Centre for Biosystems Science and Engineering

S E M I N A R

Tissue imaging for cancer diagnostics: An Optical Engineers perspective

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4:00 PM, Monday, 8th August 2016,
Seminar Hall, MRDG, Biological Sciences Building

Innovative techniques for imaging and extracting quantitative information from cancer samples (either cells or tissues) are an important part of cancer research. The clinical translation of these techniques is expected to transform surgical pathology from a century old archaic practice (qualitative) into a modern-day objective (quantitative) medical field.

The speaker will give an overview of the workflow you will find in a Pathology lab in taking tissue samples coming out of biopsy or surgery and transforming them into stained tissue slides which a pathologist can view through a microscope to make a diagnostic call. Also, some of the sources of error in this workflow, which could potentially affect the diagnostic outcome will be highlighted. Following this, there will be detailed measurements of tissue properties carried out from an Engineer's point of view with the objective of getting quantifiable metrics that can be used to improve the above-described workflow.

Next, the talk will include multiplexed marker imaging in tissue samples, its clinical implications, the different techniques which have been investigated in the research community (bright field, fluorescence and mass spectrometry) and, quantitative techniques used to separate the different markers to aid a Pathologist in diagnosis. Finally, the speaker will share a novel imaging techniques he worked on to image C-H bonds in collagen samples using a nonlinear optical microscope. He will also explain the importance of understanding collagen, its spatial properties and its implications with cancer.

About the Speaker

Dr. Varun Raghunathan is currently working as an Assistant Professor in the Electrical Communications Engineering (ECE) department at IISc. His areas of research interest are in nonlinear optics, multi-photon microscopy of biological and nanostructure samples and integrated photonic devices. Previously he was working as a research scientist at Agilent Research Labs, Santa Clara, CA from 2012-2016 in the area of biomedical imaging for cancer diagnostics and its clinical translation. He did his postdoctoral training under Prof. Eric Potma at University of California Irvine, Chemistry department in the area of nonlinear optical microscopy for tissue and nanostructure imaging. He did his MS and Ph. D at University of California Los Angles, Electrical Engineering department from 2002-2008 under the guidance of Prof. Bahram Jalali in the area of silicon photonics.