

Figure A3 The XPS process.

(ii) EELS

In EELS, a beam of monochromatic electrons is directed at a surface, and the intensity of the scattered beam (usually in the specular direction, Figure A4) is measured over a range of energy. Energy loss occurs due to the excitation of vibrations, of particular interest being the vibrational modes of surface adsorbate molecules. Interpretation depends on application of the harmonic oscillator equation and/or comparison with characteristic absorption frequencies in 'model' compounds. Information about surface-adsorbate bonding and the effects on bonding within adsorbates may be obtained.

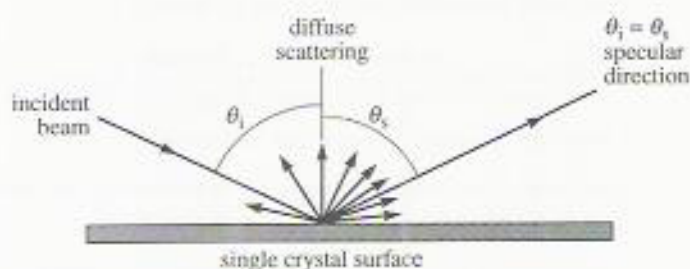


Figure A4 The EELS experiment.

In the particular case of CO adsorption on a metal surface, comparison of the absorption frequencies with those of known carbonyl clusters can provide information about the 'geometry' of the adsorption site (e.g. 'top', 'two-fold bridged', etc.). In general, the stretching frequency of the C—O bond shifts to lower values as the number of metal atoms to which each CO is coordinated increases. This has been attributed to a weakening of the CO bond by π back-bonding, the effect increasing with the number of metal atoms to which each CO is attached. (See Block 6, Section 9.3)