

DISCRIMINATION OF COLLAGEN FIBERS BY SECOND-ORDER SUSCEPTIBILITY MICROSCOPY

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As one of the most abundant connective tissues, collagen molecules are vital for a number of structural and functional roles. For example, the long striated collagen I fibers in tendon offers structural support in providing stability of limbs' movements and collagen II in cartilage acts as cushion in limb joints for impact absorption. In certain normal or pathological tissues, different types of collagen molecules co-exist and the ability to distinguish between different collagen components can contribute to an improved understanding of the underlying biophysics and physiology of these tissues. In this work, we demonstrate the use of second order susceptibility to discriminate different types of collagen fibers. By varying the excitation polarization orientation at the single-pixel level, we demonstrate how collagen I and II can be spatially separated without extrinsic labeling. Examples from engineered tissues will be shown and the impacts for biophysical and biomedical applications will be discussed.