

# Optical pump soft X-ray probe NEXAFS spectroscopy using a laser produced plasma source

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Laboratory-based laser-produced plasma (lpp) sources achieve high brightness and stability in the EUV and XUV range. With emission energies beyond 1 keV and stable operating times in the range of hours, they offer already numerous experimental possibilities independent and supplemental to investigations at large scale facilities.

One such application is near edge X-ray absorption fine structure (NEXAFS) spectroscopy for the elucidation of the electronic structure of a given sample. In combination with optical pumping also photo-induced dynamics can be probed which shed light on the structure-function relationship of complex materials.

We present a setup for pump-probe NEXAFS spectroscopy composed of a highly brilliant lpp source [1] and a reflection zone plate spectrometer [2,3]. The system can probe X-ray absorption edges between 200 eV and 1300 eV with a resolving power  $> 1300$ . The pump beamline offers a time resolution of 500 ps with a tunable wavelength (343 nm – 900 nm). Due to the high stability and efficiency of the setup dynamic changes in absorption of the excited sample down to  $10^{-4}$  are accessible. This will be shown with the help of first application measurements on thin films of bio-molecules.

## *References*

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- [2] A. Jonas et al, Rev. Sci. Instr. 89, 026108 (2018)
- [3] I. Mantouvalou et al, Appl. Phys. Lett. 108, 201106 (2016)