA, to a target site. The nano-formulations can also enable long-term stability of susceptible macromolecular payloads, in particular RNA vaccines and biotherapeutics, at room and tropical temperatures, eliminating the need for cold-chain storage. Our work presents promising platforms suitable for development of nanomedicine and vaccine formulations.

Bio: Rongjun Chen obtained his PhD degree and did his postdoctoral work in the Department of Chemical Engineering and Biotechnology at the University of Cambridge. He is Currently Professor of Biomaterials Engineering and Head of the Biomaterials and Nanomedicine Laboratory in the Department of Chemical Engineering at Imperial College London. His research focuses on design, synthesis and manufacturing of polymers, lipids and bio-inspired nanoparticles for targeted delivery of active pharmaceutical agents through fundamental understanding of their transport processes across extracellular and intracellular barriers. He has developed a translational research programme on targeted nanomedicine, thermally stable RNA vaccine formulation, cell and gene therapy. His research work has been recognised by various awards including the IChemE Global Team Award in 2021, Imperial College President’s Award for Outstanding Research Team in 2021, and highly commended for IChemE Global Biotechnology Award in 2018. He is an Editor for Chemical Engineering Journal.