

Tomogram reconstruction of pollen grains via optical diffraction tomography

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1. Introduction

The physical structure of pollen grain is related to its functional behavior. Pollen grains of different kinds exhibit unique structures of their own. For instance, a pollen grain from trees of class *Pinophyta* shows the structure in which sacci are attached to the corpus to enhance aerodynamic efficiency during dispersion [1]. while pollen grain from *Angiosperm* features folding structure called harmomegathy to prevent dehydration [2]. Studies in these structures and its relation between mechanical functions were conducted via various kinds of imaging techniques.

Although conventional approaches have presented insight to polleng grain structures, there are several limits such as acquisition throughput and time-consuming preparation procedure. Here, we present three-dimensional (3D) refractive index (RI) distribution of various angiospermae, pinus pollen grains using optical diffraction tomography (ODT). ODT is a technique which can quantitatively measure 3D RI distribution of a transparent sample. Due to its non-invasive and label-free character, ODT has enabled us to conduct 3-D imaging of live cells [3]. Using obtained RI tomograms, we could observe the anatomical structure of pollen grains of various kinds.

2. Method/Result

Optical fields scattered from the sample were measured using a Mach-Zehnder interferometer. By gathering scattered optical fields from various illumination angles, 3D RI tomograms of the samples were obtained. The illumination angle of plane wave impinged on the sample was modified utilizing digital micromirror device (DMD) which is aligned with the beam path before reaching sample [9, 10].

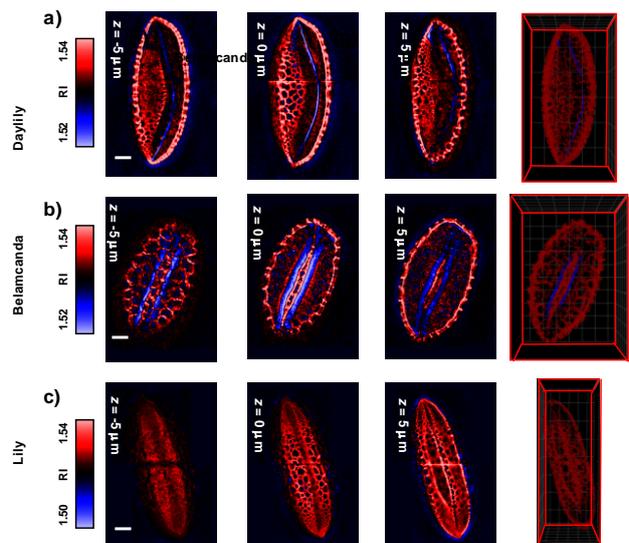


Figure 1. Reconstructed tomogram of anigiosperm pollen grains

3. References

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