

Optical Coherence Refraction Tomography (OCRT)

Value Proposition

Spectroscopic optical coherence tomography (SOCT) is a functional extension of OCT that obtains depth-resolved, wavelength-dependent backscattering profiles. However, because SOCT uses time-frequency analysis of OCT interferograms, it suffers from a tradeoff between axial and spectral resolution. Therefore, there is a need for a technique wherein the axial resolution, determined by the wavelength and the numerical aperture (NA) of the objective is not compromised.

Technology

A new Duke technology, spectroscopic optical coherence refraction tomography (SOCRT), a technique analogous to computed tomography that uses B-scans acquired from a diversity of angles to reconstruct a spectroscopic image with isotropic spatial resolution limited by the lateral resolution of OCT. It has been shown experimentally that SOCRT can differentiate differently sized scatterers at simultaneously high spectral and high isotropic spatial resolution.

Advantages

- Does not rely on the diffraction-limited width, but rather on the axial resolution of OCT, which can be independently tuned.
- Does not require phase stability.
- Speckle reduction due to angular compounding of independent speckle patterns.

Publications

- [Zhou, K. C., Qian, R., Degan, S., Farsiu, S. & Izatt, J. A. Optical coherence refraction tomography. Nat. Photonics 1-9 \(2019\). doi:10.1038/s41566-019-0508-1](#)



Duke File (IDF) #

T-006200



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