INNOVATION IN CONFOCAL INSTRUMENTATION

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Aspects of recent extensions and a preview of upcoming innovations of the Spectral Confocal Microscope Leica TCS SP5 are discussed.

1. CONFOCAL MATRIX SCREENING

Recent tendencies in Systems Biology require the acquisition of massive amounts of confocal data and images, in conjunction with automated detection of cell-specific features and rare events. An extension to the Leica TCS SP5 is described, which has been optimized for these tasks by flexible pattern screening with several autofocus modes.

2. WHITE LIGHT LASER

Combining several structure-specific labels in one specimen is common today. To cope with these demands, Confocal Microscopes are currently equipped with arrays of lasers and are a compromise in terms of the number of laser lines, the combination of laser lines, serviceability and size. Leica Microsystems will be introducing a White Light Laser with the TCS SP5 Confocal in 2007. It has the potential to replace all visible light lasers currently used by a single, powerful, reliable solid state source. Aspects of technology challenges and applications will be discussed.

3. STED SUPERRESOLUTION MICROSCOPY

Stimulated Emission Depletion Microscopy (STED) approaches molecular resolution, and offers breakthrough potentials for almost all aspects of bio-medical research. Leica Microsystems has developed a commercial STED system to be introduced in 2007. Special attention has been paid to develop a user-friendly system with long term stability. This is supported by a miniaturized STED coupling and beam shaping module with automatic alignment of excitation and depletion beams. Practical applications and specimen requirements, as well as specifications of the STED system will be outlined.