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Helium Temperature Mitigation of Radiation Damage. B. Leif Hanson[&], Unmesh Chinte[*], Binal Shah*, John Ruble[#], Keith Brister[^] Connie Schall*, B.-C. Wang[#], Alan Pinkerton[&,] *Chemical Engineering and [&]Chemistry, Univ. of Toledo, OH; [#]Biochemistry and Microbiology, Univ. of Georgia, Athens, GA; and [^]formerly Bio-CARS, now LS-CAT, APS, ANL, Argonne, IL.

Previous work by our group has shown some abatement of radiation damage in macromolecular crystals when using a Pinkerton Device open-flow helium cryostat delivering 15K data at the crystal position [Hanson et al. (2002) *J. Synchrotron Rad*. 9: 375-381]. Systematic studies at Bio-CARS of matched crystals at 15K and 100K have enabled us to quantify the improvement in lifetime in the highest resolution shell diffraction seen with the He temperature data. This can be as high as a 33% extension in diffractive lifetime in the highest resolutions shells. Improvements in lower resolution data measured at Cr wavelength has also been measured and will be detailed, as will anomalous diffraction studies with Se soaked crystals measured with 1.0Å X-rays. He cost with a Pinkerton device for a single crystal data set at APS is $10-$15. Since the use of cryogenic helium for data collection at a synchrotron source results in significant abatement of radiation damage, it should be considered for macromolecular data collection especially for proteins sensitive to radiation damage.