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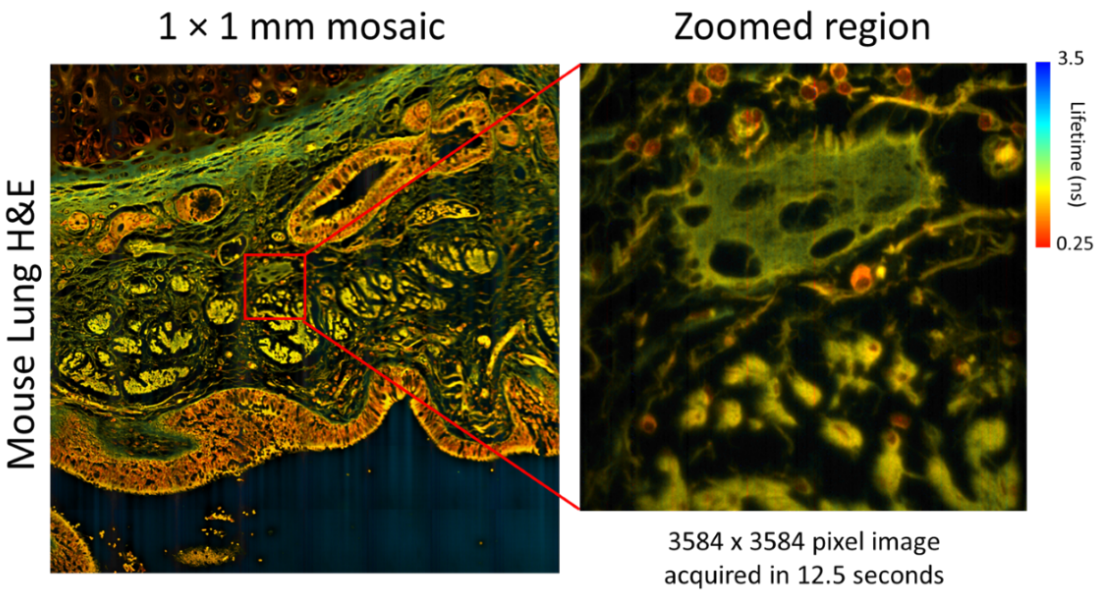
OPTICS & PHOTONICS
UNIVERSITY OF NOTTINGHAM

Optics and Photonics Group Lunchtime Seminar

"Development of new functional imaging techniques for high speed in-vivo applications"

Dr Simon Poland

King's College London



Mouse Lung H&E sample (3584 × 3584 pixels) acquired in 12.5 seconds. Zoomed region of a single image tile (512 × 512) also included.

13:30 Wednesday 1 March 2023
Coates Building - C24
All Welcome

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MS Teams link

Fluorescence lifetime imaging (FLIM) is a key fluorescence microscopy technique to map the environment and interaction of fluorescent probes. It can report on photophysical events that are difficult or impossible to observe by fluorescence intensity imaging, because FLIM is independent of the local fluorophore concentration and excitation intensity. For high precision fluorescence lifetime imaging (FLIM), time-correlated single-photon counting(TCSPC) is unparalleled in its measurement accuracy particularly for multi-exponential decays. Until recently, high-speed FLIM could only be performed using modulated or time-gated image intensifier systems as TCSPC was fundamentally limited with respect to photon counting rate in laser-scanning microscopy implementations. In this presentation I will discuss the development of development of high-speed multifocal FLIM platforms for microscopy applications utilising single photon avalanche diode (SPAD) arrays. Representing a paradigm shift in FLIM based microscopy, this has enabled dynamic functional imaging of live-cell interactions in several time-critical applications including in vivo imaging, diagnostics and histological screening.

Dr. Simon Poland (SP) is a UKRI Future Leaders Fellow at the Comprehensive Cancer Centre at King's College London. He earned his Bachelor of Science in Physics with Astrophysics and Master of Science in Optoelectronics at Queen's University Belfast in 2001 and 2002 respectively. In 2007 he was awarded his PhD. in Physics at the University of Strathclyde in Glasgow working with Prof. John Girkin. This thesis is concerned with the development of low-cost and practical biological optical imaging and diagnosis systems that would allow the user to image and resolve structure deep into biological tissue without the need for physical dissection. Since his commencement as a post-doctoral researcher, SP had been deeply involved in a number of life science based investigations at a couple of institutions. His first position was at the Institute of Photonics, at Strathclyde he was deeply involved in a number of optical imaging projects for dental and microscopy applications. This included the development of a system to detect and monitor dental caries, the integration of MEMS for laser scanning endoscopy and the use of adaptive optics to counteract for aberrations and improve signal and resolution in confocal, multiphoton and CARS microscopy. Since joining King's College at the start of 2010, SP has been involved in the development of optical instrumentation to address fundamental biological questions regarding the dynamic interaction of protein partners within the cellular environment. At the Advanced Functional Imaging group which he leads is focused on the development of FLIM based technologies to visualise the dynamic interaction of proteins within the cellular environment of complex 3D cell culture models, with the goal to further the understanding of cell signalling dynamics and control in cell migration and cancer progression. An author of over 50 publications and a H-index of 23, and co-recipient of 3 NHS Health innovation awards. SP also holds two patents in optical-based technologies for diagnostics and microscopy which are currently being commercialised.