



Femtosecond EUV and soft X-ray pulses for the study of dynamic processes at surfaces

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The discovery of the generation of High Harmonics in the interaction of intense laser pulses with rare gases prompted very active research of this process using different lasers as fundamental sources. The recent development of reliable high-intensity, high-repetition rate Ti:sapphire laser systems with pulse durations around 30fs yielded convenient table-top laser systems for High Harmonic generation. For surface science the possibility to excite valence and inner shell states carries the promise to extract information with elemental and chemical specificity from the surface, similar to ESCA methods using synchrotron radiation sources. In addition, the ultrashort pulse duration of the source enables time-resolved studies of dynamic processes at surfaces using a pump - probe arrangement. In this talk the properties of High Harmonic sources and of EUV and soft x-ray optics and techniques will be discussed. In first applications to surface science problems this radiation is used for photoelectron spectroscopy of adsorbates on Ni(111) and Pt(111) surfaces. With the same laser source also incoherent K radiation ($h\nu = 1$ to 10 keV) with ultrashort pulse duration can be produced. First applications in time-resolved x-ray diffraction are discussed.