Real-time processing for full range FD-OCT using a low cost GPU

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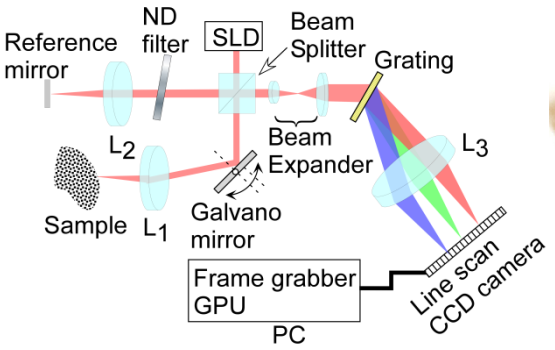
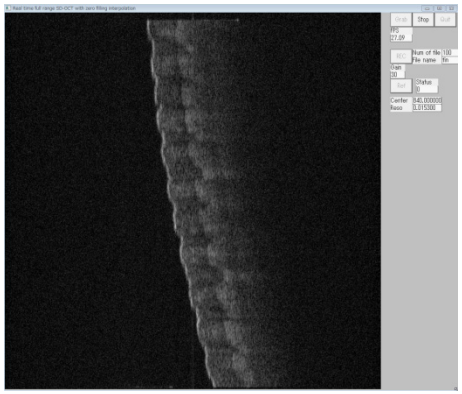
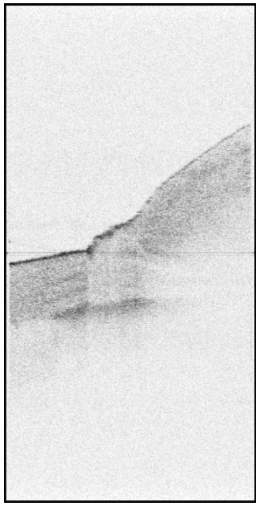


Schematic of FD-OCT

GPU



Captured graphical user interface in measuring a finger pad



full range OCT image of a human-nail-fold region. Imaging range : 5.0 × 6.78 mm^2 (lateral × axial).

Content:

Real-time display of full-range, 2048 axial pixel × 1024 lateral pixel, Fourier-domain optical-coherence tomography (FD-OCT) images is demonstrated. The required speed was achieved by using dual graphic processing units (GPUs) with many stream processors to realize highly parallel processing. We used a zero-filling technique, including a forward Fourier transform, a zero padding to increase the axial data array size to 8192, an inverse-Fourier transform back to the spectral domain, a linear interpolation from wavelength to wave number, a lateral Hilbert transform to obtain the complex spectrum, a Fourier transform to obtain the axial profiles, and a log scaling. The data transfer time of the frame grabber was 15.73 ms and the processing time, which includes the data transfer between the GPU memory and the host computer, was 14.75 ms, for a total time shorter than the 36.70 ms frame interval time using a line scan CCD camera operated at 27.9 kHz. That is, our OCT system achieved a processed-image display rate of 27.23 frames per second.

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