MS08-1-5 Microfluidic Tools for Serial Protein Crystallography and Imaging at Synchrotron Facilities #MS08-1-5

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Abstract
Recent developments in ultra-brilliant synchrotron and hard X-ray free electron lasers (FEL) open very exciting possibilities in structural biology, such as serial protein crystallography (1) and time resolved structural studies of bio-macromolecules. These techniques already contribute to high impact science, yet both require high consumption of crystals and generate large data volumes for structural analysis, potentially requiring long periods of beamtime acquisition on oversubscribed central facilities. These issues can be somewhat mitigated with efficient sample delivery under the X-ray beam. Microfluidic and microscale technologies have played a critical role in facilitating both protein crystallization and structure determination (2). The transfer of microfluidic technology experiments is, however, technically challenging due to the requirement of X-ray compatibility of the different device materials. In the current presentation we will review the impact of microfluidic device technologies on protein crystal growth and X-ray diffraction analysis. We focus on applications of microfluidics for use in serial protein crystallography experiments and imaging at synchrotron sources. At Synchrotron SOLEIL, the microfluidic team, together with the life sciences scientists provides expertise in the design, manufacturing, and experimental implementation of microfluidic devices optimized for X-ray experiments. We also provide facilitated means of sample handling and specialized sample environments that address specific experimental conditions at synchrotrons and XFEL facilities. Finally, we are attempting to prepare standardized microfluidic trapping devices for biomacromolecular structural studies at Synchrotron SOLEIL and other synchrotron facilities (3).

References
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