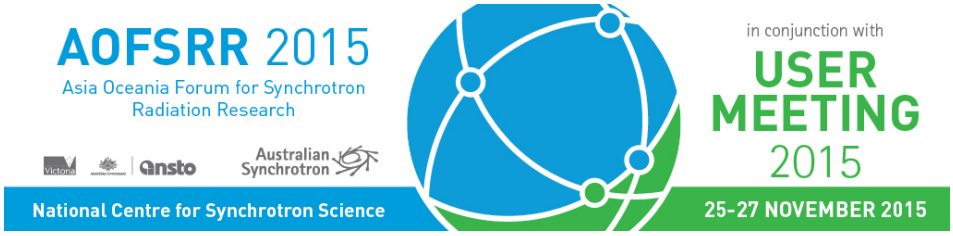

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Synchrotron-beam Focal Plane Array (FPA) illumination: Developing fast acquisition, high spatial resolution FT-IR chemical mapping at the IR Microscopy beamline

Thursday, 26 November 2015 13:30 (45)

The IR Microscopy (IRM) beamline at the Australian Synchrotron is used to generate detailed FTIR chemical maps of samples at diffraction-limited spatial resolutions, with high S/N ratios. Using a single element detector and confocal-like apertures to focus the beam at the sample surface, 2D maps at spatial resolutions between 3-5 microns can be measured. This is however time-consuming, with one 50 micron squared map taking 1-2 hours to acquire. How then can sample throughput be improved? FTIR mapping systems using Focal Plane Array (FPA) detectors are capable of covering much greater surface areas at a time; each array pixel can measure a full FTIR spectrum, and the IRM beamline at the Australian Synchrotron is equipped with a 64x64 FPA. The compromise is that a Globar source must be used to evenly illuminate this relatively large detector, greatly reducing spatial resolution. So how then to illuminate a large array with a small, low-emittance SR beam? The IRENI beamline, SRC, extracted 12 IR beams from their source to achieve full FPA illumination across a 96x96 array (1). We extract only one IR beam, therefore such wide field illumination is not possible. Instead this poster outlines a method similar to that used at NSLS (2), where the single beam is split into 4, to successfully illuminate a 16x16 FPA grid. The overall setup and some results are shown.

(1) Nasse et al. Nature methods 8.5 (2011)

(2) Stavitski et al. Analytical chemistry 85.7 (2013)

Keywords

Infrared, microscopy, chemical maps, focal plane array

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