

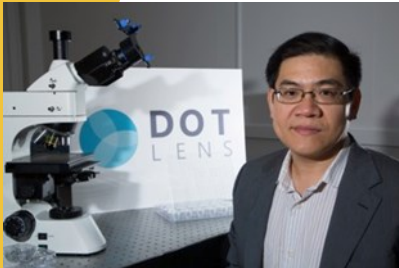


College of Engineering  
Department of  
Mechanical & Industrial Engineering

## The Robert W. Courter Seminar Series

3:00-4:00pm, Friday, October 23<sup>rd</sup>, 2020

ZOOM: <https://lsu.zoom.us/j/7441111111>



### Toward detecting sub-10nm transparent object and single molecule by incoherent bright-field imaging

by **Wei-Chuan Shih\***

**University of Houston**

In the age of digital electronics, modern imaging sensors provide high sensitivity, superb dynamic range, fast data acquisition rate, and low noise. Significant strides have been made in areas such as super-resolution microscopy (Nobel Prize in Chemistry 2014), where single molecule fluorescence plays an enabling role. However, for general transparent objects or molecules the limit of detection still has room for improvement. The most advanced imaging techniques typically require sophisticated instrumentation, costly light sources and detectors, and highly-controlled experimental environment. Considering the majority of the world's microscopes equipped with lamps and cameras, they lack sophisticated lasers, beam shaping, scanning and special launching capabilities, precise timing, interferometric detection, and etc. Operating in such a so called incoherent bright-field imaging territory, detecting transparent objects smaller than 100 nm remains a formidable challenge. In this talk, I will introduce a novel plasmonic imaging technique that uniquely relies on unscattered light to detect sub-100 nm transparent objects. Its system is identical to a standard bright-field microscope with a lamp and a camera – no laser, beam shaping & scanning or interferometry is needed. I will also discuss potential applications in single biological nanoparticles analysis of exosome and virus.

\* Dr. Wei-Chuan Shih earned his Ph.D. from MIT. Prior to joining the University of Houston, he was a Schlumberger research fellow. Dr. Shih is a Professor of Electrical & Computer Engineering with joint appointments in Biomedical Engineering, Materials Science & Engineering, and Chemistry at the University of Houston (UH). He was a MIT Martin Fellow, and received NSF CAREER Award in Biophotonics, inaugural NASA Early CAREER Faculty Award, UH Award for Excellence in Research and Scholarship, UH Cullen College of Engineering Faculty Research Excellence Award, and UH Cullen College of Engineering inaugural Rising Innovator Award. He has published more than 120 articles in books, journals and conference proceedings, including 70+ peer-reviewed journal papers. He has 13 issued US patents. He currently serves as Associate Editor for OSA Optics Express and SPIE Journal of Nanophotonics. He is a Senior Member of National Academy of Inventor, OSA, SPIE, and IEEE. Website: <http://www.ee.uh.edu/faculty/shih>.