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SRNML

Microscopy Laboratory

www.journalofmicroscopy.org
ISSN: 0022-2720

Volume 288 • Issue 2 • November 2022

Journal of Microscopy

Confocal Microscopy Today

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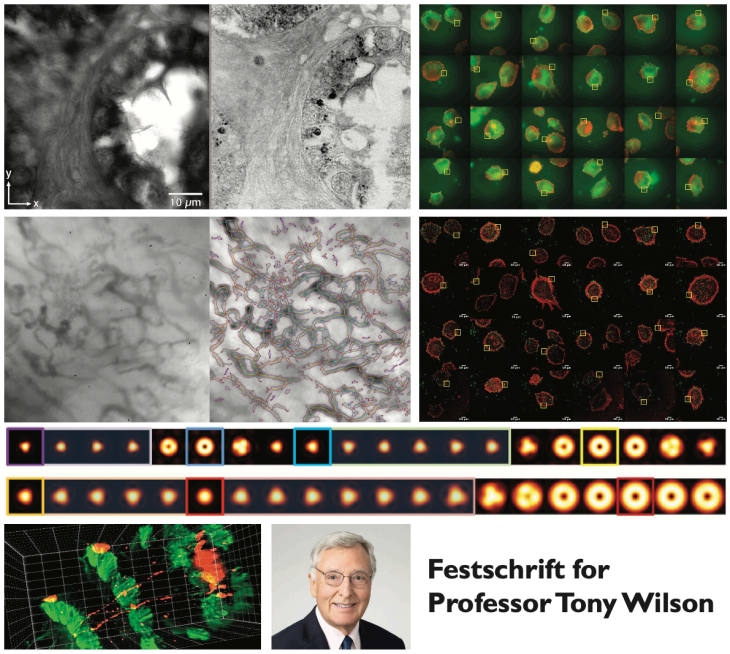

Festschrift for Professor Tony Wilson

WILEY

RMS Published for the Royal Microscopical Society by Wiley

Monday December 9th, 1pm
NML conference room

The most important property of the confocal microscope is probably its ability to record high resolution, high contrast, thin, in focus optical slices from within a thick specimen. In many cases, the increase in contrast is the important point. In other cases a through-focus series of such optical sections permit the specimen to be rendered din three dimensions. The original designs of such instruments used the point source – point detector optical system proposed by Marvin Minsky in the 1950s. This system provides the necessary optical sectioning but, in order to form an image, it is necessary both to introduce scanning and, because of the need to use point illumination and point detection, a bright light source such as a laser must be used. This was the only practical approach when confocal microscopy first came to prominence in the 1970s. The early systems, and many commercial implementations, were built around conventional microscopes. However, since these early days technological advances in areas such as high-quality CCD cameras, non laser light sources and inexpensive optical image processing has permitted alternative, 21st century, approaches to obtain optical sectioning to be developed. We will describe one such approach which uses a combination of structured illumination and structured detection to allow optical sectioning to be achieved at high speed without the need for laser illumination. We will show examples where the approach can either be combined with a conventional optical microscope or built as a stand-alone system