

## Laminate Packaging- Applications of Microscopy

The Microscopy section uses a comprehensive range of techniques to carry out packaging investigations, e.g. the identification, characterisation and thickness of layers in multi-laminate films, as well as looking at delamination and other issues.

### Methods

#### Compound Microscopy

Thin sections of packaging can be taken and viewed under the compound microscope. This allows imaging and measurement of the layers present (Figure 1).

Compound microscopy also allows the presence of dyes and evidence of delamination to be seen.

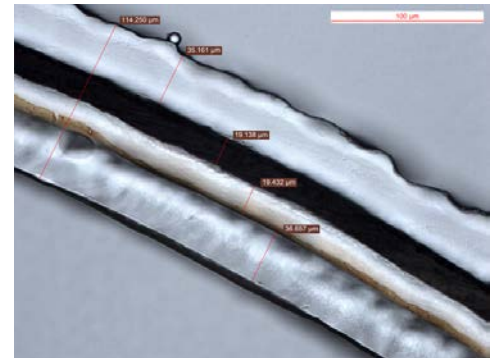
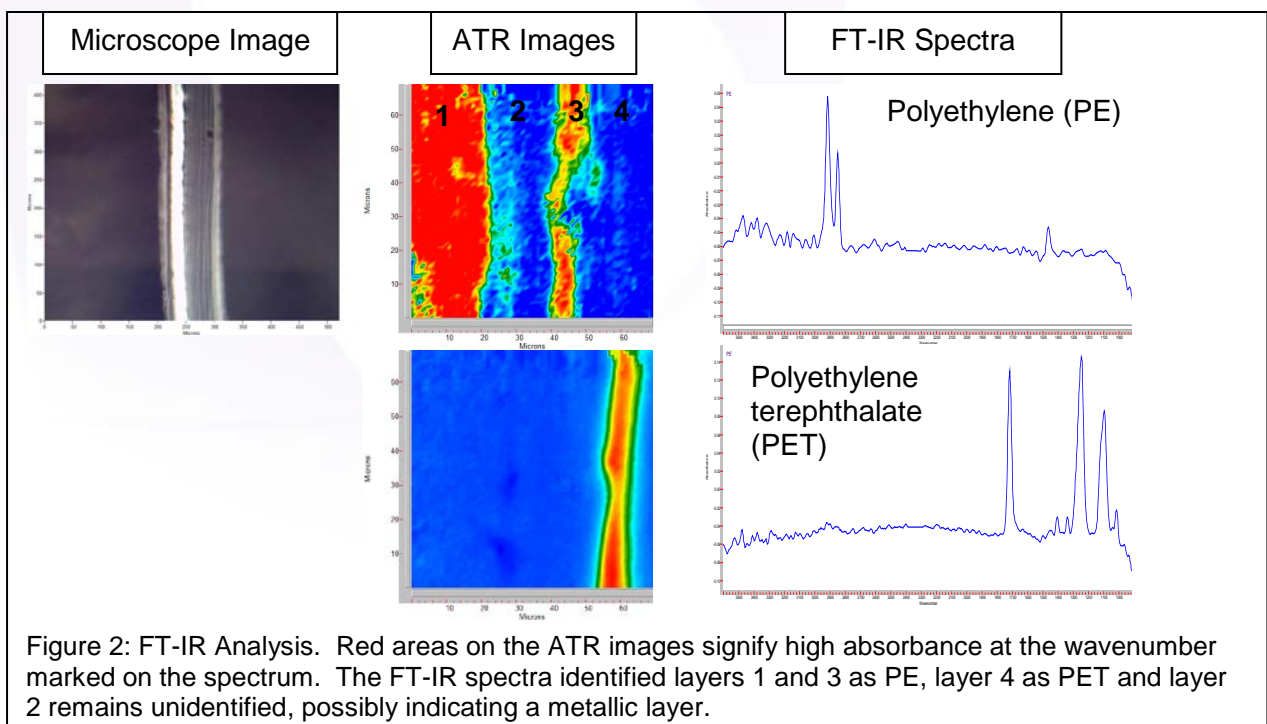


Figure 1: Layers viewed under a compound microscope

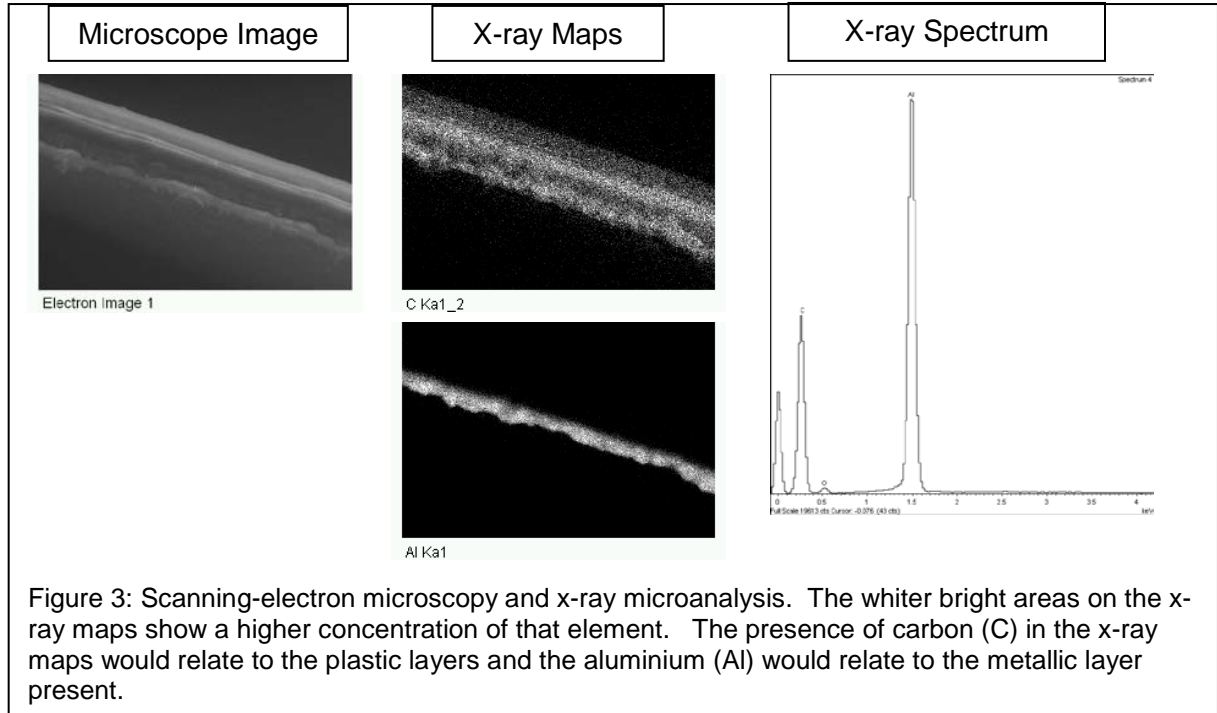
#### FT-IR Analysis

Fourier transform infra-red (FT-IR) spectroscopy coupled with focal plane array (FPA) and microscope attenuated total reflectance (ATR) allows the identification of plastics present in packaging (Figure 2). A section of packaging is taken and viewed using FT-IR microscopy to gain a visual image of the layers present and help pin-point an area of interest. This area can be mapped using the FPA to produce an image of differing contrasts, which correspond to different plastics within the area of interest. Spectral searches are then performed against an extensive reference library to produce an identification for each component polymer layer.



## Scanning-Electron Microscopy (SEM) and X-ray Microanalysis

The SEM is used to identify metallic layers, such as aluminium and to confirm plastics that contain certain elements, such as polyvinyl chloride (PVC) where chlorine would be detected. A section can be taken of the packaging and mounted on a stub with the cut surface facing upwards. From this a visual image is gained, which allows the relevant area to be selected for further analysis. X-ray microanalysis can be used for spot analysis and x-ray mapping can be used for multiple areas of interest (Figure 3).



## Summary

Using the range of techniques discussed the structure and composition of packaging can be determined and compared against a specification or reference material. Defects in packaging, including delamination, holes/indents or printing issues can also be investigated using these techniques.

We can provide a comprehensive packaging analysis service covering all forms of packaging, with additional techniques including a micro-CT scanner, dye penetration testing, pressure testing and migration testing.

This summary contains only brief details, for further information please contact:

Zoe.Larkins@campdenbri.co.uk

Kathryn.Harding@campdenbri.co.uk

Ref: ZG/1/Packaging- Applications of Microscopy/01/03.2019