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Optical Ptychographic Microscope for Quantitative Bio-Mechanical Imaging[1] NICHOLAS ANTHONY, GUIDO CADENAZZI, KEITH NUGENT, BRIAN ABBEY, ARC CoE Advanced Molecular Imaging, La Trobe Univ — The role that mechanical forces play in biological processes such as cell movement and death is becoming of significant interest to further develop our understanding of the inner workings of cells. The most common method used to obtain stress information is photoelasticity which maps a samples birefringence, or its direction dependent refractive indices, using polarized light. However this method only provides qualitative data and for stress information to be useful quantitative data is required.

Ptychography is a method for quantitatively determining the phase of a samples complex transmission function. The technique relies upon the collection of multiple overlapping coherent diffraction patterns from laterally displaced points on the sample. The overlap of measurement points provides complementary information that significantly aids in the reconstruction of the complex wavefield exiting the sample and allows for quantitative imaging of weakly interacting specimens[2].

Here we describe recent advances at La Trobe University Melbourne on achieving quantitative birefringence mapping using polarized light ptychography with applications in cell mechanics[3]..

[1]Australian Synchrotron, ARC Centre of Excellence for Advanced Molecular Imaging

[2]T. Godden et al., **Opt. Ex.** 2014

[3]N. Anthony et al., **Nat. Sci. Rep.** 2016

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