3D OPTICAL CHARACTERIZATION OF LIVE FROG ERYTHROCYTES: MORPHOLOGY, CONSTITUTION, AND MECHANICS

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KEY WORDS: optical diffraction tomography, quantitative phase imaging, living cells, 3D imaging, amphibians

Amphibian erythrocytes have features distinct from mammalian erythrocytes, including the presence of nuclei. However, previous studies were unable to fully access the structures of live amphibian erythrocytes, due to the lack of 3D live-cell imaging methods [1]. Recently, 3D quantitative phase imaging (QPI) techniques including optical diffraction tomography (ODT) have enabled access to the 3D structures of live cells without labeling [2]. Here, we present an investigation of the 3D structures of live frog erythrocytes using ODT [3]. 3D refractive index (RI) maps of individual cells were obtained using ODT. In the 3D RI maps, the nucleus was the central high-RI region, which was verified using fluorescence imaging. Also, morphological, chemical, and mechanical parameters of the erythrocytes were extracted from the measured images to allow quantitative comparison with those of mammalian erythrocytes [4,5].

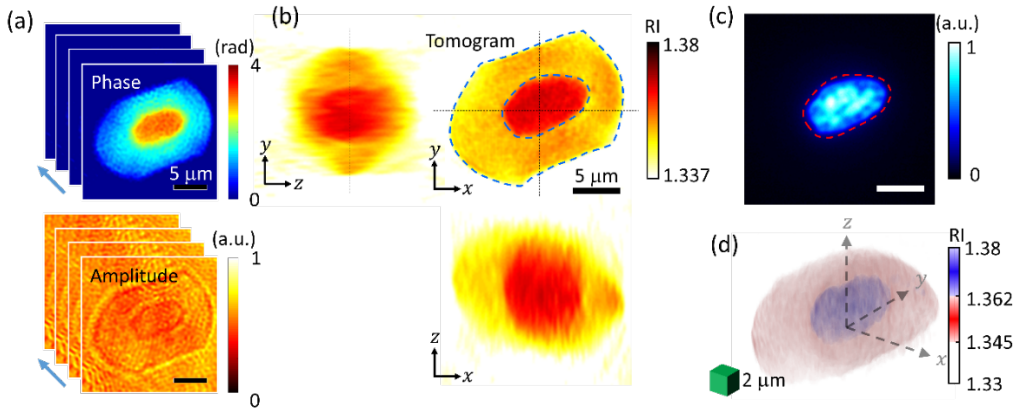

Figure 1: 3D imaging of live frog erythrocytes. (a) Phase and amplitude images of a frog erythrocyte. (b) The 3D RI map reconstructed from images of (a). (c) The corresponding fluorescence image of (b). (d) A 3D iso-surface rendering of (b).

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