

# **ULTRA-THIN FLUOROCARBON CUVETTES FOR IMAGING OF NATIVE AND OPTICALLY CLEARED TISSUES WITH LIGHT SHEET FLUORESCENCE MICROSCOPY**

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Light sheet fluorescence microscopy (LSFM) is the technology of choice for imaging large organs and three-dimensional cell cultures. LSFM imaging often requires embedding of the specimen in agarose-gel slabs. This is problematic for delicate specimens such as organoids, and is often not compatible with optical clearing techniques. Moreover, retrieving the specimens from the agarose gel for further analysis can be challenging. In order to solve these issues, we developed fluorocarbon (fluoroethylene propylene, FEP) cuvettes as specimen holders for LSFM. The cuvettes are easily fabricated with laboratory-scale technologies. We tested the imaging performance of rapid-prototyped FEP-cuvettes in a digitally scanned light sheet microscope (DSLMS). We demonstrate excellent image quality of the FEP cuvettes on whole organs, thick tissue sections and dense organoid clusters. The FEP foils outperform established sample mounting techniques in terms of full separation of the specimen from the immersion medium in the LSFM chamber, accommodation of a broad specimen size range, quick specimen mounting without hydrogel embedding, compatibility with aqueous and organic clearing media, as well as applicability in multi-view imaging and automated nuclei segmentation.