

Monochromated XPS Analysis of PET

Key Words

- Co-axial Charge Compensation
- High Resolution
- High Sensitivity
- Surface Analysis

XPS analysis of polymers on Thermo Scientific ESCALAB 250 is usually performed using a monochromatic X-ray source. This type of source optimizes spectral resolution, eliminates satellite peaks and minimizes the risk of sample damage.

ESCALAB 250 is fitted with a coaxial electron flood source which compensates for sample charging and avoids the effects of differential charging.

The example shown here shows the C 1s region of the PET spectrum in which carbon can be seen in different morphological and chemical environments.

Polyethylene terephthalate (PET) is a very common polymer used in packaging and magnetic recording media. The chemical structure of the polymer is shown.

Carbon is present in three different chemical environments: C-C, C-O and O-C=O. The XPS binding energies of C 1s electrons are shown in the table.

It can be seen that, while the C-C and C=O components are precisely aligned in the spectrum, the O-C peak position depends upon the morphology of the polymer. The ESCALAB 250 clearly shows this binding energy difference of only 0.09 eV.

Ref. 1 should be consulted for further information about peak shifts in PET resulting from its morphology.

PEAK	B.E. (eV)
C-C	285.00
C-O (Sheet)	286.56
C-O (Spin Cast)	286.65
O-C=O	289.00

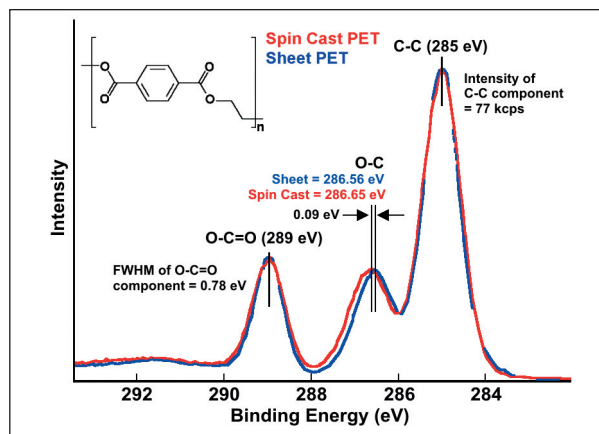


Figure 1: The C 1s spectra from spin cast and sheet PET showing the high resolution of ESCALAB 250 at high sensitivity. The very small binding energy difference between the C-O is clearly seen in the spectra.

Acknowledgement

Our thanks are due to Dr G Beamson, RUSTI, Daresbury, UK.

Ref. 1: G. Beamson, D.T. Clark, N.W.Hayes, S-L Law, V. Siracusa and A. Recca, polymer 37 (1996) 379.

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