Contribution ID : **10** Type : **Poster**

Single Shot Three-Dimensional Infrared Microscopy

The Australian synchrotron has two infrared microspectroscopy systems: online system with synchrotron infrared source and an offline system with a globar source. The infrared synchrotron beam has a unique fork shaped intensity distribution which demands tight focusing (36×) at the sample plane followed by a pixel-by-pixel scanning approach to record 2D image of the sample. The offline system, on the other hand, has a uniform infrared beam and so a weaker objective (15×) lens can be implemented to achieve a large diameter at the sample plane. In the offline system, it is therefore possible to record 2D image of the sample using a focal point array (FPA) detector without scanning. In this study, we have converted this 2D infrared microscope into a 3D microscope using computational imaging technique. In the first step, a point spread function (PSF) library was recorded corresponding to different range of axial aberrations using a pinhole mounted in the sample plane. The recording of PSF library was done only once. In the next step, a biochemical sample was mounted in the sample plane and a single intensity distribution was recorded by the FPA. A new computational reconstruction method called the Lucy-Richardson-Rosen algorithm was developed by combining two well-known reconstruction methods namely the Lucy-Richardson algorithm and non-linear reconstruction. The object intensity distribution was processed with the PSF library and the different planes of the sample was reconstructed. We believe that the developed technique will enable rapid measurement of samples in a short period of time.

Level of Expertise

Experience Researcher

Presenter Gender

Man

Pronouns

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