

IEEE Photonics Society, NSW Joint Chapter

(with Circuits and Systems, Solid State Circuits, and Electron Devices)

IEEE Distinguished Lecturer: Winthrop Professor David Sampson



Title: "Photonics enables a microscope in a needle for imaging deep in tissues"

Date: Friday 11 July, 2014

Place: Charles Perkins Centre (Auditorium), University of Sydney, Camperdown

Time: 4:00pm for 4:30pm start

(Light refreshments will be provided)

Please RSVP with your name & affiliation to joe.mok.au@ieee.org for catering purposes

Abstract: Microscopy is usually performed in a laboratory on carefully prepared, very thin samples and achieves resolutions of better than a micrometre. Medical imaging, by contrast, is usually performed on sizeable portions of the living human body, and resolutions are rarely better than 1 millimetre.

Over the last decade, there has been great progress in applying optical microscopy techniques to the human body in a medical setting. This push has been led by optical coherence tomography (OCT), which is now in mainstream use in ophthalmology and is gaining acceptance in cardiology.

In this talk, 3D microscopic imaging deep inside tissue using the OCT microscope in a needle will be described. Needle delivery makes optical imaging possible in many tissues previously inaccessible to optics.

Aimed to be broadly accessible, this talk will describe the underpinning photonics and guided-wave optics design and fabrication needed to make high-quality micro-imaging possible. Technical advances such as realization of ultra-small needle probes, extended imaging depth of focus, handheld micrometre-resolution tracking, and multimodality needle probes combining OCT with fluorescence, and with elastography will be presented. It will describe how such probes are built into photonic systems and where they are being applied, such as in breast cancer surgery, as well as how the technology may evolve and where it may be applied in the future.

Biography: Winthrop Professor Sampson is Director of the Centre for Microscopy, Characterisation & Analysis, a core facility of the University of Western Australia, and heads the Optical+Biomedical Engineering Laboratory (OBEL) in the School of Electrical, Electronic & Computer Engineering. He directs the Western Australian nodes of the Australian Microscopy & Microanalysis Research Facility and Australia's National Imaging Facility. He is a Fellow of the OSA and the SPIE, and an Associate Editor of IEEE Photonics Journal, the IEEE Transactions of Biomedical Engineering and on the editorial boards of the Journal of Biomedical Optics and the journals Photonic Sensors and Photonics & Lasers in Medicine.

W /Prof. Sampson's research interests are in biomedical optical engineering, with an emphasis on photonics, imaging and microscopy. His current main interest, beyond advancing microscope-in-a-needle technology, is in optical elastography - the imaging of tissue mechanical properties. His other interests include anatomical optical coherence tomography for imaging in human airways, and holographic microscopy.

