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MHz pump and probe combined with XAS-XES

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We implemented a MHz pump and probe scheme on beamline ID26 of the European Synchrotron Radiation Facility. The laser runs at 1.4 MHz in the ESRF 16b mode and thus pumps every fourth pulse with ca. 15 uJ per pulse and 350 fs pulse length. The beamline hosts an X-ray emission spectrometer and thus allows combining resonant inelastic X-ray scattering with a MHz pump and probe schemes. The scattered X-rays are recorded with an avalanche photodiode in single photon counting mode. We measured the transient spectra of the spin cross-over transition in [Fe(bpy)₃]Cl₂ of the non-resonant K α lines and of 1s_{2p} resonant inelastic X-ray scattering (RIXS) at the K absorption pre-edge of Fe. The K α transient spectrum can be readily modeled using crystal field multiplet calculations because the spectra mainly depend on the Fe spin state. The 1s_{2p} RIXS is richer in information because it also probes the unoccupied molecular orbitals and a theoretical interpretation is more challenging.

[1] *Angew. Chem. Int. Ed.* 2010, 49, 5910–5912, [2] *J. Elect. Spect. Rel. Phen.* 2013, 188, 166–171

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