

# An open source structured illumination microscopy extension for general fluorescence microscope body

22.09.2023  
Haoran Wang  
Leibniz-IPHT  
Jena, Germany

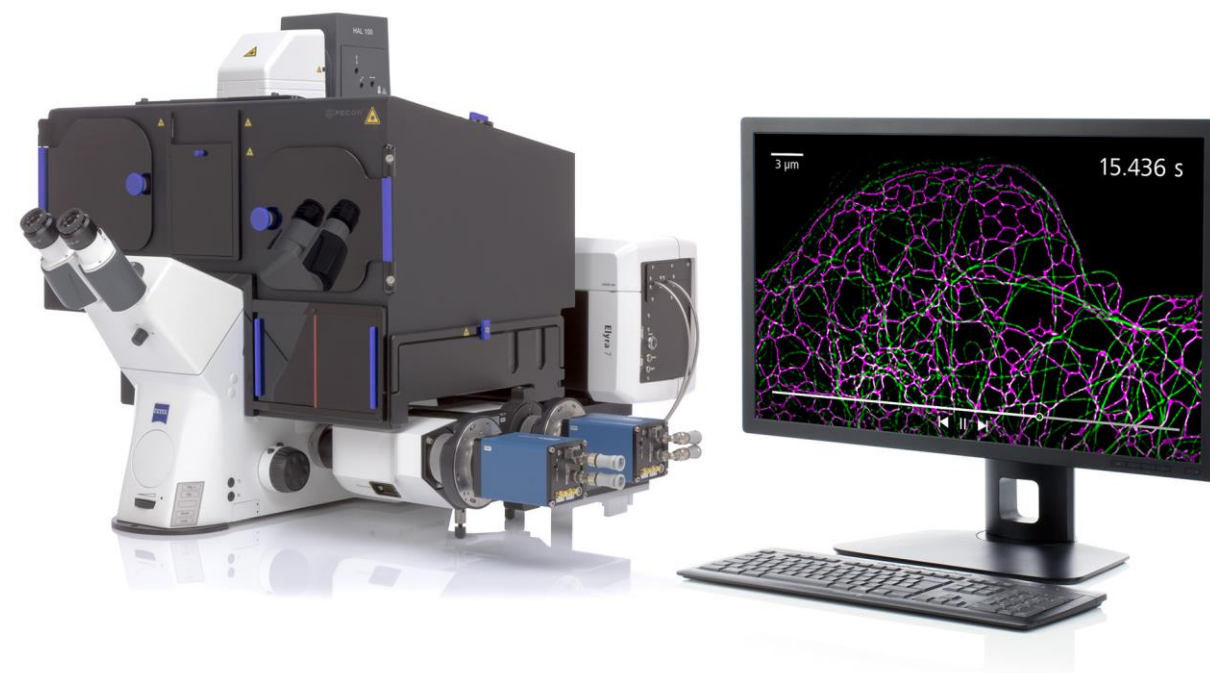
# Motivation

What we have



Widefield fluorescence microscope

What we want



Superresolution fluorescence microscope

# Motivation

What we have



Widefield fluorescence microscope

What we want



High-resolution fluorescence microscope

# Setup design



PCO.Edge42

+ SIM +



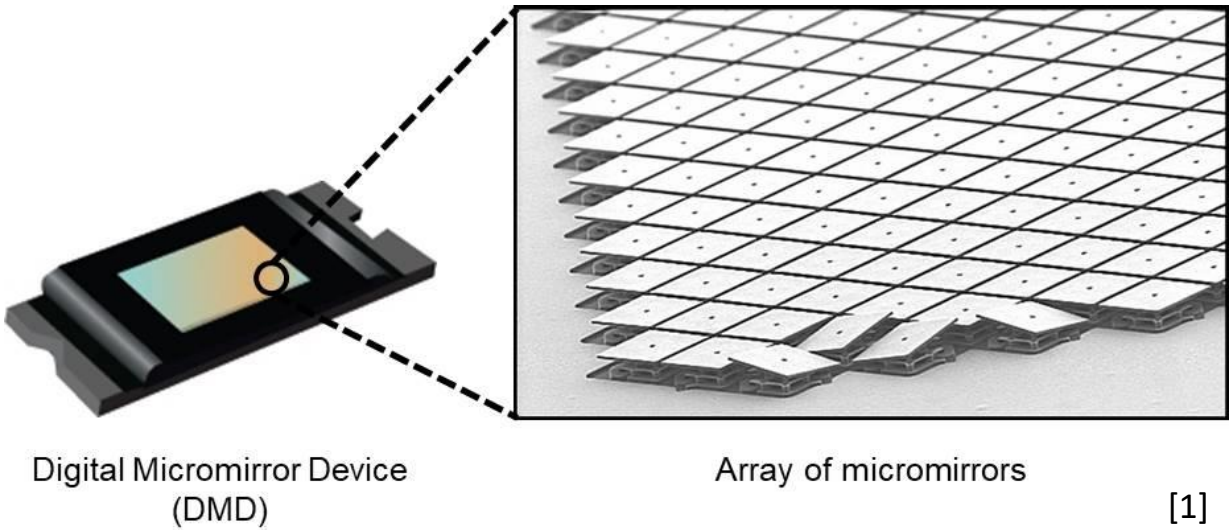
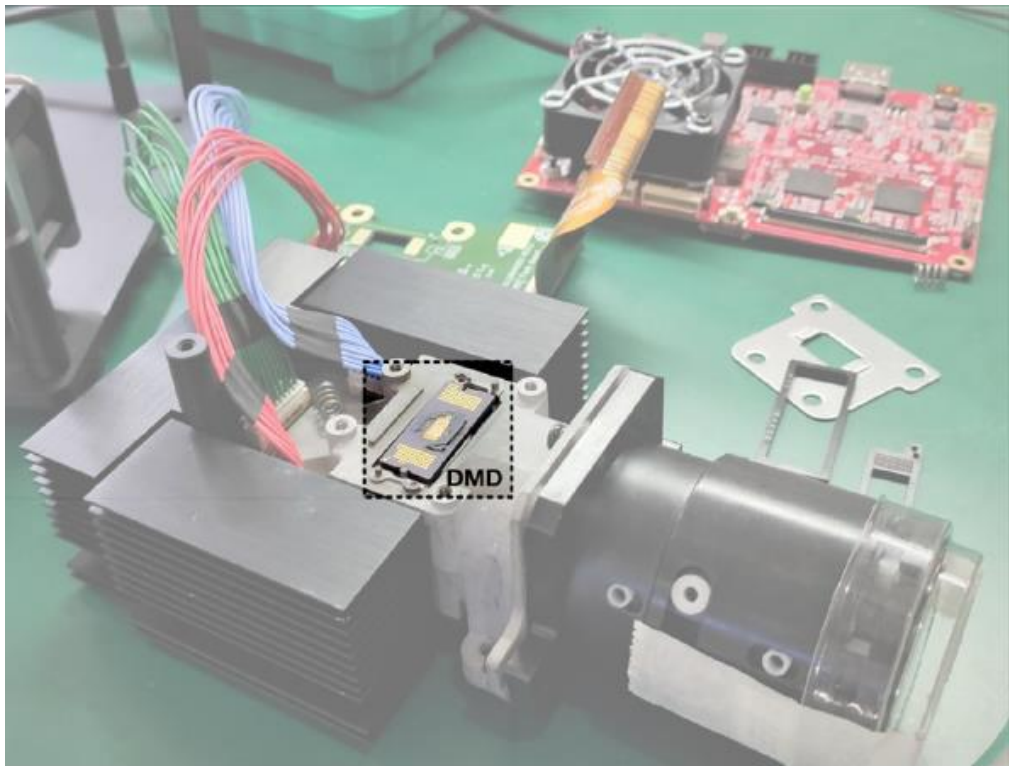
NIKON Ti2A



# Spatial light modulator



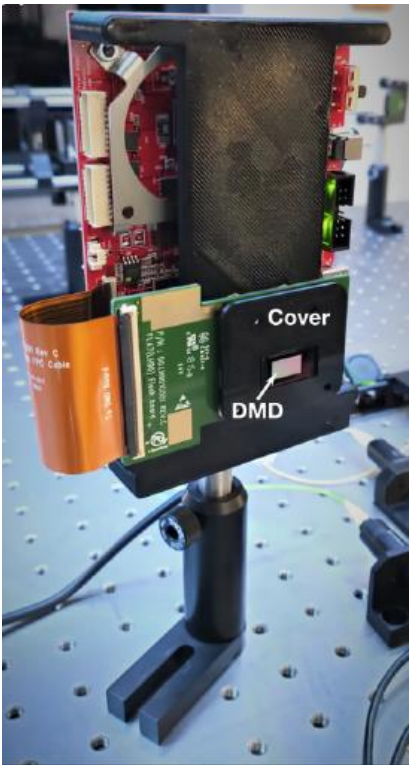
DLP4710EVM-G2



Digital Micromirror Device (DMD)

Array of micromirrors

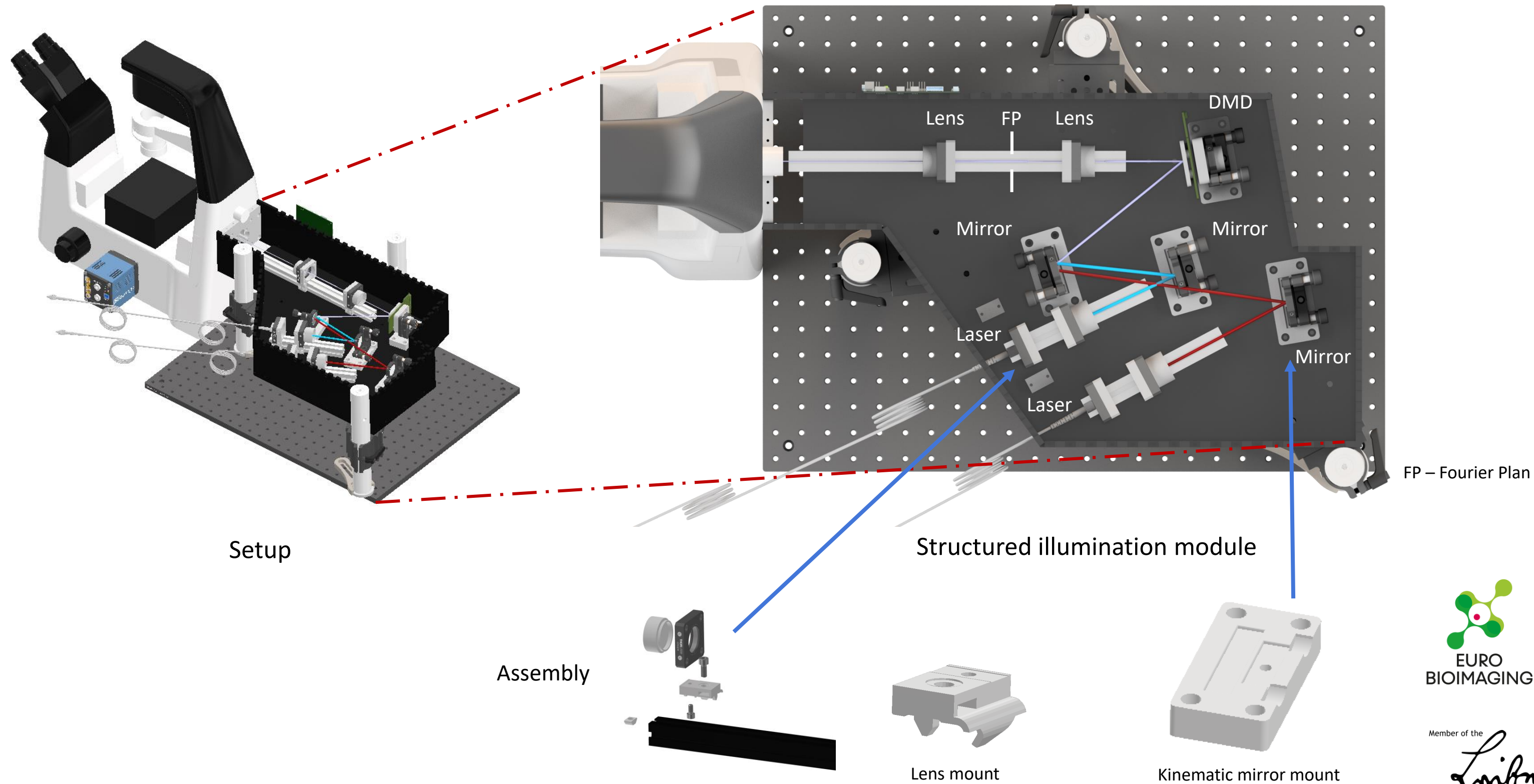
[1]



[2]

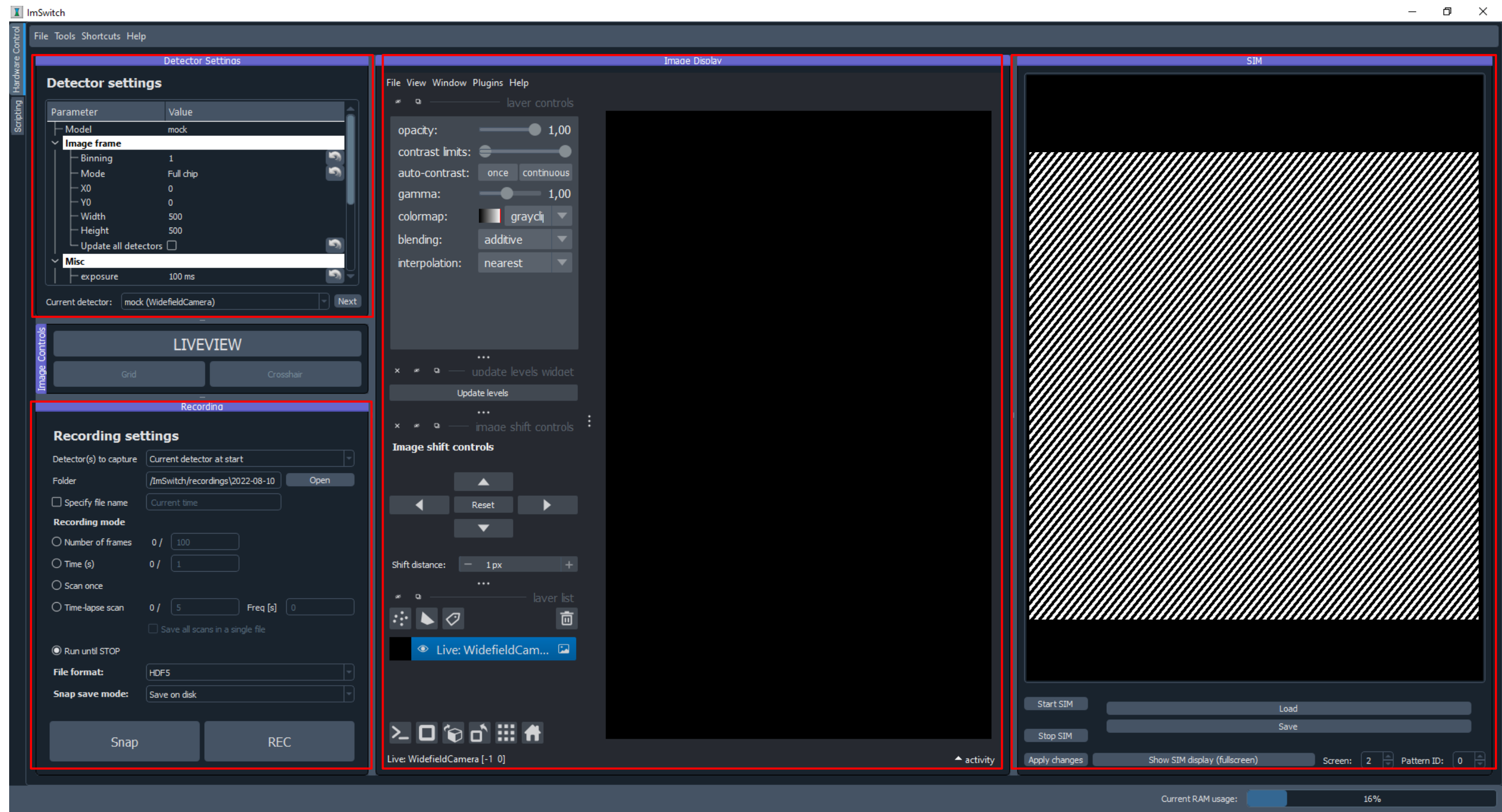
[1] <https://ibsen.com/technology/spectrometer-tutorial/dmd-spectrometers/>  
[2] Mitchell A. Cox and Alice V. Drozdov, "Converting a Texas Instruments DLP4710 DLP evaluation module into a spatial light modulator," Appl. Opt. 60, 465-469 (2021)

# Setup details





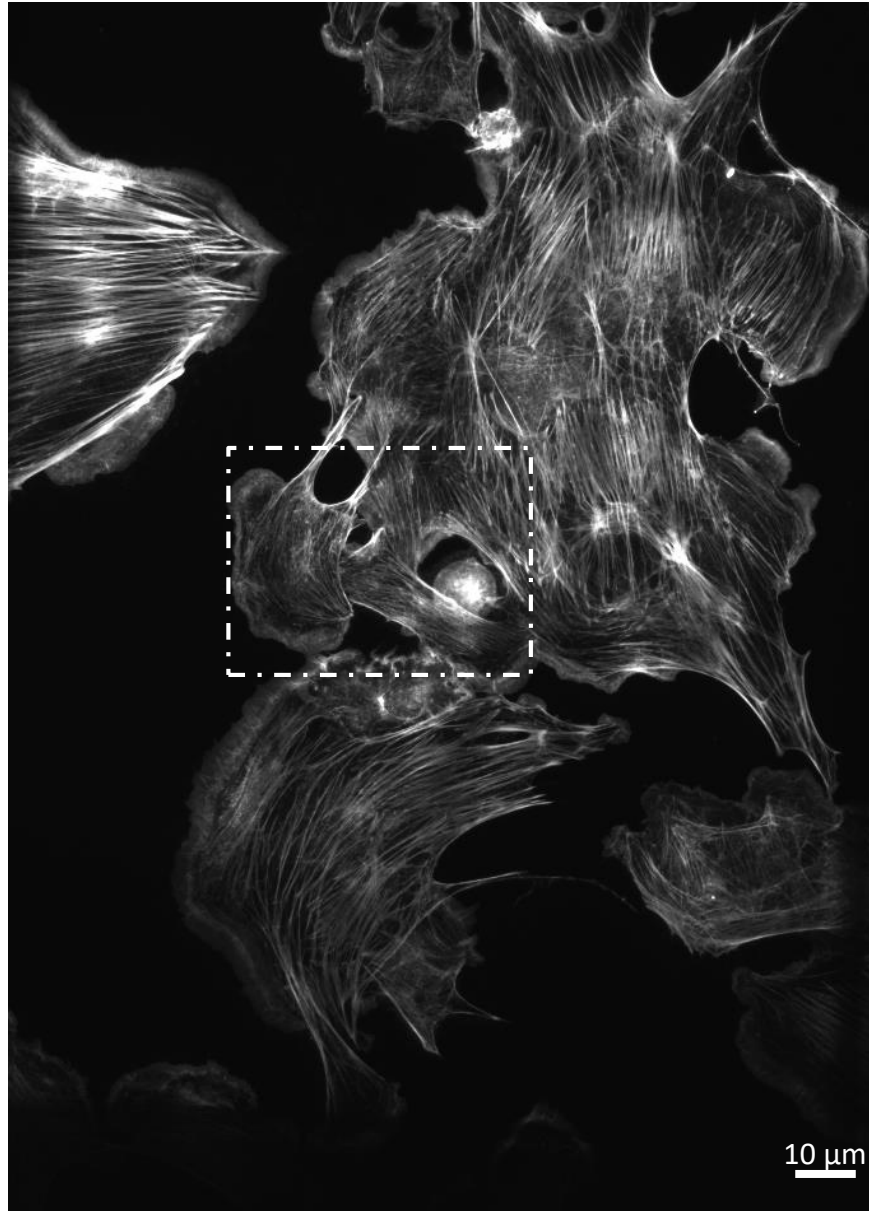
# Control interface



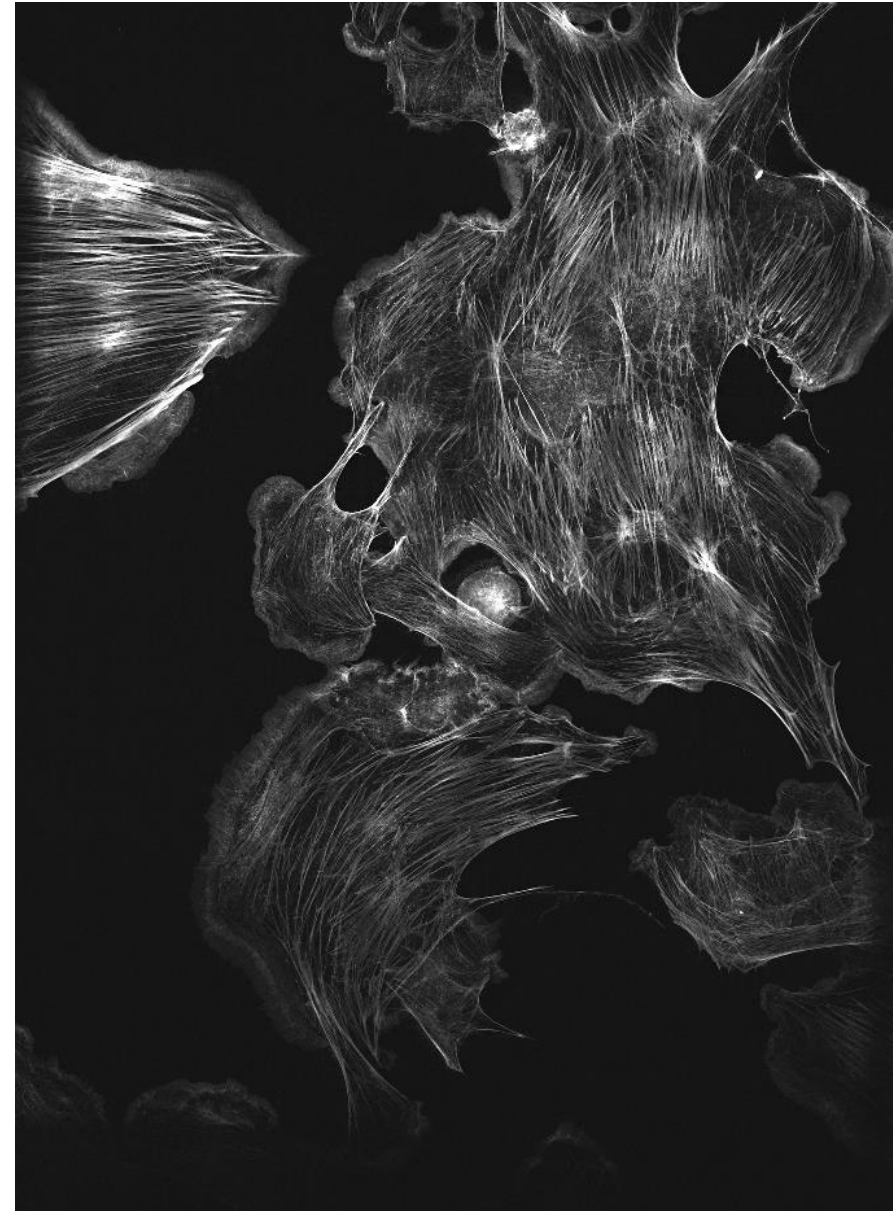


# Imaging results

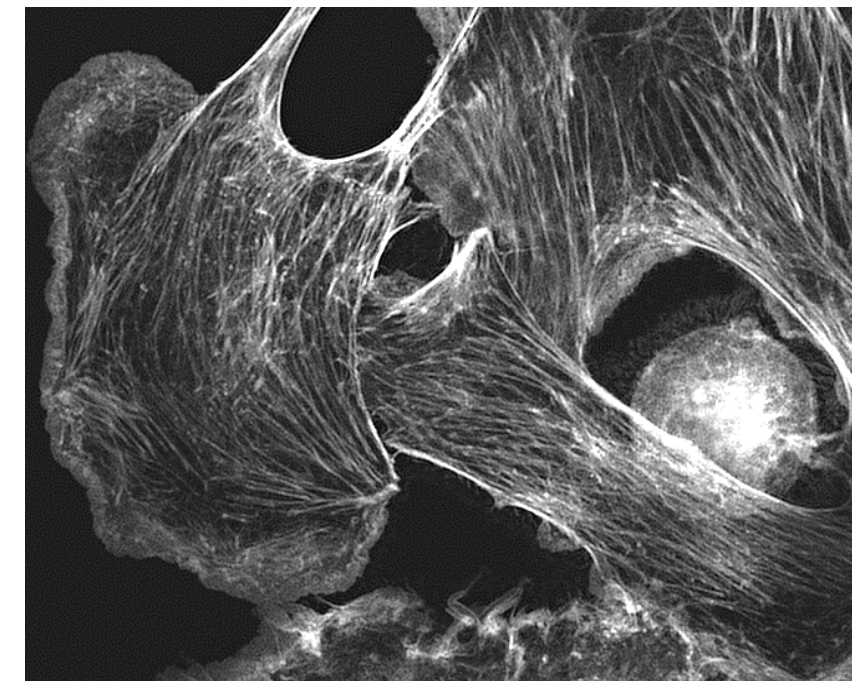
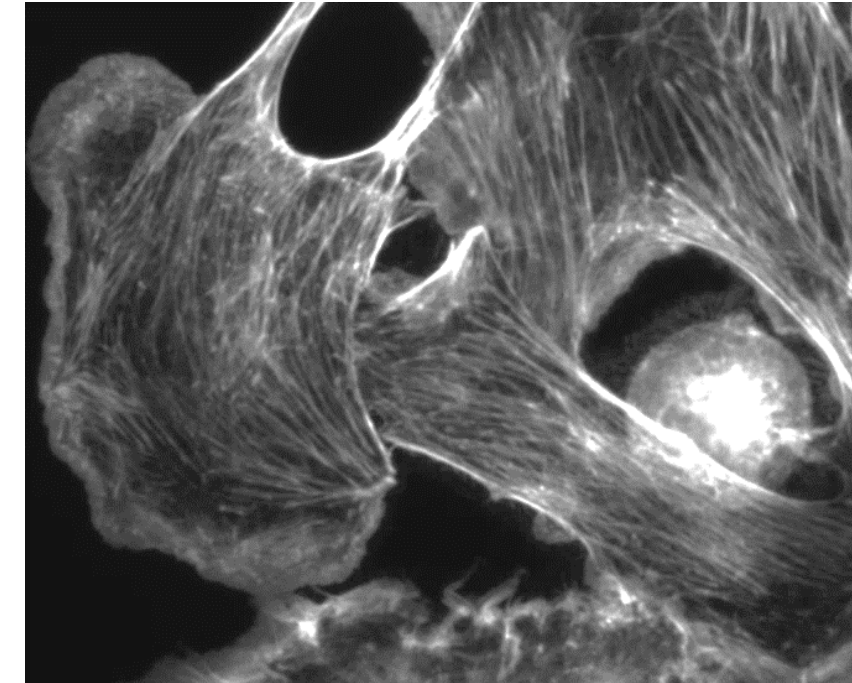
Nikon 20x/0.75



Brightfield

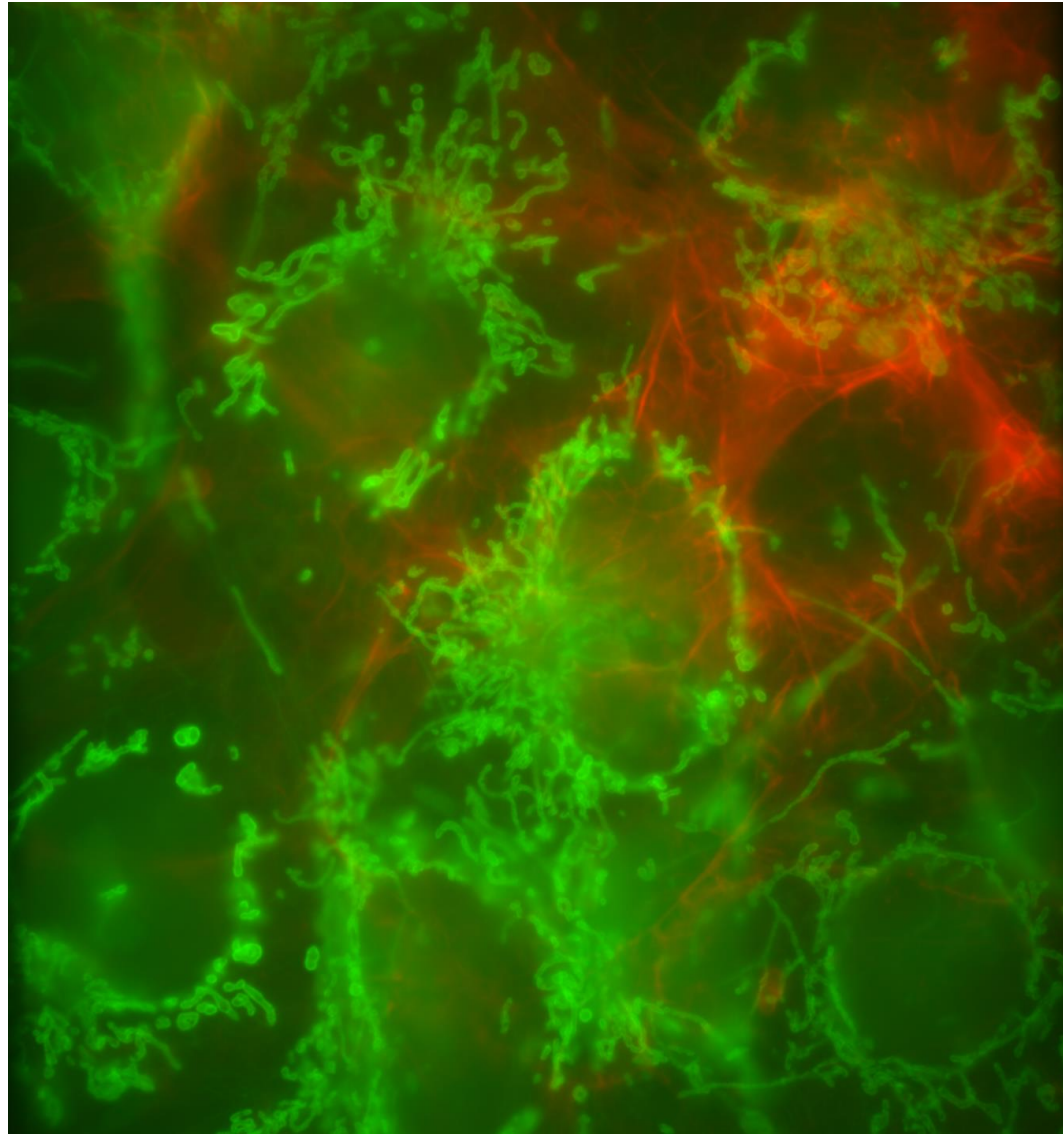


Reconstruction

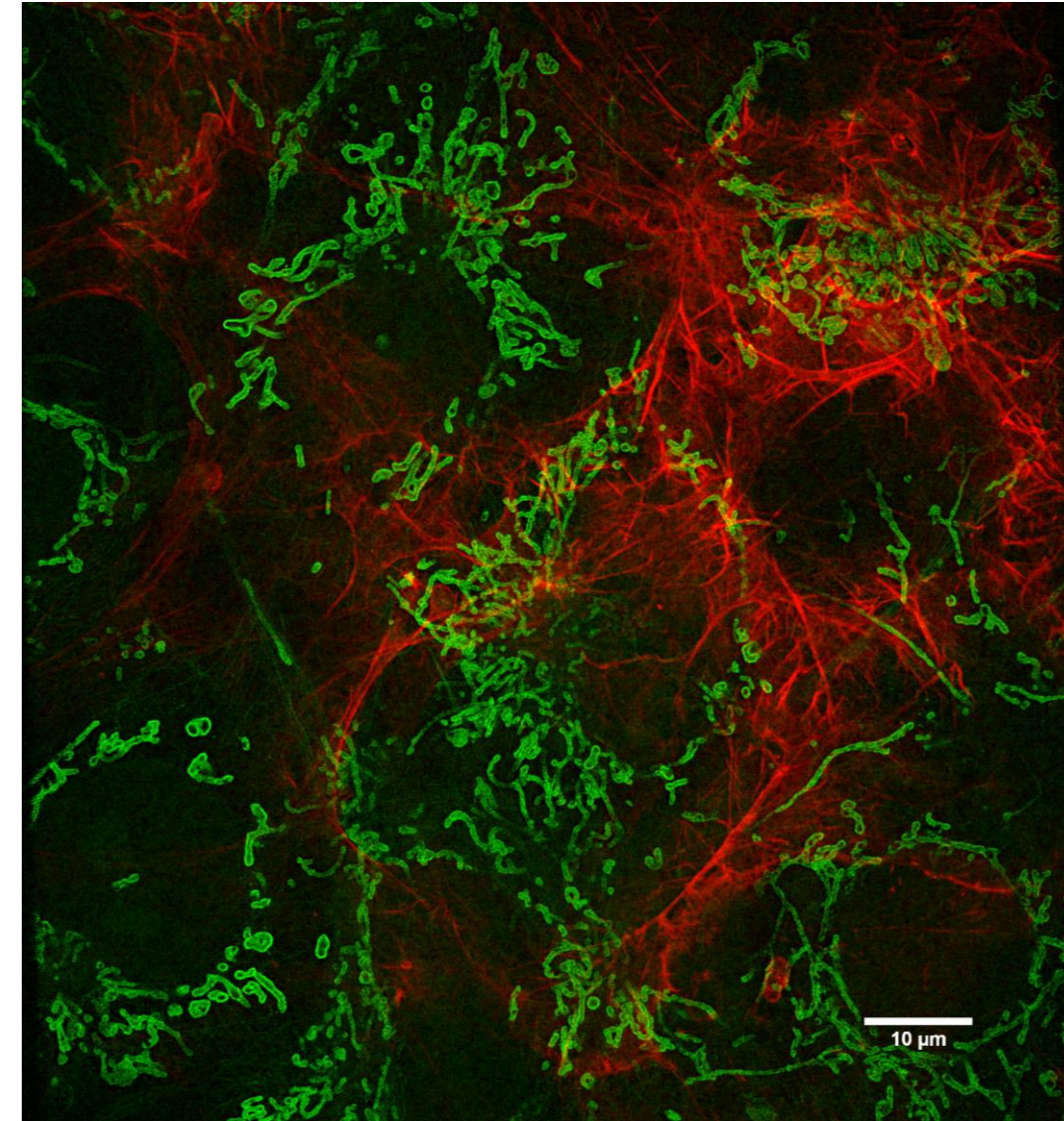




# Dual-color imaging



Widefield



Reconstruction

60X / NA 1.4

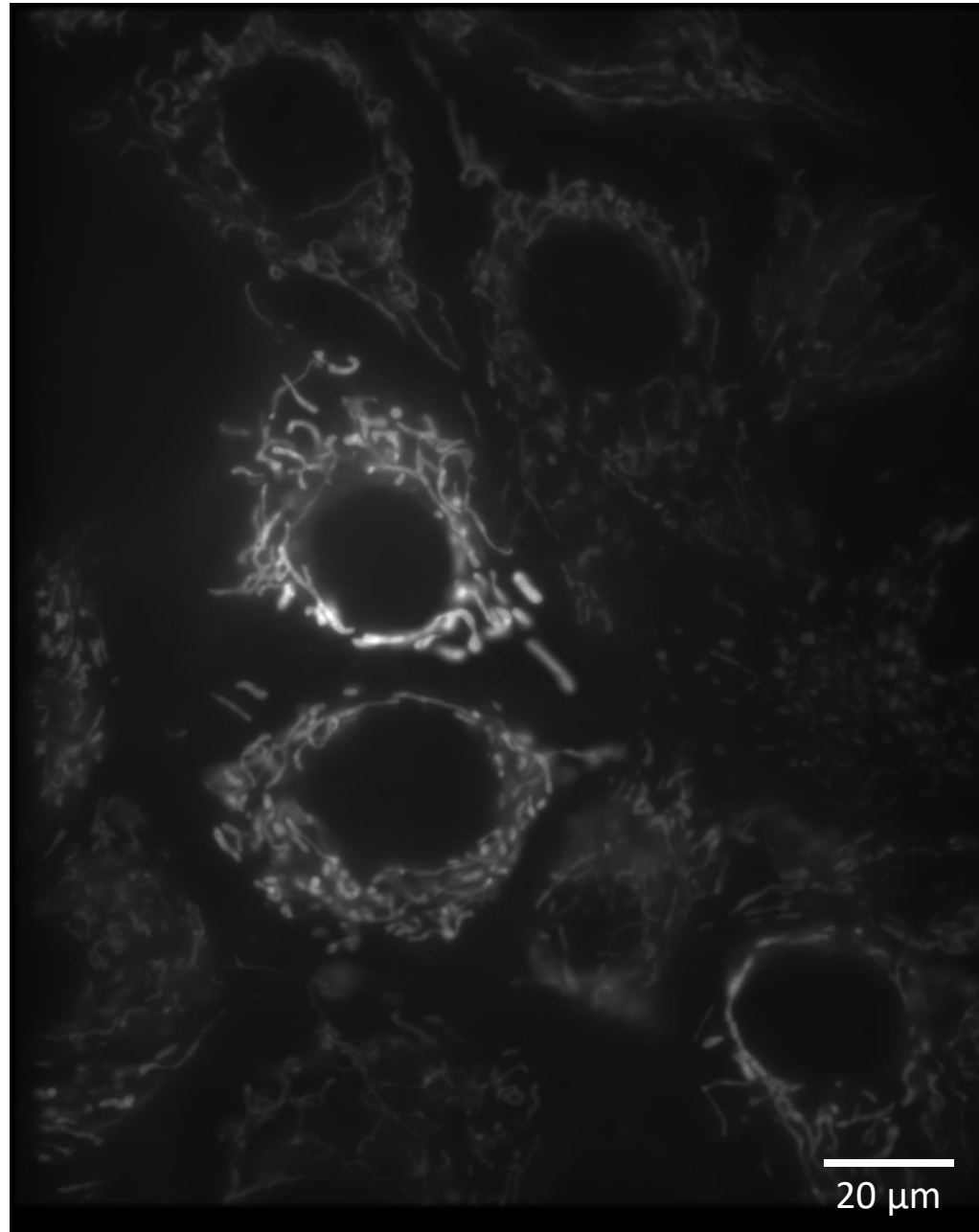
Green: AF488 - Mitochondria

Red: SiR - Actin

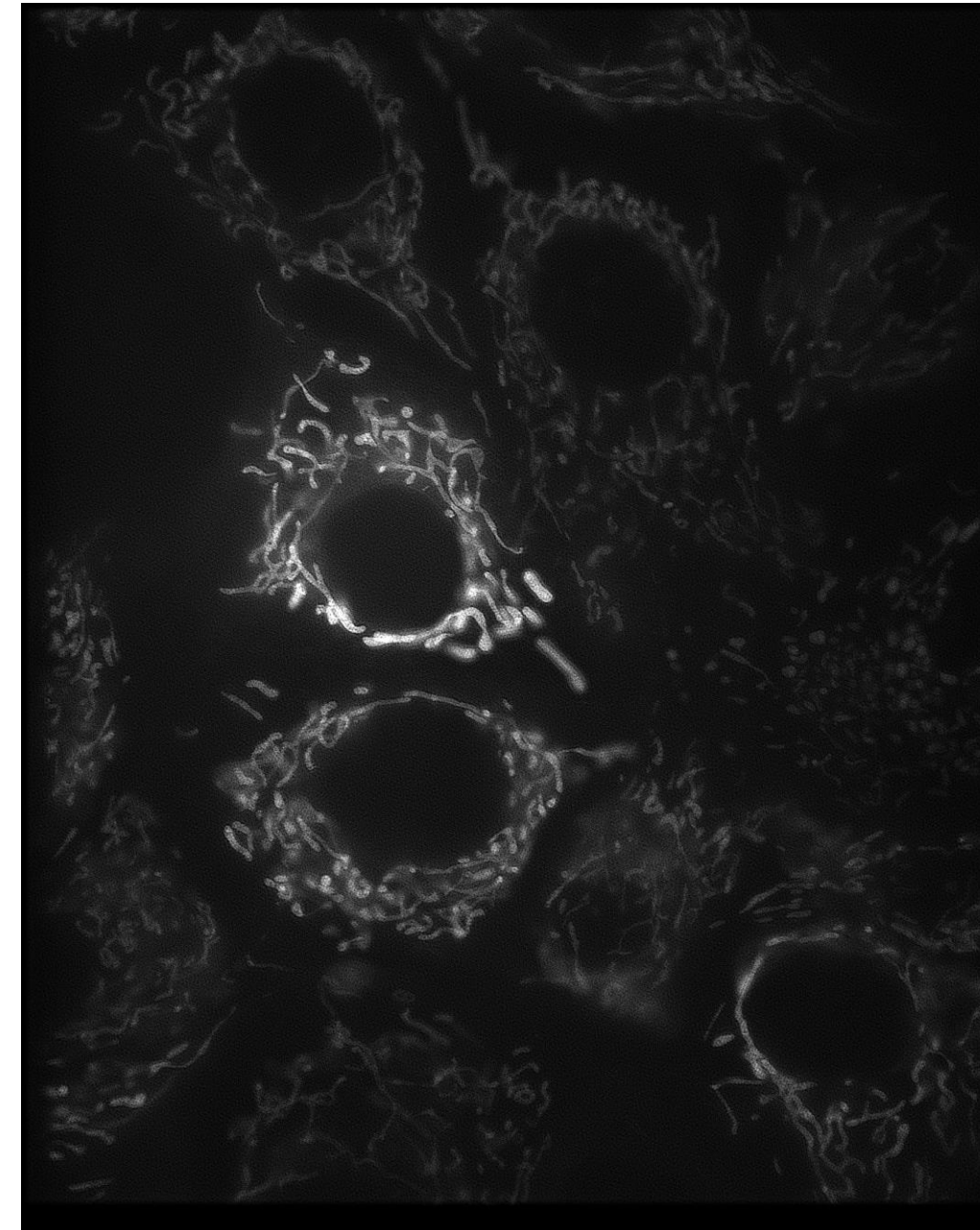
Enhancement 1.75x



# Timelapse Imaging



Widefield

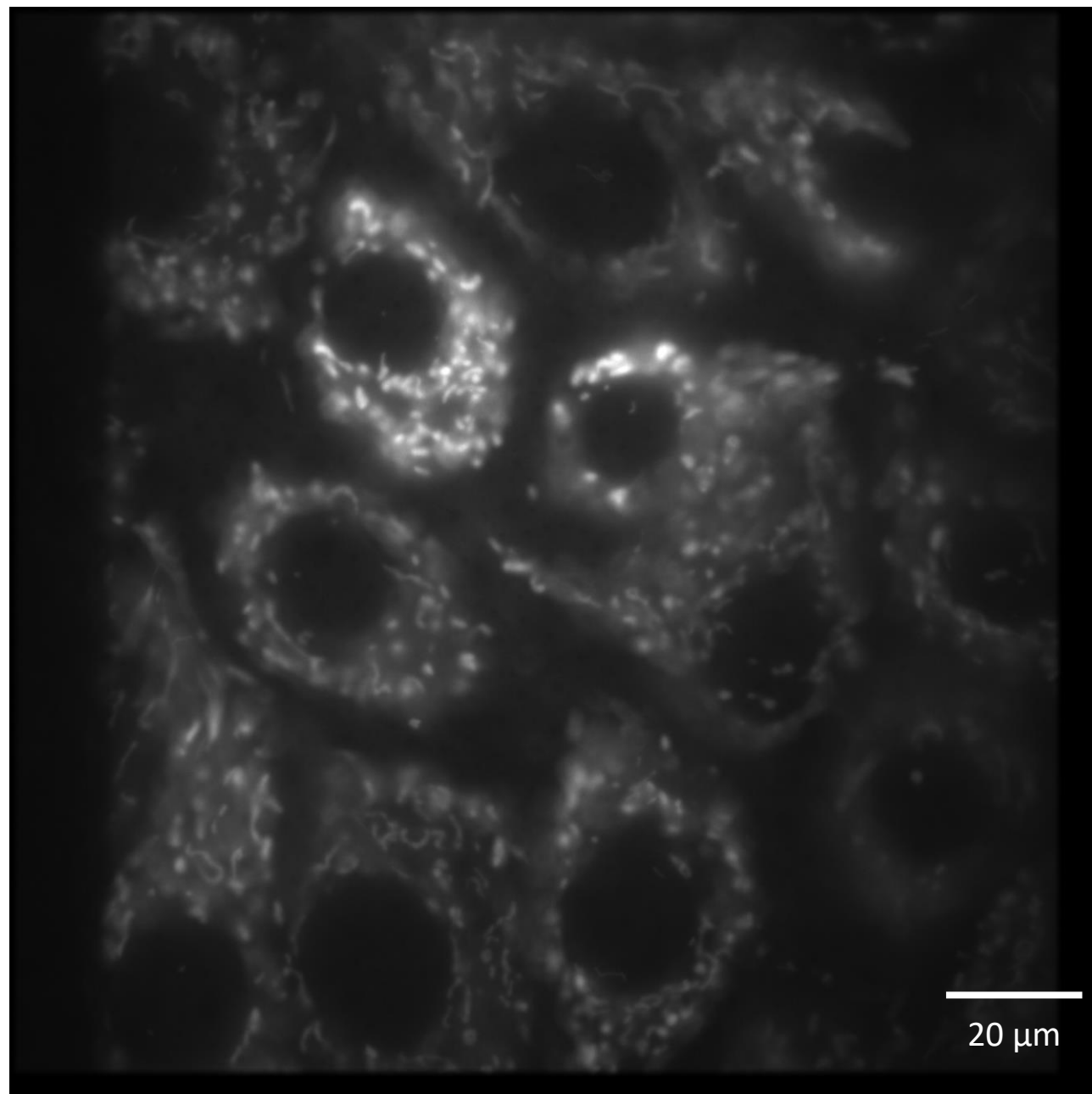


Reconstruction

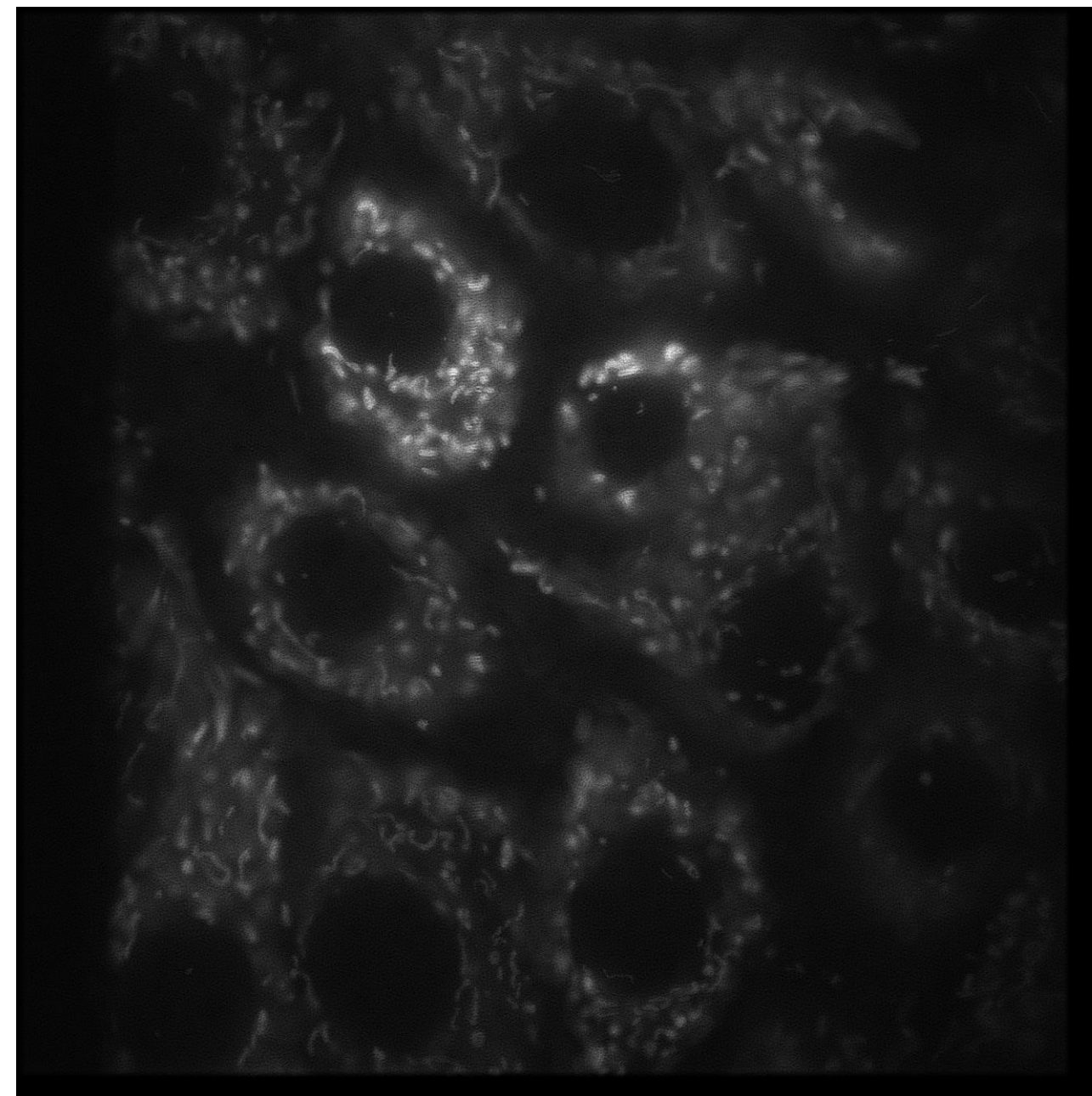
Ex: 488nm  
HeLa MitoTracker Green  
Time interval: 2 min  
Total duration: 2.5 hours



# Z-axis sectioning



Widefield

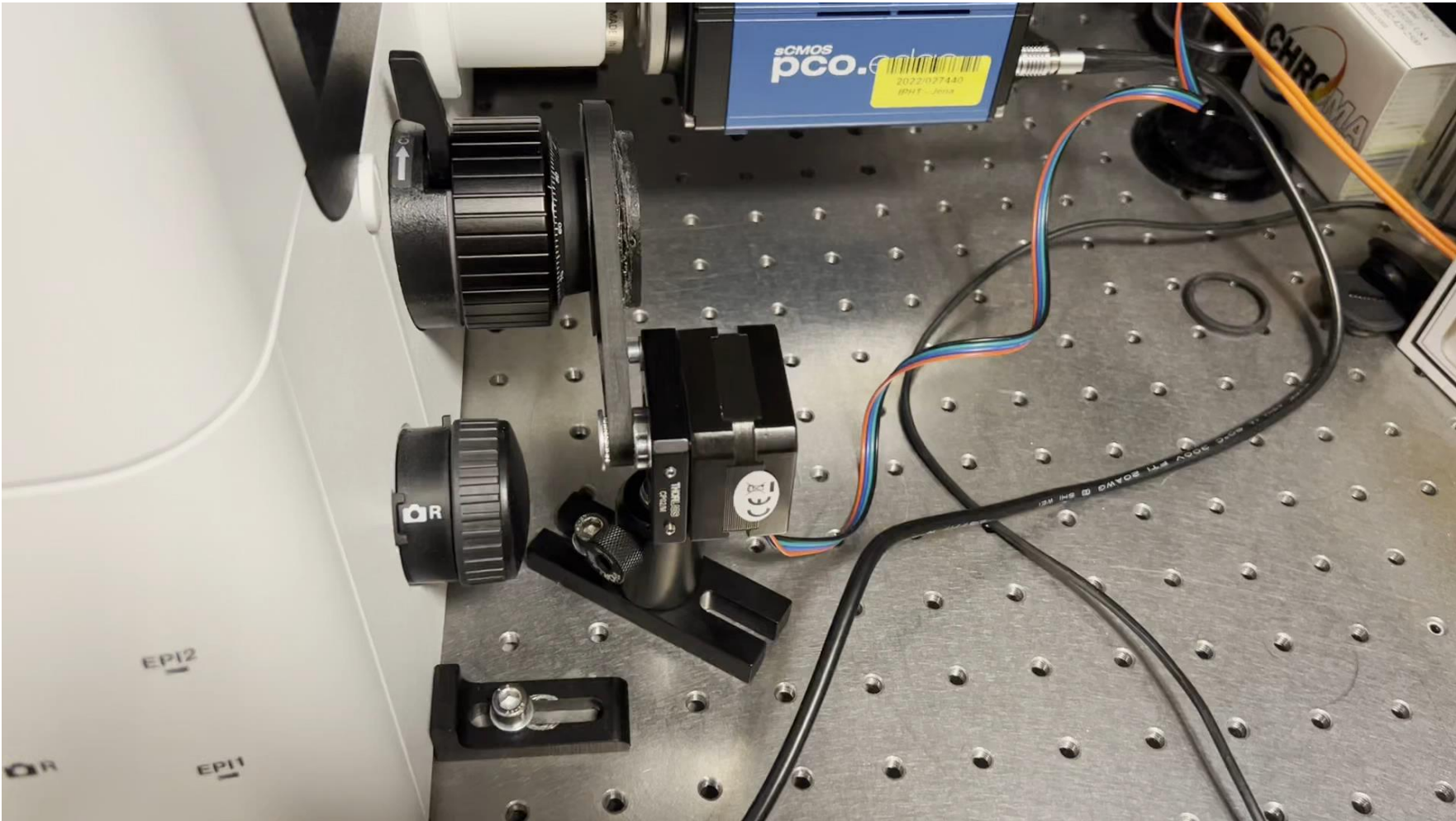


Reconstruction

Ex: 488nm  
HeLa MitoTracker Green  
Time interval: 2 min  
Total duration: 2.5 hours



# Accessory parts



Motorized Z focus



Benchtop incubator





# Thank you

Project repository:  
<https://github.com/openSIMMO/openSIMMO> (coming soon)

