



PRESS RELEASE

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Onefive signs agreement with Leica Microsystems as exclusive supplier for the pulsed STED depletion laser at 775 nm.

Zürich, Switzerland – Onefive GmbH and Leica Microsystems have signed an exclusive agreement on a pulsed STED depletion laser at 775 nm, which will allow Leica STED super-resolution microscope to achieve sub-30 nm resolution in a simple and cost-effective manner. Under the terms of the agreement, Onefive GmbH will be the exclusive supplier of the STED depletion laser – the [Katana-08 HP](#). Onefive will also provide Leica with dual-color single-box excitation lasers.

Onefive's picosecond laser platform Katana-08 HP, which has been available in the market since 2010 has been further streamlined to STED applications to deliver 600 ps pulses to enhance the performance of the Leica's super-resolution microscope system [TCS SP8 STED 3X](#) (STED 3X). Operating as STED beam at 775 nm in pulsed regime, the Katana-08 HP allows to achieve sub-30 nm resolution and can reveal details in multicolor co-localization that have not been visible before [1].

Far-field fluorescence microscopy is a very successful and popular imaging technique because, among other benefits, it is live-cell compatible. Its spatial resolution is however limited to a few hundreds of nanometers by the diffraction-limited nature of light. The innovative STED (STimulated Emission Depletion) microscopy technique overcomes this limitation and achieves nano-scale imaging resolution [2-5]. The impact of this achievement keeps being recognised both at a technological as well as at a scientific level. Dr. Stefan W. Hell of the Max Planck Institute for Biophysical Chemistry will be awarded this year the prestigious Klavi price for his efforts on the development of this technology.

STED microscopy is based on the ability to control the fluorescence emission of the markers in time and space by the superposition of a red-shifted STED laser beam to the excitation beam. The STED beam features a doughnut spatial intensity distribution with a zero-intensity region in the middle. This superimposed beam stimulates an earlier emission of the excited markers. Fluorescence can be practically quenched in regions near the focal point except in the zero-intensity region of the superimposed beam. Because this region can be smaller than the diffraction-limited spot size, the effective spatial extent of the detected spontaneous fluorescence is reduced to sub-diffraction dimensions.

The choice of Katana-08 pulsed laser as the STED beam instead of a CW beam allows achieving the depletion effect almost instantaneously to excitation, leading to a better spatial confinement of the fluorescence, hence a better on-off switching contrast. The pulsed stimulation reduces the blurring effect typical of CW stimulated emission and leads to a better imaging resolution. It has been demonstrated that the performance of the pulsed-depletion modality offers better performance if the pulses are a few hundred ps long [3,6].

The picosecond Katana platform offers the versatility of continuously tuning the pulse repetition rate, from pulse on demand up to 120 MHz. Pulse duration can range from sub 20 ps up to 1 ns. Various wavelengths ranging from the near infrared, the visible to the UV are available. Onefive lasers are designed and qualified for 24/7 operation under harsh environments. A focused product development approach provides a dust-sealed, maintenance-free small footprint product with reliable turn-key operation at a competitive price throughout the complete product fleet.

References:

- [1] [Coaligned Dual-Channel STED Nanoscopy and Molecular Diffusion Analysis at 20 nm Resolution](#), Biophys J., Vol. 105, L01-L03, 2013
- [2] [Selected papers on STED super-resolution microscopy](#) – by Leica Microsystems
- [3] [The Leica STED microscope TCS SP8 STED 3X](#) – by Leica Microsystems
- [4] [Super-resolution imaging: beyond the realm of fluorescence](#) – Nature Photonics 7, 426-428
- [5] [A guide to super-resolution fluorescence microscopy](#) – J. Cell Bio. Vol. 190, No. 2, 165-175, 2010
- [6] [Photostability of a fluorescence marker under pulsed excited-state depletion through stimulated emission](#), Applied Optics, Vol. 42, 5123-5129, 2003

About Onefive GmbH:

Founded in 2005, Onefive GmbH is dedicated to innovation of the emerging OEM ultrafast laser market by introducing a novel generation of advanced laser modules. The lasers rely on a unique packaging technology allowing for combination of compactness, stability, efficiency and a high ease of use. The areas of application range from medical and biological applications, environmental to homeland security applications, sensing, material processing and R&D. Onefive is strongly committed to bringing ultrafast laser technology solutions with industrial-grade performance and reliability.



Fig.1: The Onefive Katana - 08 HP laser installed in the Leica TCS SP8 STED 3X laser rack

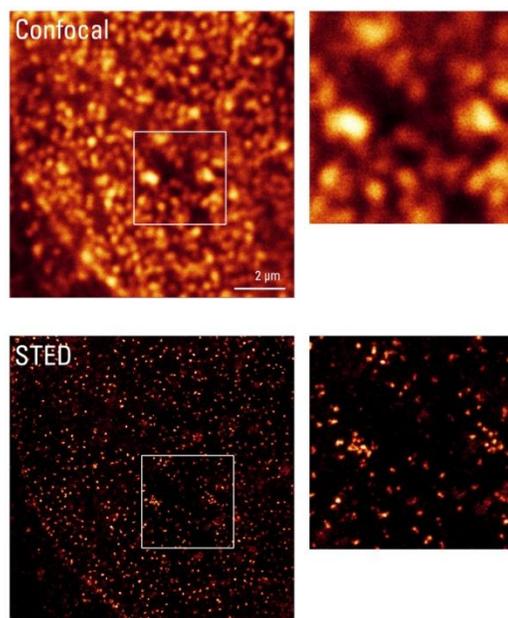


Fig.2: Resolution enhancement achieved with Leica TCS SP8 STED 3X and the 775 nm Katana-08 HP pulsed laser, compared to the resolution achieved with confocal microscopy.

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