

500nm resolution, 2K pixels, 30fps by 300g hand-held NIR/VIS imager

Satoshi Nishimura

Center for Molecular Medicine, Jichi Medical University, Tochigi, JAPAN

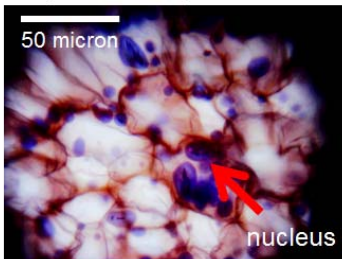
E-mail : snishi-tky@umin.ac.jp

KEY WORDS : multi-scale, minimized microscope,

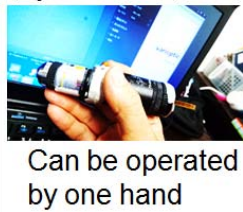
We developed hand-held imaging device which can cover small to large sample, and visible to infrared wave length by one lens. New patenting optical path enabled us to capture both in high-magnification and broad-field imaging mode, using identical lens, focusing, and sensors. We changed image-formation modes by liquid lens, placed just behind microscope objective lens, to change magnification, and focusing. Theoretical spatial resolution is similar to that of conventional microscope (500nm), but system can be minimized to hand-held size, which weighs less than 300g.

Broad-scale hand-held IR/VIS imager

Captured image



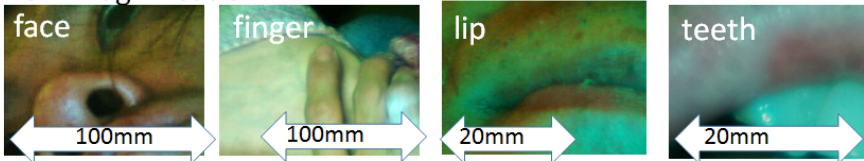
System view



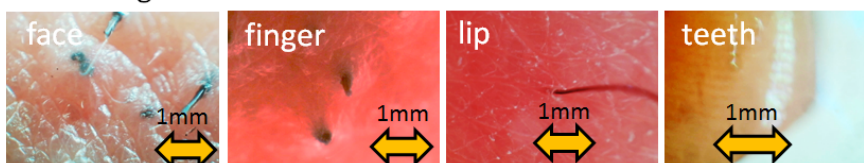
One of potent clinical application is for replacement of “dermatoscope”. In dermatology, medical doctors use this device for recording of skin surface lesions, and making pathological diagnosis based on micro-level visualization. However, current available dermatoscope cannot fully provide single cell level information, and imaging is limited to surface area. Our device provides multiple image formation modes by same light path, to cover broad imaging scale from micro (sub-micron) and macro (scales). Reflectance wide-field imaging with visible 3color-LED provide fine surface information, and deep layer structure can be also visualized based on transparency and absorbance by 940nm LED illumination.

Body surface captured by hand-held IR/VIS imager

Low magnification



HIGH magnification



Another application is image capture in ophthalmology department. Using our device, front orbital are clearly visualized by one-hand, and enables us to evaluate damaged or inflammatory conditions in eye. Hand-held size has

clear advantage for handling, and also reducing patients' frustrations.

In sum, we designed new optical path, minimized imaging device, and made new hand-held diagnosis device. Imaging system can provide not only micro level information, but also macro organ structures and functions. Clinical application is broad and trial is now ongoing.