

Poster Presentation

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Time-resolved Crystallographic Developments Utilising Detector Gating Techniques

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The X-ray scattering process occurs on the time scale of about 10-18 seconds; the complete data collection is in the order of hours at synchrotron sources and consequently gives a time-averaged structure of the crystalline material. Previously on beamline I19 at Diamond Light Source we have used a method which involves mechanically chopping the X-ray beam to produce a pulsed source. The pulsed X-ray beam can then be used to probe the crystal a short period after the sample has been photo-activated by a laser beam. This method can be repeated changing the period between the laser (pump) and X-ray pulse (probe) until the entire time series is obtained. Beamline I19 in collaboration with the Dynamic Structural Sciences Consortium at the Research Complex at Harwell have designed a novel strategy to collect an entire time-series (zero to 100 ms) in one data collection utilising the fast image collection time of the Pilatus detector. The 300K Pilatus detector has a readout out time of 2.7 ms and can be gated down to 200 ns. This means that we can use this gating (instead of the mechanical chopper) to obtain single crystal time-resolved structures. This technique shortens the data collection time and as the entire series is obtained from one crystal during the same data collection, this reduces decay and scaling issues.

[1] P. Raithby, *Crystallogr. Rev.* 2007, 13, 121-142, [2] P. Coppén, *Angew.Chem.Int.Ed.* 2009, 48, 4280-4281

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