

위상천이원리와 PS-OCT시스템을 적용한 역산란광의 매질 깊이별 스톡스변수 추출

Depth-resolved Stokes parameters of light backscattered from
turbid media with polarization-sensitive optical coherence
tomography system and successive phase-shifting algorithm

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Polarization-sensitive optical coherence tomography (PS-OCT) was developed to image highly scattering tissues with accounting for polarization effects in the sample. These polarization-sensitive images can provide additional information on the structure of the tissue because of a polarization state of the light is changed at its interaction with biological tissues. The scattering and birefringence are two phenomena, which change the polarization state of light passing through medium. Many biological tissues such as cornea, tendon, muscle, bone and teeth show birefringence. It was reported in many publications.^{1,2,3} Tissue birefringence results from the linear and circular anisotropy of proteins such as collagen. The molecular packing structure of the collagen fibers is such that the index of refraction is higher along the length of the fiber than along the cross section, leading to linear birefringence.

In this work we present our bench-top PS-OCT system, which can extract full Stokes parameters, s^0, s^1, s^2 and s^3 , from the two orthogonal OCT signals. Although an optical configuration is almost same with those of previous researches^(1,2,3). Stokes parameter extraction method is different. Choosing successive temporal phase-shifting algorithm as the extraction method, we try to find amplitude of each interference signal and phase difference between them. As a preliminary result, we first show Stokes parameters tomographic images for porcine ligament that is well known for its form birefringence. Several biological samples are also tried to verify characteristics of polarization change, which is unique for each sample.

References

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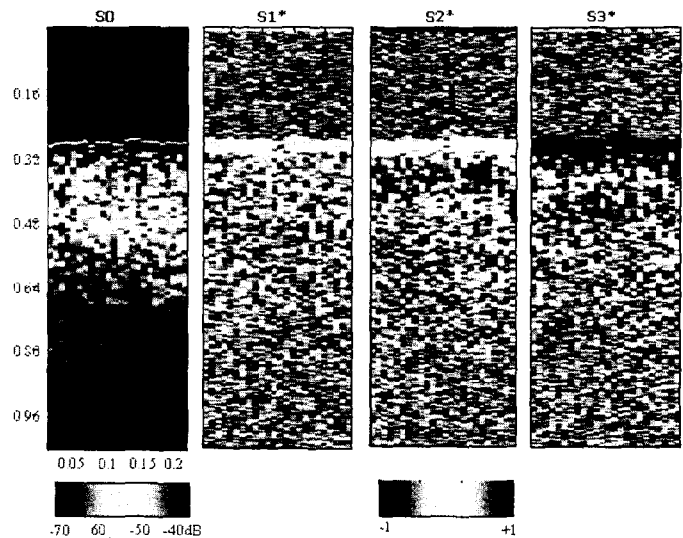
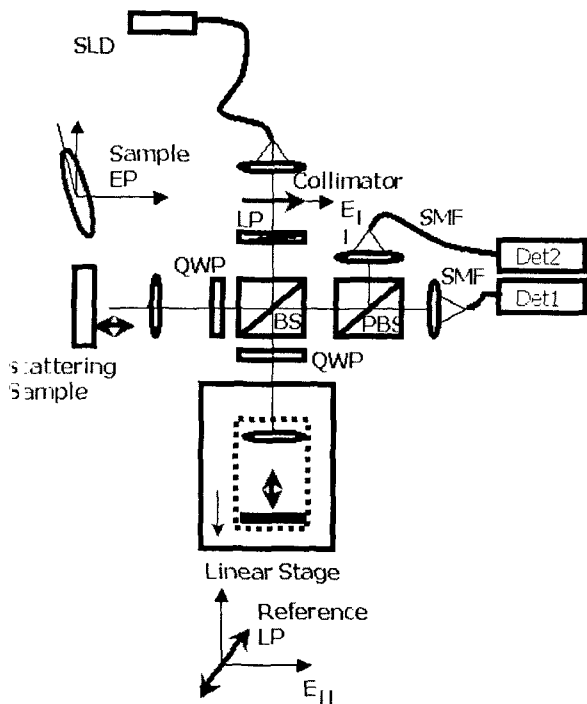


Figure 1 the schematic of experimental PS-OCT system

Figure 2 two-dimensional stokes parameters of light backscattered from porcine ligament. * means normalized parameters by s_0 and left color bar is color reference for s_0 and right one for s_1^* , s_2^* and s_3^* .