MS01-05 | Measuring The Dose: Photoelectron Escape In Micro-Crystals

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With the trend of using microcrystals and intense microbeams, radiation damage becomes a more pressing problem. Theoretical calculations by Nave and Hill [1] show that the photoelectrons that primarily cause damage can escape very small crystals, reducing the effective dose, an effect which was demonstrated to be pronounced at higher energies [2].

To investigate photoelectronic escape, we measured radiation damage at cryo-temperatures on lysozyme crystals of 5um and 20um mounted on a cryo-EM grid. The data were collected at 13.5 keV and 20.1 keV using a 2M CdTe Pilatus and were analysed with DIALS [3] and RADDOSE3D [4]. Our data indicate a longer crystal lifetime for smaller crystals and support the theory of photoelectron escape.

[1] Nave & Hill, (2005), J. Synchrotron Rad. 12, 299–303
[2] Sanishvili et al. (2011), PNAS 108(15), 6127–6132
[3] Winter et al. (2018), Acta Cryst. D74, 85-97
[4] Zeldin et al. (2013), J. Appl. Cryst. 46, 1225-1230