NANYANG TECHNOLOGICAL UNIVERSITY

CBC SEMINAR ANNOUNCEMENT

Professor Shuang Fang Lim
North Carolina State University

Nanophotonics – From Simulations, Photophysics, to Biomedical Devices

Rare earth ion doped upconverting nanoparticles are excited in the near infrared (NIR) and fluoresce via Anti-stokes emission in the visible energy range (400-650 nm). They show large penetration depth of excitation, no blinking, and high signal-to-noise ratio due to zero tissue autofluorescence. In addition, since upconversion is a two-photon fluorescence process, it has the same ability as other 2-photon fluorescence microscopies to resolve the 3-dimensional structure of objects. Despite the fundamental advantages that UCNPs have over semiconductor nanoparticles and molecular dyes, they have not been used widely due to their comparatively low brightness and low upconversion efficiency at low pump powers.

Our upconversion nanostructures are optimized with predictive finite element modeling, and correlated structural and optical single nanoparticle spectroscopy is performed to explore the link between nanostructure orientation, geometry and the corresponding nanoparticle optical property. Investigation of the enhancement at the single particle level is directly relevant to this work because the effect of the modifications can be explained both quantitatively and qualitatively. The single particle results are also more consistent with finite element calculations, without having to correct for anomalies generated by ensemble measurements.

The optimized nanostructures are applied in the sensing of protein translocation and specific DNA binding events, at high spatial resolution.

Date:	**17th July 2017 (Monday)**
Time:	**11:00am – 12:30pm**
Venue:	**SPMS Research & Graduate Studies Office Conference Room**
Host:	**Assoc Professor Xing Bengang**