

Seminar Announcement

Friday, March 9th, 2018

12:00 pm – 1:00 pm

Olin Engineering, Room 202

Marquette University

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Professor

Biomedical Engineering, Northwestern University

Abstract

***“Functional Optical Imaging
from Single Molecules to Human Eyes”***

My lab mainly focuses on two optical imaging technologies, optical coherence tomography (OCT) and photon localization microscopy, to fill the gaps in both clinical diagnoses and fundamental biomedical investigations. To enable OCT to extract physiological and pathological information beyond high-quality anatomical imaging, we developed visible-light OCT or vis-OCT. Operating within the visible-light spectral range, vis-OCT has demonstrated great potential in ultra-high resolution imaging, angiogram, oxygen metabolic imaging, and ultrastructural pathological sensing. We are applying vis-OCT to investigate several blinding diseases (diabetic retinopathy, retinal vein occlusion, macular degeneration, and glaucoma) and ischemic strokes.

In super-resolution imaging work, we developed spectroscopic photon localization microscopy (SPLM). Traditional photon localization microscopy analyzes the spatial distributions of photons emitted stochastically by individual molecules to reconstruct super-resolution optical images. SPLM further captures the inherent spectroscopic signatures of these photons. Through molecular discrimination and regression, SPLM can reach a spatial resolution of 10 nm or greater without significantly increasing the total number of image frames. Using SPLM, we demonstrated simultaneous multi-molecular super-resolution imaging, where the number of fluorescence labels can have largely overlapping emission spectra with only minute differences. We further investigated intrinsic stochastic fluorescence emission from unstained nucleotides, seeking label-free super-resolution imaging.

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Olin Engineering is located at 1515 W. Wisconsin Ave, Milwaukee, WI.

Parking is available in Structure 1 on 16th Street between Wisconsin Ave. and Wells Ave.