The Effects of Temperature and Radiation on Holo and Apo Ferritin Crystals

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It is known that both temperature and radiation dose induce expansion of the unit cell of cryocooled macromolecular crystals [1]. Dose-induced increases are not thought to be caused by temperature changes in the crystal. We have investigated the nature of the dose and temperature induced unit cell expansion.

A series of datasets were collected at SRS Daresbury and ID14-4 at ESRF Grenoble on crystals of apo and holo ferritin at 100K. Further sets were collected on a second crystal of each type, but this time over a controlled temperature series. By comparing the results from the two crystals, effects of radiation damage could be distinguished from those of temperature, and differences in behavior of the two forms of ferritin were also examined.

As has been previously reported [2, 3], it was found that the increase in unit cell dimensions is linear with dose. Our results show that the irreversible effects of dose could be distinguished from the reversible temperature-induced effects.

[1] Murray J. W., *DPhil Thesis*, Oxford University, 2004. [2] Murray J.W., Garman E. F. J., *Synchrotron Rad*., 2002, **9**, 347-354. [3] Ravelli R.B.G., Theveneau P., McSweeney S., Caffrey M. J., *Synchrotron Rad*., 2002, **9**, 355-360.

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