NEXAFS spectroscopy using a laser-produced plasma source: single shot, quick-XAFS and optical pump-X-ray probe experiments

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X-ray absorption fine structure spectroscopy (XAFS) is a powerful tool for the investigation of the chemical nature and electronic structure of matter. While the technique is decades old, it has been restricted largely to large scale facilities such as synchrotron radiation sources, due to the high brilliance of these sources and the adapted instrumentation. Due to an increasing interest in and widespread use of the technique in its different experimental modi, more effort has been invested into the development of laboratory instrumentation. Thereby, nowadays, with high harmonic generation and laser-produced plasma sources for the soft X-ray range, near edge XAFS (NEXAFS) and extended XAFS (EXAFS) have become accessible with performance parameters suitable for routine investigations.

We present the experimental possibilities offered by the BLiX NEXAFS setup, which is based on a ns-laser-produced plasma source [1] and a twin arm spectrometer using reflection zone plates [2]. The highly efficient setup enables static spectroscopy with a resolving power of $E/\Delta E > 900$ in the whole available range from 280 eV to 1300 eV. While single shot spectroscopy has already been shown in previous work [3], newest developments enable quick-XAFS with 10 ms time resolution as well as optical-pump X-ray probe spectroscopy of thin organic films with ns time resolution.

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[2] A. Jonas *et al*., *Optics Express*, **2019**, *27:25*, 36525.
[3] I. Mantouvalou *et al*., *Appl. Phys. Lett*., **2016**, *108*, 2011106.