

Multimodal Multiphoton Tomograph

JenLab will launch its femtosecond fiber laser-based two-photon imaging device *MPTcompact* during *MEDICA* in Düsseldorf in November 2023 and *Photonics West* in San Francisco in January 2024. The primary application is non-invasive *in vivo* skin imaging to provide optical biopsies with submicron spatial resolution and picosecond temporal resolution.

The laser device was tested in a multicenter clinical study in Germany on 100 patients suffering from black skin cancer and at the *Massachusetts General Hospital* in Boston for MPT-guided surgery. Furthermore, the *MPTcompact* was tested in the cosmetic industry in Japan to study anti-aging effects.

The tomograph employs an ultracompact 50/80 MHz fiber laser at 780 nm that is positioned inside the 360° imaging head. The near-infrared laser pulses are used for (i) two-photon autofluorescence imaging of coenzymes, melanin, elastin, and keratin, (ii) fluorescence lifetime imaging (FLIM) based on time-correlated single photon counting (TCSPC) to perform optical metabolic imaging (OMI), (iii) second harmonic imaging (SHG) of the collagen network, and (iv) confocal reflection microscopy (CRM). Furthermore, white LED imaging provides surface images for dermoscopy purposes and navigation.

The multiphoton tomograph is powered by batteries and can be charged by sunlight. The weight is reduced by 50% and the energy consumption by 75% compared with the present clinical multiphoton imaging devices *DermaInspect* and *MPTflex*.



In vivo multimodal multiphoton tomography of the skin with the “green” air-cooled femtosecond fiber laser system MPTcompact of the company JenLab GmbH.