Olympus Confocal and Live Cell Seminar

Date: 21st November 2012, 9am -12 pm

Venue: LT29, YLLSoM, NUS

Topics to be covered:

- **Instrumentation in Live Cell Imaging**
- **Live Cell Confocal Microscopy**
- **The New FV1200 Confocal Microscope**
- **Fluorescence Correlation Spectroscopy**

Speakers:
Thorsten Wohland (CBIS, NUS), Graham Wright (IMB, A*STAR), Hiromi Utsunomiya (Olympus, Japan), Steve Chai (Olympus, Singapore).

Organised by: Prof. Hanry Yu (CMU, NUS) and Olympus Singapore.

For registration please visit : http://tinyurl.com/FV1200-launch

For more information please contact Shu Ying (6516 6306) or Steve Chai (9117 9733)

All are welcome. Refreshments and Lunch Provided !

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Seminar Schedule (21st November 2012)		
Day/time	Title	Speaker
Wednesday	**Chair: Prof. Hanry Yu**	
Location :	**NUS Lecture Theater 29**	
09.00 - 09.20	Arrival of guests	
09.20 - 09.30	Introduction	Professor Hanry Yu NUS/Confocal Microscopy Unit
09.30 - 10.00	System requirements for Live cell imaging – Introduction to the new Olympus IX-3 microscope	Mr. Steve Chai Olympus Singapore
10.00 – 10.45	Fluorescence Correlation Spectroscopy with Confocal	Associate Professor Thorsten Wohland NUS / CBIS
10.45 – 11.15	Coffee break	
11.15 – 11.45	Introduction Of New Olympus FV1200 Confocal System	Ms. Hiromi Utsunomiya Olympus Tokyo
11.45 – 12.30	Live Cell Imaging with Confocal	Dr. Graham Wright Institute of Medical Biology
12.30 – 13.30	Lunch	
13.30 – 1600	Equipment Display	

Mr. Steve Chai, Senior Product Specialist, Olympus Singapore Pte. Ltd

Title: Instrumentation in Live Cell Imaging – Introduction to the New Olympus IX-3 Microscope

Abstract

Live cell imaging has become an important tool for biological research. It allows investigation of dynamic processes and movements of living cells. The emerging of new live cell imaging techniques requires the advancement of the microscope system for sophisticated applications. A range of imaging options combined with world class optics is the pre-requisite for advanced imaging. To make sure a Live Cell Imaging system is able to generate useful data, it is important for us to understand the different components that made up an LCI system. This will ensure that the correct equipment is chosen to suit specific research requirement. Nevertheless, with the advancement in computerization and motorization, suitable software is essential to ensure optimum workflow of the system. Thus, we shall look into the instruments essential for a LCI set up and how the components could affect the performance of the system. At the same time, Olympus is proud to present a new solution for Live Cell Imaging, the IX3 Series. A variety of advanced component combinations and the modularity of this system strive to accelerate your research to the next level.

Associate Professor Thorsten Wohland, Departments of Biological Sciences and Chemistry, Centre of Bioimaging Sciences, National University of Singapore

Title: Fluorescence Correlation Spectroscopy – A versatile tool to obtain quantitative information in confocal and total internal reflection microscopes

Abstract

In recent years Fluorescence Correlation Spectroscopy (FCS) has become a routine tool in biophysical studies for the quantification of biomolecular dynamics and interactions. FCS relies on the detection of fluorescence fluctuations, created by single fluorescent molecules moving in and out of small observation volumes (~1 femtoliter). By calculating temporal and spatial correlations of the fluorescence intensity traces, one can extract the average number of molecules within the observation volume and their diffusion or transport coefficients. And in the case of Fluorescence Cross-correlation Spectroscopy (FCCS), when fluorescence is observed at two or more wavelength, interactions between differently labeled molecules can be directly measured and dissociation constants (K_d) can be determined even in organisms.

Since its inception in 1972 many different FCS modalities have been developed. However, of particular interest are those modalities that can be easily adapted to commercial instrumentation. First, confocal FCS can be directly mounted on laser scanning confocal microscopes and has very high time resolution (1 ns) but measures essentially only at one point. Another possibility is the use of total internal reflection (TIR) microscopy, in which the observation volume is determined by the evanescent in conjunction with the pixels on a camera. This method is sensitive only to samples close to the cover glass surface, e.g. cell membranes, but can measure one million points or more simultaneously with moderate time resolution (40 □s – 1 ms).

In this seminar we will introduce the fundamentals of FCS, discuss how FCS can be established with commercial confocal or TIR microscopes, and explore how biomolecular interactions can be measured in live cells and organisms on the example of membrane and cytosolic proteins.

Ms. Hiromi Utsunomiya, Senior Supervisor,
Life Science Business Division, Olympus Corporation, Japan.

Title: High-Performance Laser Scanning Microscope for Live Cell Imaging

Abstract

Laser scanning microscope has become one of the convenience tools for live cell imaging. In live cell imaging by laser scanning microscope, the most important points are to minimize photo damage and Z-drift during image acquisition. In this talk, I will explain how Olympus achieves high quality and reliable live cell imaging by the FLUOVIEW FV1200.

The photo damage is not avoidable due to excitation light. FV1200's enhanced GaAsP-PMT detector and new galvanometer coating improves the sensitivity of the whole system. And new silicone immersion objective minimizes spherical aberration when observing live cells with relatively high numerical aperture. These new optics and detectors help users to image dim samples with weak excitation light reducing photo damage.

Z-drift is sometimes caused by adding reagent to sample during image acquisition. With the new IX83 microscope, the FV1200 allows user to acquire real time Z-drift compensated image even when reagent is applied.

Furthermore, the FV1200 offers simultaneous high speed photo-stimulation of live cells for new optogenetic technology.

Dr. Graham Wright, Microscopy Manager,
Institute of Medical Biology

Title: Confocal Live-Cell Imaging

Abstract

Through technological advances across multiple disciplines; from fluorescent probes for living cells, to precision-motorisation, computation and microscope incubation systems, live-cell imaging has become an invaluable tool for biological and biomedical research. It allows the researcher to investigate dynamic processes, behavior and environmental responses of living cells, their sub-cellular compartments as well as thicker samples such as embryos and cultured tissues. Confocal microscopy enables the imaging of optical slices from within thicker samples that would otherwise be blurred by contributions from above and below the focal plane. Though the collection of z-stacks, 3D images in multiple colours can then be acquired without further processing. Combining these two powerful techniques live-cell confocal imaging has become popular for gaining a greater understanding of biological processes. This seminar will introduce the techniques and hardware options available, the considerations and limitations for effective live-cell imaging experiments and demonstrate a variety of applications for cell and developmental biology.