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X-ray photoelectron spectroscopy in the hard x-ray regime[1]

CHARLES S. FADLEY, UC Davis & LBNL

Photoelectron spectroscopy is by now a very widely used tool for the study of atoms, molecules, solids, surfaces, and nanoscale structures. Until very recently, the exciting radiation has been limited to the energy range below about 2 keV. However, within the past few years, a few experimental projects have been initiated in which photon energies in the 5-15 keV range are employed. By matching the characteristics of undulator beamlines at third-generation synchrotron radiation sources to the optical properties of the electron spectrometer, it has proven possible to overcome the reduced photoelectric cross sections at such high energies and to study both core and valence electronic levels with resolutions down to ca. 50 meV [1]. Such hard x-ray photoelectron spectroscopy (HXPS or HAXPES) has the advantage of being more bulk sensitive, with electron inelastic attenuation lengths in the 50-150 Angstrom range. In this talk, I will discuss the advantages and disadvantages of this new direction, including highlights from recent work, as well as suggested future avenues for HXPS studies. [1] Nuclear Instruments and Methods A 547, 24 (2005), special issue dedicated to hard x-ray photoelectron spectroscopy, edited by J. Zegenhagen and C. Kunz.

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