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Presents

Seminar series – Drug Delivery and Translational Medicine

Engineered Materials and Devices for Phototherapy and Optogenetics



by

Prof. Yong Zhang

Chair Professor & Head
Department of Biomedical Engineering
City University of Hong Kong

Date: 29 February 2024 (Thursday)

Time: 10:00 a.m. – 11:00 a.m.

Venue: 3SR-SR2, 4/F, No. 3 Sassoon Road

Abstract:

Light has proven useful in a wide range of biomedical applications such as optogenetics and photodynamic therapy (PDT). Optogenetics use light to activate light-responsive proteins that modulate a specific cell function and PDT uses light to activate light-sensitive drugs that produce reactive oxygen species for cell killing. PDT has been clinically proven effective in treating early lung, bladder, head and neck cancer and is the primary treatment for skin cancer. However, their clinical applications are severely constrained by the low penetration depth of UV/visible light through thick tissue, limiting its use to target areas only a few millimeters deep. One way to improve the range is to use nanomaterials or miniaturized devices as transducers to convert deep-tissue penetrating radiations to UV/visible light suitable for activating light-sensitive proteins/drugs, extending the depth. We have demonstrated some new treatment modalities for wireless optogenetics and cancer phototherapy in deep tissues using NIR light or X-ray activatable nanomaterials, light-emitting hydrogel implants, and radiofrequency-activated micro-LEDs. Use of these technologies could be extended to other light-based applications.

Bio:

Professor Yong Zhang is currently a Chair Professor and Head of Department of Biomedical Engineering at City University of Hong Kong. Before joining CityU, he was Provost's Chair Professor and had over 20 years of working experience in the Department of Biomedical Engineering at the National University of Singapore (NUS). Prof Zhang's research interests include functional nanomaterials and miniaturized devices for wireless phototherapy and optogenetics, upconversion nanoparticles and microfluidic devices for point-of-care diagnostics, and wearable/implantable technologies for healthcare applications. He has authored over 300 research articles in peer-reviewed journals such as Nature Medicine, Nature Biomedical Engineering and PNAS, and delivered many plenary/keynote/invited talks in international conferences. Prof Zhang has served in the editorial/advisory boards of journals such as Chemical Society Reviews. He has received many awards such as Humboldt Research Award and IES Prestigious Engineering Achievement Award, and has recently been awarded the prestigious Global STEM Professorship by the Hong Kong SAR. He is an elected Fellow of Singapore Academy of Engineering (FSAEng) and Royal Society of Chemistry (FRSC). He is also a founder of four startups to commercialize the technologies developed in his lab.

Moderator: Prof. Weiping Wang, Associate Professor, Department of Pharmacology and Pharmacy & Dr. Li Dak-Sum Research Centre, The University of Hong Kong
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Seminar series
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