

Optical sample manipulations for synchrotron radiation probing of biological and soft matter objects in aqueous environments

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Optical tweezers (OT), based on the trapping capabilities of focused laser beams, have found numerous applications in different fields from physics to life sciences. We have realized and commissioned an OT setup adapted to the synchrotron environment at the ESRF. The performance of the setup in the beamline environment has been tested by WAXS and SAXS scattering experiments on single optically trapped starch granules, using a synchrotron radiation microfocussed beam at the ID13 beamline. We have explored the feasibility of microdiffraction on optically trapped protein crystals of 35 microns diameter. The effect of radiation damage at room temperature has been investigated by repeated raster-scanning up to the complete loss of the structural order.

In the near future, the combination of optical forces, synchrotron and laboratory probes may initiate the development of new research fields for fragile, biological and soft matter objects.

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