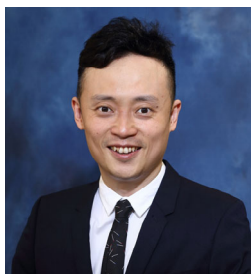




Date: 20 Sep 2023 (Wed)  
Time: 4:00pm Venue: ERB1122

## Nano–Cell Interactions of Non-Cationic Bionanomaterials



**Prof. CHOI Chung Hang Jonathan**

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### **Abstract**

Bionanomaterials form the basis of important nanomedicine applications, such as gene regulation and COVID-19 mRNA vaccines. Cationic, lipid nanoparticles (NPs) are classical drug carriers due to their high penetration across the negatively charged cell membrane, but they tend to cause cytotoxicity and immune response. Non-cationic NPs (neutral or anionic) generally show higher biocompatibility but enter cells less abundantly. Intriguingly, some types of non-cationic NPs exhibit high biocompatibility and cellular uptake properties, both attractive features for delivery. We are interested in the cell-nano interactions of such special non-cationic bionanomaterials.

The first half of the talk will focus on near-neutral “alkylated gold NPs” with minute amounts of alkyl chains on the gold core. We illustrate how alkylation affects endocytosis and exocytosis in vivo and demonstrate that alkylated gold NPs are self-therapeutic agents against psoriasis. The second half will feature “spherical nucleic acids (SNAs)”, anionic nanospheres derived from the attachment of oligonucleotides to a NP core. We prove that SNAs bind to class A scavenger receptor (SR-A) in vitro and in vivo and show that SNAs boost gene delivery to SR-A-rich macrophages and endothelial cells for treating atherosclerosis.

### **Biography**

Dr. Jonathan Choi is an Associate Professor and Vice-Chairman (Undergraduate) in the Department of Biomedical Engineering (BME) and an Associate Professor (by courtesy) in the School of Life Sciences CUHK. He received his BS/MS degrees from Stanford in 2005/2006 and PhD degree from Caltech in 2011, all in chemical engineering. He was a Croucher postdoctoral fellow at Northwestern from 2011 to 2013. His research interests are non-cationic bionanomaterials, bio-nano interactions, nanomedicine, and drug delivery.

Jonathan established the first lab that focuses on in vivo nanoparticle-based drug delivery and bio-nano interactions (how nanoparticles interact with the body) in Hong Kong in 8/2013. He won a Croucher Innovation Award in 2016 and the Best Paper from Hong Kong Institution of Engineers (HKIE) Materials Division in 2019, was conferred a 2023/24 Research Grants Council (RGC) Research Fellow, and was a finalist of the 2023 ACS *Nano* Impact Award (one winner and four finalists globally). He cofounded CUHK Department of BME (first BME department in Hong Kong) in 7/2017 and was Assistant Dean (Student Affairs) of Engineering at CUHK from 2018 to 2021. He is a director of American Institute of Chemical Engineers (AIChE) Nanoscale Science & Engineering Forum and was Communications Chair of Controlled Release Society (CRS) Bioinspired and Biomimetic Delivery Focus Group. He is an editorial board member of *Pharmaceutics* and *Frontiers of Bioengineering and Biotechnology* and guest-edited a special issue for *Molecular Pharmaceutics*.

**\*\*\* ALL ARE WELCOME \*\*\***

*For enquiries, please contact Ms Heidi Chan, Department of Biomedical Engineering at 3943 8261.*