

Soft x-ray spectroscopy and microscopy using a table-top laser-induced plasma source

Matthias Müller

Laser-Laboratorium Göttingen e.V.

The progress in development of laboratory-scale soft x-ray sources in recent years has enabled experimental techniques that could be performed before almost exclusively at synchrotrons. Here, we present two applications of a compact, long-term stable and nearly debris-free laser-induced plasma source based on a pulsed gas jet target are: Broadband radiation is used for polychromatic absorption spectroscopy in the 'water window' spectral region, investigating the fine-structure of absorption edges that reveals information e.g. about type of bonds, oxidation states and coordination. The performance of this NEXAFS spectrometer is demonstrated for a variety of different organic and inorganic samples probing the K- and L-edges of carbon, calcium, oxygen, manganese, and iron. On the other hand, monochromatic radiation at a wavelength of 2.88 nm produced from a nitrogen plasma is employed for soft x-ray transmission microscopy, accomplishing a spatial resolution of about 50 nm.