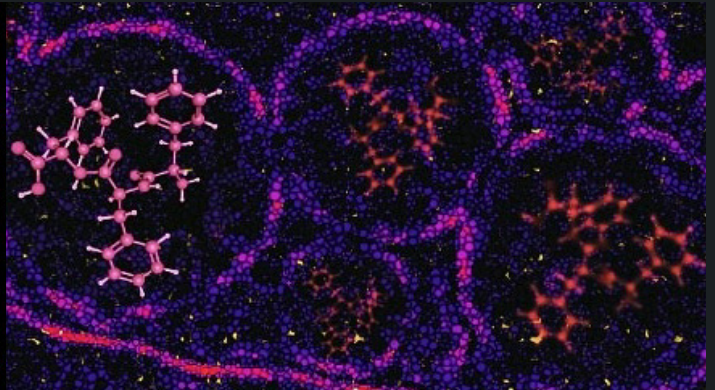# Microscopy Focus

Leica MICROSYSTEMS

See the Hidden: Cancer Research
LIVE ONLINE WORKSHOP

Imperial College London Edition

Thursday 27th January 2022
LONDON 09:30 - 15:00 | BERLIN 10:30 - 16:00 | DUBAI 13:30 - 18:00

Leica Microsystems is pleased to welcome you to the 4th virtual edition of our popular See the Hidden Workshop Series hosted by Microscopy Focus, which will explore the next generation of methodologies, techniques, and workflows that are helping to accelerate cancer research.

In partnership with Imperial College London (ICL), this joint event will showcase how a multidisciplinary research approach is creating innovative new ideas for the detection, prevention, and ultimately the treatment of cancer.

Through a series of scientific talks, Professor Chris Bakal, Dr. Vania Braga, and Dr. Periklis Pantazis from ICL will present their cutting-edge research and discuss how specialized microscopy techniques are contributing to their findings. We'll also take a closer look at the microscopy workflows used, with relevant product demonstrations in real-time.

The program will focus on two exciting areas of microscopy—high-resolution optical imaging and artificial intelligence (AI)-powered image analysis.

Join us to put your questions to these leading researchers and our team of experts and get involved in the discussions.

AGENDA
Each presentation will be followed by a live, interactive Q&A session.

WELCOME & OVERVIEW
09:30 GMT | 10:30 CET

Dr Abdullah Ahmed
Leica Microsystems

Mr Paul McCormick
Leica Microsystems

Dr Periklis Pantazis
Imperial College London

SESSION INFORMATION CONTINUED BELOW

Leica MICROSYSTEMS

SESSION 1: ADVANCED IMAGING TECHNOLOGIES FOR CANCER CELL AND TISSUE STRUCTURAL ANALYSIS

09:50 GMT I 10:50 CET

AI-driven interrogation of signalling pathways underpinning cell detachment during oncogenic transformation
Dr Vania Braga

Dr Vania Braga is a Reader and Head of Section at the National Heart and Lung Institute at ICL. Her primary research interest is understanding the signaling pathways that govern epithelial homeostasis and those subverted during cancer progression and other epithelial diseases. Recently, her lab has focused on developing new tools for quantitative imaging software to enable medium to high throughput pathway analyses of junctional components.

During oncogenic transformation, disruption of contacts among neighbors is one of the first signs that cells lose their identity and shape and begin their morphological transformation towards malignancy. In this talk, Vania will discuss how computer vision challenges to identify junctions and specific patterns of disruption were overcome by designing a powerful, unbiased, and highly applicable software for profiling cell-cell adhesion phenotypes.

Dr Vania Braga
Imperial College London

10:30 GMT I 11:30 CET

Leica THUNDER Imaging Systems: Analysing 3D specimens with widefield microscopy
Dr Abdullah Ahmed

Dr Abdullah Ahmed joined Leica Microsystems in 2019 as an Advanced Workflow Specialist following a joint PhD project with Oxford Brookes University and Evotec, focusing on the characterization of cancer signaling mechanisms. He developed and used fluorescent imaging technologies to observe the localization and interactions of proteins in conjunction with FRET–FLIM. Super-resolution microscopy techniques were also imperative in his doctoral research.

Classic widefield microscopy is of limited use for cancer researchers investigating volumetric specimens as it can be difficult to obtain high-quality data. This is particularly true for feature analysis in thick 3D samples because of out-of-focus light. In this virtual practical session, you'll discover the ease of use, speed, and sensitivity of THUNDER imagers, and see how to obtain a clear view of details even deep within the specimen thanks to Computational Clearing.

Dr Abdullah Ahmed
Leica Microsystems

LUNCH BREAK

11:10 GMT I 12:10 CET

SESSION 2: INNOVATIVE APPROACHES TO TARGETTING AND TRACING CANCER CELLS USING HIGH-RESOLUTION OPTCAL IMAGING

12:10 GMT I 13:10 CET

Biodegradable harmonophores for targeted high-resolution *in vivo* tumour imaging
Dr Periklis Pantazis

Dr Periklis (Laki) Pantazis is a Reader in Advanced Optical Precision Imaging at the Department of Bioengineering at ICL. He is also the Chair of the Leica Microsystems and ICL Imaging Hub. Dr. Periklis obtained his PhD in Biology and Bioengineering at the Max Planck Institute of Molecular Cell Biology and Genetics in Dresden. As a Royal Society Merit Award recipient, he established the Laboratory of Advanced Optical Precision Imaging at ICL in 2018/19.

Nonlinear optical imaging probes, such as second harmonic generating (SHG) nanoprobes, hold great promise as clinical contrast agents because of minimal background signal and long-term photostability. In this talk, Laki will show how biodegradable harmonophores (bioharmonophores) were developed to overcome the health concerns of inorganic SHG nanoprobes, and can target single cancer cells with high detection sensitivity in zebrafish embryos *in vivo*.

Dr Periklis Pantazis
Imperial College London

12:50 GMT I 13:50 CET

Get closer to the truth with the STELLARIS Confocal Microscope Platform
Mr Paul McCormick

Paul is the Advanced Workflow Manager at Leica Microsystems (UK). The Advanced Workflow Specialist Team specializes in confocal and widefield microscopy and sample preparation techniques specifically for life science research. They cover various disciplines, from live-cell microscopy down to super-resolution and CLEM applications. The team's proximity to real science means they are ideally placed to facilitate the development of new technologies.

The ability to study cancer cell behavior in intact tissues within a living organism is crucial to gaining insights into disease progression and developing treatments. Discover how the new Leica Microsystems STELLARIS confocal platform can help unlock the full potential of cancer studies by overcoming limitations and challenges. We will also present a guide to imaging confetti mice and the benefits of multiphoton confocal imaging.

Mr Paul McCormick
Leica Microsystems

AFTERNOON BREAK
13:30 GMT I 14:30 CET

SESSION 3: AI-POWERED IMAGE ANALYSIS INNOVATIONS TO ADVANCE THE UNDERSTANDING OF CANCER BIOLOGY
13:40 GMT I 14:40 CET

What the shape of our cells says about our health and disease: Using AI-powered single cell morphology analysis to describe the states of cancer
Professor Chris Bakal

Chris Bakal is the Professor of Cancer Morphodynamics at the Institute of Cancer Research in London, where he leads the Dynamical Cell Systems Laboratory. His team aims to understand how signaling networks regulate cancer cell shape. After being awarded a Wellcome Trust Career Development Fellowship, Chris established his laboratory at ICR in 2009. In 2015, he was awarded the prestigious Cancer Research UK Future Leaders Prize.

The genomics era has generated unprecedented biological insights. However, we still have a poor understanding of how the interaction of genes with each other, and their environment, lead to different cellular fates. Discover how Chris and his team are building predictive frameworks using detailed 'omics data to describe how the shape of cells interacts with genes to determine cell fate, and how this could be used in therapeutics and bioengineering.

Professor Chris Bakal
Imperial College London

14:20 GMT I 15:20 CET

Aivia: The future of AI microscopy
Dr Patrice Mascalchi

As a biologist, Patrice is passionate about microscopy and image analysis with 10+ years of hands-on experience. Self-taught in programming, he spent several years collaborating with scientists from various fields on image processing and analysis and has actively participated in research projects requiring image analysis. He now works with Aivia software for Leica Microsystems in the EMEA region, believing that AI is the key to speeding up image analysis.

Aivia is the most complete, AI-powered, image visualization and analysis platform available. It bridges the gap between biology and computer science to provide AI access and a radically simplified segmentation process to all. Using Aivia, biologists can easily extract insights from large and complex images in minutes. Aivia covers most applications and is available locally or on the web. Live demonstrations will be performed during the workshop.

Dr Patrice Mascalchi
Leica Microsystems

Following closing remarks the workshop will conclude at 15:00 GMT I 16:00 CET.

Banner image: Magma bioharmonophores

"Spherism" rendition of triphenylalanine bioharmonophores captured by TEM. The cores of the probes feature an artistic representation of their molecular components, triphenylalanine molecules.

Courtesy of Mr. Konstantinos Kalyviotis, Research Postgraduate in Periklis Pantazis' group at ICL.