

Picosecond X-ray Absorption Spectroscopy at the Swiss Light Source

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Abstract

Electronic structure changes are at the origin of chemical reactivity, which drive the forming and breaking of bonds. The latter can be visualized by measuring the geometric structure during the course of a chemical reaction. Time-resolved x-ray absorption spectroscopy delivers both the electronic (via XANES) and geometric (via EXAFS) transient structure changes, when interfaced with a femtosecond laser in a pump-probe scheme. In addition, XAFS methods are extremely flexible, since they are element-selective and can be applied to disordered bulk systems. We have recently recorded high-quality transient XAFS spectra at the Swiss Light Source with currently <100 ps temporal resolution, corresponding to the electron bunch width of the synchrotron. Examples of excited state structures of solvated coordination chemistry compounds and of short-lived atomic radicals in aqueous solution will be presented.