



The Chinese University of Hong Kong



Department of Biomedical Engineering

Time: 10:00am, 31 March 2023 (Friday)

Venue: Lady Shaw Building C2 (G/F)

Blood-cell 'lens' for high-resolution, high-throughput ptychographic imaging



Prof. Guoan Zheng

UTC Associate Professor

Departments of Biomedical Engineering/

Electrical and Computer Engineering

University of Connecticut

Abstract

Ptychography is an enabling coherent diffraction imaging technique for both fundamental and applied sciences. Its applications in optical microscopy, however, fall short for its low imaging throughput and limited resolution. In this talk, I will discuss a coded ptychography technique that achieves the highest numerical aperture and an imaging throughput order of magnitude greater than previous demonstrations. In this platform, we translate the samples across the disorder-engineered surfaces for lensless diffraction data acquisition. The engineered surface can be made by smearing a monolayer of blood on top of the image sensor. The entire system can be built using a modified Blu-ray disc. For the first time, we report the direct observation of bacterial growth in a 15-s interval by tracking the phase wraps of the recovered images, with high phase sensitivity like that in interferometric measurements. The combination of high phase sensitivity, high spatiotemporal resolution, and large field of view is unique among existing microscopy techniques.

Biography

Dr. Guoan Zheng received the B.S. degree from Zhejiang University in 2007 and the Ph.D. degree from Caltech in 2013. He joined the University of Connecticut in 2013 as an Assistant Professor. Currently, he is the United Technologies Corporation (UTC) Associate Professor in the areas of Biomedical Engineering and Electrical Engineering. His current research efforts focus on the development of novel imaging tools to tackle measurement problems in biology and medicine. Dr. Zheng has published more than 100 papers, including Nature Photonics, Nature Reviews Physics, Nature Protocols. He has been cited over 9500 times and has an h-index of 50. The Fourier ptychography approach he developed with his colleagues is now a sub-chapter in Goodman's textbook, "Introduction to Fourier Optics (the 4th edition)".

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

For enquiries, please contact Ms. Joyce Chan, Department of Biomedical Engineering at 3943 8278