TRUE DEPTH-RESOLVED POLARIZATION SENSITIVE OPTICAL COHERENCE TOMOGRAPHY

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ABSTRACT

Polarization sensitive optical coherence tomography (PSOCT) can image sample polarization properties including retardance, diattenuance, and optical axis and has potential applications in many biomedical fields. However, due to the round-trip nature of OCT measurements, conventional PSOCT can only measure the cumulative optical properties that are affected by optical properties from sample surface to the imaging depth. Such cumulative image results cannot be directly used for optical diagnosis. In this research, novel PSOCT systems and image processing algorithms were developed for mapping depth-resolved local polarization properties from conventional cumulative polarization measurements. The new algorithms were tested in both *ex vivo* and *in vivo* biological tissues. Using local optical axis, fiber bundles in bovine heart muscle were successfully visualized in depth-resolved 3D images.