



Time: 10:30am, 26 Sep (Mon) Venue: ERB1118 and on Zoom (hybrid)

Seminar Link:

<https://cuhk.zoom.us/j/93190304628?pwd=bW8ySk85MVBabzVsR1VtVkY5WDRnQT09>

Recent Advances on Quantitative Phase Microscopy for Biomedical Imaging and Material Metrology



Professor Renjie Zhou

Assistant Professor

**Department of Biomedical Engineering
The Chinese University of Hong Kong**

Abstract

Quantitative phase microscopy (QPM) is a label-free imaging technique, which has been widely applied to biomedical imaging and material metrology. In this talk, I will highlight several recent QPM advances and their demonstrated applications from our group. I will first introduce our development of high spatiotemporal resolution synthetic aperture phase microscopy that can image and quantify millisecond-level fluctuations in living cells. I will further show our work on high-speed tomographic phase microscopy and its applications on high-speed three-dimensional (3D) cell imaging and characterization of 3D-printed structures. After that, I will talk about our recent work on single-frame label-free cell tomography with an unprecedented speed of >10,000 volumes/second. Then, I will move to our work on correlating the phase maps with clinically-relevant information with machine learning with an example on classifying leukocyte subtypes, which has achieved over 90% classification accuracy without using chemical reagents with cross-validation on human blood donors. Finally, I will present our results on pushing the phase sensitivity limit to ~2 picometers, which has laid the foundation to develop quantitative phase profilometry for mapping the thickness maps of 2D materials. To further demonstrate the potential of our QPM platforms, we are open for more interdisciplinary research collaborations in the future.

Biography

Dr. Renjie Zhou received his PhD degree in Electrical and Computer Engineering from the University of Illinois at Urbana-Champaign in 2014 and undertook postdoctoral training at MIT between 2014-2017. He is currently an Assistant Professor in the Department of Biomedical Engineering (BME) at The Chinese University of Hong Kong (CUHK), where he directs the Laser Metrology and Biomedicine Laboratory. His research interest is in developing optical precision instruments for material metrology and biomedical imaging applications. Dr. Zhou has published 44 journal papers and 46 peer-reviewed conference papers. He has 1 US patent granted and 8 US/China patent applications with 3 of them licensed to industry, including his own startup. He has been involved in organizing ~ 20 international conferences as co-chairs/committee members, delivered ~ 40 conference invited talks and seminars/colloquiums, and reviewed for >30 journals. He is currently serving on the editorial boards of JOSA A and IEEE Photonics Technology Letters and the IEEE Photonics Society Hong Kong Chapter as the treasurer. He is a Senior Member of Optica and SPIE and a regular member of IEEE. Dr. Zhou was recognized twice as SPIE Community Champion (2019 & 2020) and received Croucher Innovation Awards in 2019.

*** ALL ARE WELCOME ***

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