

17.2.1.2 X-ray photoelectron spectroscopy (XPS)

A technique with a fixed energy X-ray source and an electron energy analyzer. *X-ray Photoelectron Spectroscopy (XPS)* or *Photoemission Spectroscopy (XPES)* is also known as *Electron Spectroscopy for Chemical Applications (originally Analysis) (ESCA)* or, less frequently, as *Photoelectron Spectroscopy of the Inner Shell (PESIS)*. If the photon energy employed is less than 300 eV the technique is sometimes referred to as *Soft-X-ray Photoelectron Spectroscopy (SXPS)*. *XUV Photoelectron Spectroscopy* (where XUV refers to the extreme vacuum ultraviolet) is sometimes used to refer to PES employing a photon source in the frequency range between the ultraviolet and the X-ray regions.

The main applications of *XPS* are based on its elemental sensitivity, (since the characteristic lines of different elements are often widely separated in relation to their widths) and in addition the chemical shift information. Materials studied range from gases to polymer surfaces and Langmuir-Blodgett films.

Incident: Fixed energy X-ray photons within range 1-10 keV. Flux: low; angle of incidence: 70-85° (not critical).

Detected: Electrons: 0 eV to within a few eV of incident photon energy. Angle of exit: Polar and azimuthal angles fixed. Polar angle usually in the range 10-80°. Azimuthal angle not critical.

Spectrum: Photoelectron count rate vs. analysing energy (Photoelectron energy or binding energy).