

MS44-2-3 Protein crystallization and characterization for serial femtosecond crystallography at the European XFEL

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Abstract

The highly intense and short pulsed X-ray free electron laser (XFEL) beams enabled the measurement of nano- and micro-crystals as well as the study of protein dynamics by overcoming radiation damage through 'diffraction before destruction' (1). However, its application is still limited due to the difficulties in production and characterization of highly ordered nano- and micro-crystals, which are essential for the success of SFX experiments. To obtain high amount of microcrystal slurry requires conversion and optimization of vapour diffusion crystallization to batch crystallization, and this process can be sped up by systematic approach (2). The characterization of protein microcrystals in terms of size, density, homogeneity, and crystalline ordering necessitates the use of equipment not available in every laboratory, such as DLS, SONICC, and TEM.

The bio lab of the European XFEL is an integrated user facility connected to the beamlines for supporting biological experiments (3). The laboratory was financed and built by a collaboration between the European XFEL and the XBI (XFEL biology infrastructure) User Consortium. It is equipped with various state of the art equipment for bio-sample preparation and characterization, including the equipment listed above. We also offer the possibility to test different sample delivery methods in order to select the optimal one that maximizes the success of the experiments at the XFEL instruments.

In this presentation, we would show process of protein microcrystal preparation and characterization in the XBI lab at the European XFEL with examples of beamtime preparation.

References

1. Neutze, R., Wouts, R., van der Spoel, D., Weckert, E. & Hajdu, J. Potential for biomolecular imaging with femtosecond X-ray pulses. *Nature* (2000). 406, 752–757.
2. Beale, J.H. et al. Successful sample preparation for serial crystallography experiments *J. Appl. Cryst.* (2019). 52, 1385–1396.
3. Han, H. et al. The XBI BioLab for life science experiments at the European XFEL. *J. Appl. Cryst.* (2021). 54, 7–21.

The layout of the XBI BioLab in European XFEL

