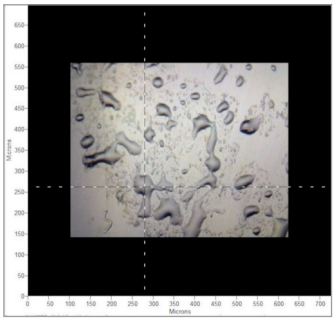
Materials and Surface Characterisation

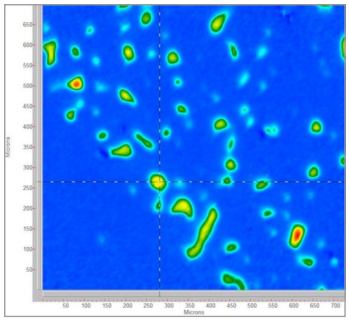
FTIR SPECTROMETER & MICROSCOPE

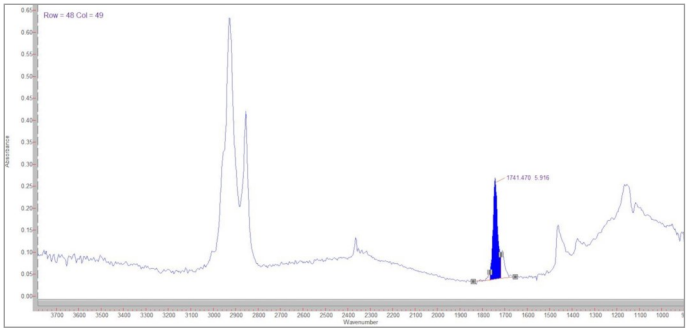
This Fourier transform infrared (FTIR) spectrometer has an attached microscope and provides the ability to identify the specific chemical nature of a sample as well as characterise the spatial distribution of components. The instrument allows for infrared mapping by sequentially recording multiple infrared spectra from different points on the same sample, which facilitates the study of within-sample chemical heterogeneity. The software allows to overlay the visible image with the chemical image to facilitate the identification of surface features. By using the mosaic mode surface areas of several square millimetre in size can be analysed.
Common infrared mapping applications in material sciences include simple material characterization, the analysis of the homogeneity of coating materials, the investigation of multi-layer sample interfaces such as polymer laminates and paint cross-sections, as well as the screening of samples for defects or contaminations.

Analysis of surface contaminations

In this example, the reflection mode was used to analyse a fingerprint on a polished steel surface. The picture on the left shows the visible image of the sample surface. On the right side is a chemical image, showing the intensity distribution of the peak at 1741 cm^{-1}, which is characteristic for fat in the fingerprint. The corresponding FTIR spectrum of the fingerprint is shown below the pictures.

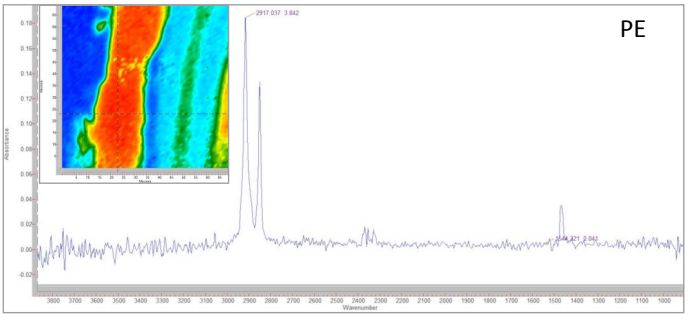


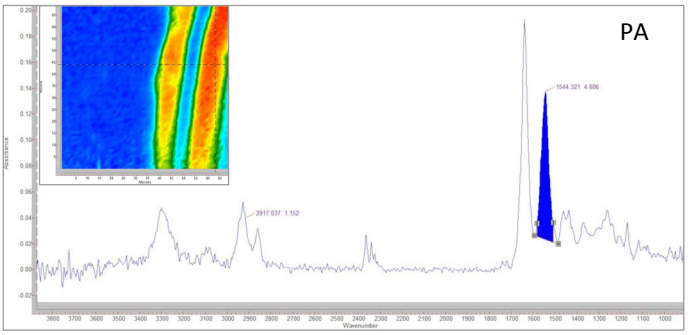




Characterisation of a polymer laminate

This example of a PE/PA laminate shows how high quality chemical information can be collected from multi-layer samples with a high spatial resolution. For this the cross-section of the laminate film was analysed by using the single point ATR mode. Characteristic peaks of both materials (PE: 2917 cm^{-1}, PA: 1544 cm^{-1}) were chosen from the FTIR spectrum to obtain the respective chemical images.





Spectrometer

- Attenuated Total Reflectance (ATR)
- Transmission (solid, liquid)
- Reflection (variable angle)

Microscope

- Reflection (FOV 700x700 μm^2)
- Transmission (FOV 700x700 μm^2)
- Single point ATR (FOV 70x70 μm^2)
- Large area ATR (FOV 700x700 μm^2)

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