

Imaging Depth-Resolved Tissue Birefringence With a Single Detector

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We report a novel frequency multiplexed optical coherence tomography (FM-OCT) system that is capable of measuring depth-resolved tissue birefringence from a single record of a single detector. The FM-OCT system utilizes polarization-maintaining-fiber based components. The orthogonal channels of the polarization-maintaining-fiber and the cross-terms are frequency

multiplexed. After recording the interference signal, a set of digital band-pass filters extract the polarization information. A rapid scanning optical delay line in the reference arm compensates for dispersion and allows a real-time display of tissue birefringence. The axial resolution provided by a superluminescent diode working at 855 nm with 28 nm bandwidth is 12 μm . The accuracy and sensitivity measurements suggest that the FM-OCT system is suitable for depth-resolved birefringence characterization of biological tissue.