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【702】Using X-ray Techniques to Investigate Ultrafast Chemical Dynamics

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Time-resolved X-ray spectroscopy is a versatile tool for investigating both electronic and structural dynamics in functional chemical systems. By measuring both the X-ray absorption and X-ray emission signals simultaneously we obtain information on both the occupied and unoccupied electronic states of the sample, as well as structural information from both the near-edge and Extended X-ray Absorption Fine Structure (EXAFS) regions of the absorption spectrum. When combined with X-ray scattering techniques, which provide structural information on the system and its interaction with the environment, we can obtain unparalleled details on the ultrafast dynamics of both energy flow and structural changes. In this presentation, I will show how we have developed these techniques at the Swiss Light Source and other X-ray facilities, and applied them to investigate ultrafast dynamics in photo-excited systems. I will present several examples of the kind of information that can be obtained on a large variety of samples, ranging from photoactive proteins in solution through to colloidal suspensions of semiconductor nanoparticles. I will conclude with a brief overview of the types of experiments we anticipate being able to perform at SwissFEL in the coming years.

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