Seminar

Department of Biomedical Engineering
香港城市大學
City University of Hong Kong

SIRIUS, Bright Tetherless Near-Infrared Implantable in Photodynamic Therapy

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Time: 3:35 – 4:05 pm
Venue: LT-4, YEUNG

Abstract

Photodynamic therapy is a localized light modulated tumoricidal activation of photosensitizer, which accumulates in tumour. With localized application, it offers minimal systemic side effect, yet the requirement of visible light hampers deep tumour or non-invasive repetitive target. Near-infrared (NIR), which has greater tissue depth penetration can overcome this optical limitation, nevertheless photosensitizers do not react to NIR. Upconversion nanotechnology (UCN) has been introduced to address this gap. First as a proof-of-concept, UCN has successfully enabled NIR based tether-free PDT. We have improved the conventional UCN concept by developing diffused waveguide hydrogel based UCN optical fiber that is functional even while bending, acting as wireless and flexible implant for brain PDT. To improve large area illumination with higher intensity, UCN silicone based implantable were introduced as implantable underneath the skin for orthotopic breast cancer rodent PDT. To date, we have also pioneered the first clinical UCN breast implantable prototype and large animal PDT which would see a seamless transition for clinical translation.

Biography

Dr. Daniel Teh oversees the interdisciplinary laboratory of neuroscience and ophthalmology at the National University Singapore (NUS). He is a first year tenure-track assistant professor at the departments of Ophthalmology & Anatomy, at Yong Loo Lin School of Medicine and at the department of Biomedical Engineering of the College of Design & Engineering. His laboratory is located at the Neurobiology Program, Life Sciences Institute, where he is serving as one of the Principal Investigator. Dr. Daniel, graduated from Tohoku University, Japan with his doctorate in neuroscience prior to moving to NUS. His laboratory focuses on the development of wireless phototherapeutics and optogenetics in biomedical applications. This revolves advancing wireless light technologies as therapeutics and in its application to elucidate biological processes in pre-clinical models. He has been awarded approximately SGD $4.2 million in total grants as Principal Investigator at Singapore and was also awarded with the Ten Outstanding Young People (Singapore) in 2022 by the Junior Chambers International. His works are published in prestigious high impact journals including but not limited to Advanced Materials, Nature Communications, ACS Nano, Nature, Science and others.