Poster

Advancing serial crystallography: comparative analysis of low and high energy data collection

D-H. Gu[1], S. Jaho[1], D. Axford[1] and R. L. Owen[1]

[1]Diamond Light Source, Harwell Science and Innovation Campus, Didcot OX11 0DE, United Kingdom.

do-heon.gu@diamond.ac.uk

Serial crystallography (SX) has emerged as a leading technique for protein structure determination and studies of protein dynamics at room temperature. Due to the small changes that must be resolved, successful SX data collection necessitates an optimized experimental setup. Among the various sample delivery approaches for synchrotron-based SX (SSX), the fixed target method is particularly popular due to its straightforward implementation within existing beamline end-stations, streamlined sample loading procedures, low sample consumption and opportunity for integration with complementary techniques. Similar to cryo data collection SX experiments can utilize a range of X-ray wavelengths, but while typically a 'default' wavelength is used shorter wavelength/higher-energy X-rays offer significant advantages provided a suitable detector is available [1, 2]. High-energy X-rays enhance diffraction intensity, improve signal-to-noise and offer the chance to minimize radiation damage. Taken together, these gains offer promise of optimised SSX, which is crucial for accurate protein structure determination and dynamic studies, through use of high energy X-rays. We describe and compare high and low energy fixed target SSX data collected at beamline I24, Diamond Light Source. Our results demonstrate that high-energy X-rays provide improved diffraction intensity and signal-to-noise compared to low-energy X-rays, highlighting the advantages of high-energy approaches in SX experiments. This poster provides an overview on optimizing SX data collection by leveraging the benefits of high-energy X-rays.

[1] Storm, S. L., Axford, D., & Owen, R. L. (2021). *IUCrJ*, ***8*(6)**, 896-904.

[2] Dickerson, J. L. & Garman, E. F. (2019). *J. Synchrotron Rad.* **26**, 922–930.