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Supporting information for article:

Microcrystal delivery by pulsed liquid droplet for serial femtosecond crystallography

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S1. Supplementary Methods

The accelerator and beamline were tuned to produce XFEL with a central photon energy of 7 keV and a bandwidth of 5×10^{-3} (FWHM). Averaged pulse energy was attenuated to 10−100 μJ at the sample position using an Al sheet. Each XFEL pulse has a duration of 10 fs (Inubushi *et al.*, 2012). The KB mirror system at EH4 provides a focused XFEL beam with a size of 1.2×1.4 μm^2 (FWHM) (Yumoto *et al.*, 2013). Hence, the position of the nozzle must be moved finely by using XYZ stage with the 0.1-μm precision. The timing and the position of the pulsed droplet were adjusted by monitoring the droplet with a CCD camera, with which the droplet was observed to be shattered after the XFEL pulse irradiation. Single-pulse diffraction patterns were observed by the multi-port CCD (MPCCD) detector placed 50-mm away from the droplet (Kameshima *et al*., 2014). Each pattern, tagged with a serial number, was recorded in the SACLA data acquisition system (Joti *et al.*, 2015).

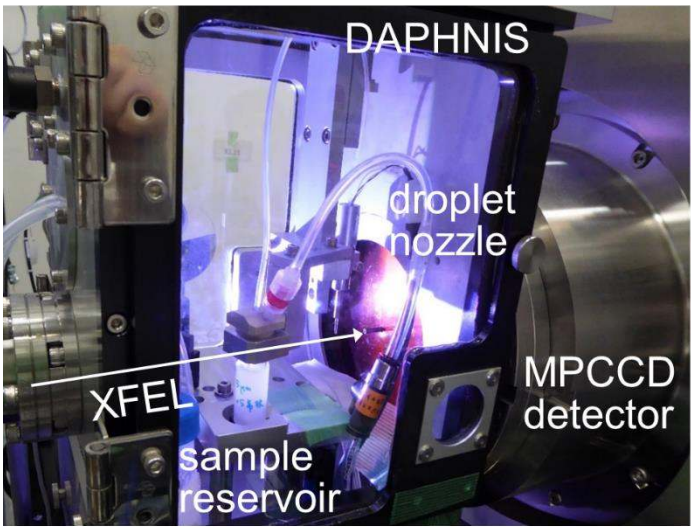

Figure S1 Experimental setup. Pulsed liquid droplets containing microcrystals of lysozyme were introduced into a DAPHNIS chamber filled with He.

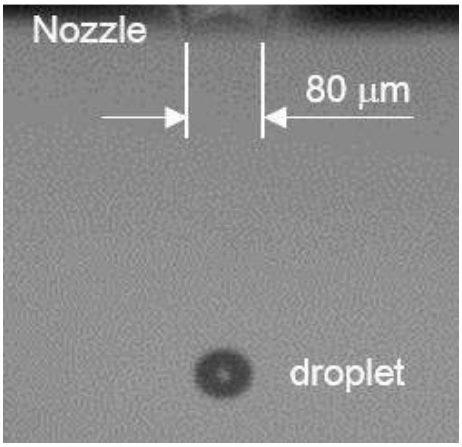

Figure S2 A microscope image of a pulsed liquid droplet. Generally, the diameter is almost the same as the diameter of the aperture of the nozzle (80 μm). The shape of the droplet depends on the sample solution and the injection condition.

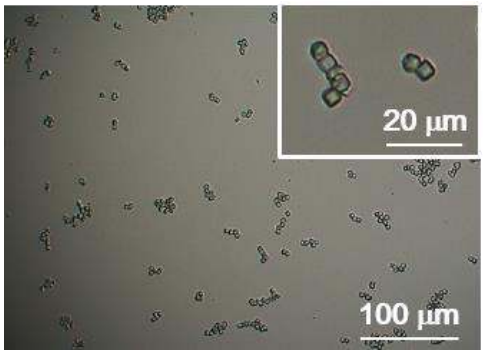

Figure S3 Microscope image of microcrystals of lysozyme. The sizes of the crystals are almost uniform at 5 μm.

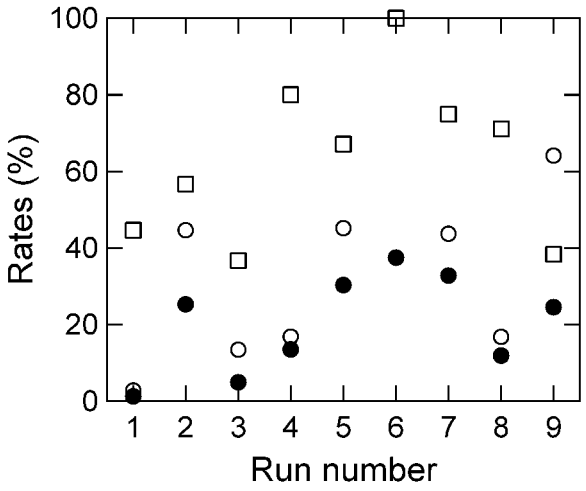

Figure S4 Hitting (open circle) and indexed rates (solid circle) for microcrystals of lysozyme in the liquid droplets at 1.6×10^{8} crystals/ml for serial different runs. The ratio of the indexed rate to the hitting rate is also shown as open square. The low hitting and indexed rates at run number 1 are due to precipitation of crystals in the solution. Only 16 images were recorded at run number 6, where all of the 6 hit images were able to be indexed.

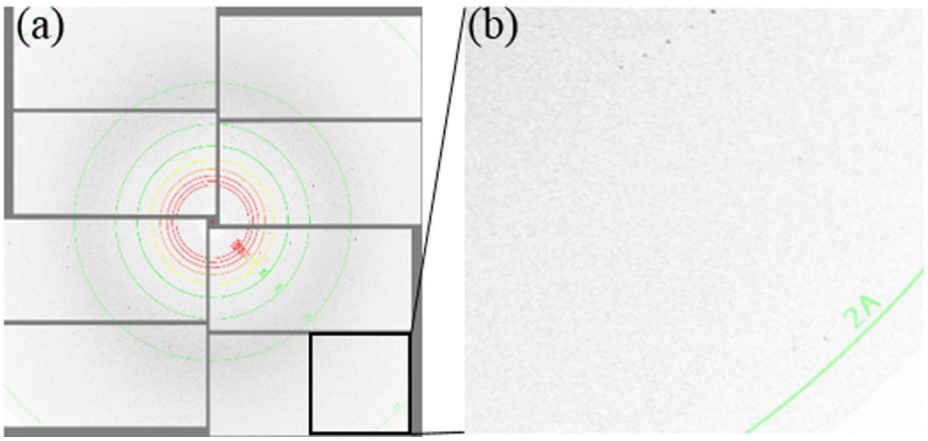

Figure S5 (a) A typical diffraction pattern obtained in the SFX measurement. The Bragg spots were superimposed on the water diifraction ring. (b) Magnified image of the pattern enclosed in the square.

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