



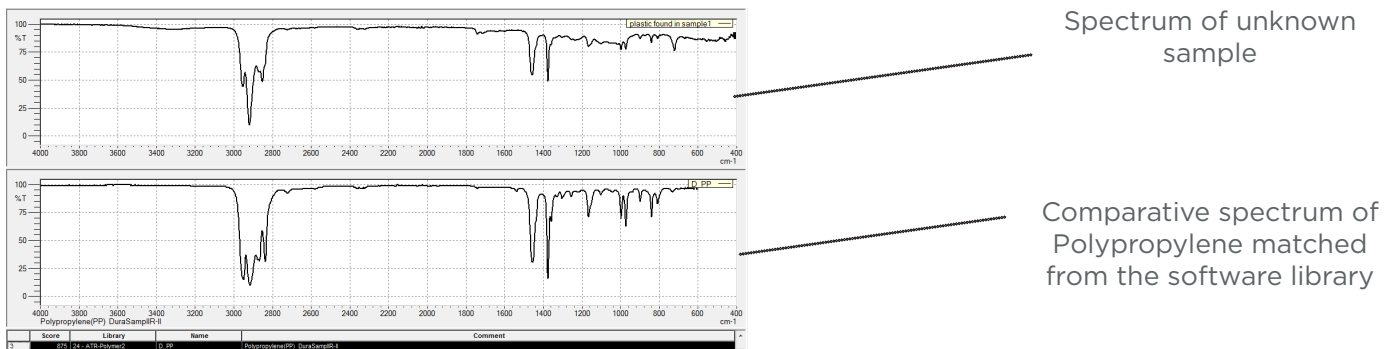
FTIR Spectroscopy

Technical White Paper

FTIR Spectroscopy

The FTIR (Fourier Transform Infrared) instrument is used for analysis and characterisation of organic and polymeric samples such as plastics, rubbers, greases, oils and fibres. The sample size needed for analysis is small and so the technique is also ideal for establishing the composition of contaminants.

The instrument analyses the sample to produce an Infrared (IR) spectrum unique to the material, and this is then compared to an extensive database of spectra within the software to enable an identification. As well as identification of material type, FTIR can be used to establish variations in the material composition such as the fillers and additives present within the material matrix.

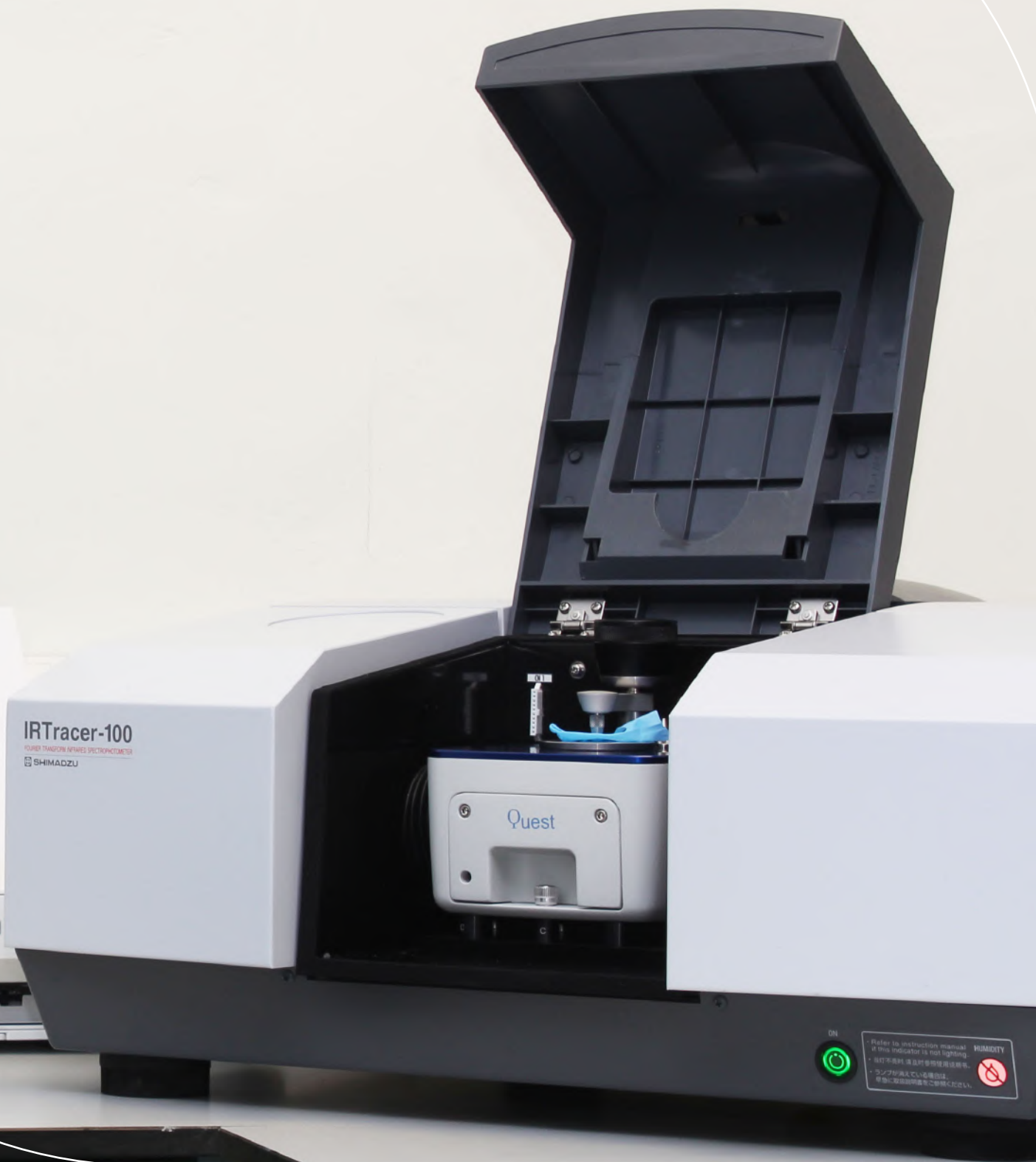


Uses of FTIR at SureScreen

At SureScreen, FTIR is often used for failure investigations in conjunction with other techniques such as optical and scanning electron microscopy (SEM) as well as semi-quantitative chemical analysis using the energy dispersive X-ray (EDX) attachment of the SEM. These techniques combine to help determine the origin of the material.



Typical uses include:

- Textile identification
- Quality verification of materials for example of supplier incoming goods
- Composite material identification
- Staining and blemish identification
- Adhesives
- Coatings
- Resins
- Failure analysis



IRTracer-100
FOUR TRANSFORM INFRARED SPECTROSCOPY
SHIMADZU

Quest

ON  
Refer to instruction manual
if this indicator is not lighting.
湿度計が点灯しない場合は
・湿計が壊れている可能性があります。
・湿度計が壊れている場合は
事前に製造販売店等に連絡してください。

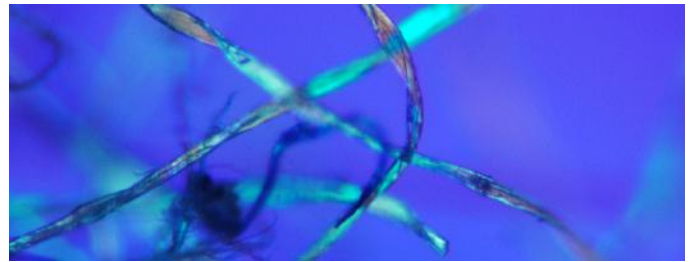
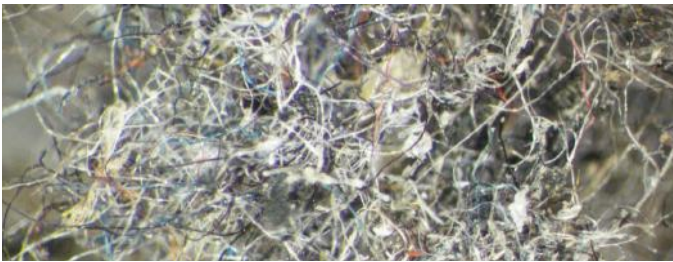
Canon

Function

FTIR works by bombarding the sample with a spectrum of infrared radiation which excites the atomic bonds in the sample. The sample absorbs energy from these wavelengths and the instrument produces a molecular fingerprint from the resulting spectrum, which is unique to that material. Software in the instrument then compares the obtained spectrum against an extensive database of materials enabling an identification of the sample.

Examples

01



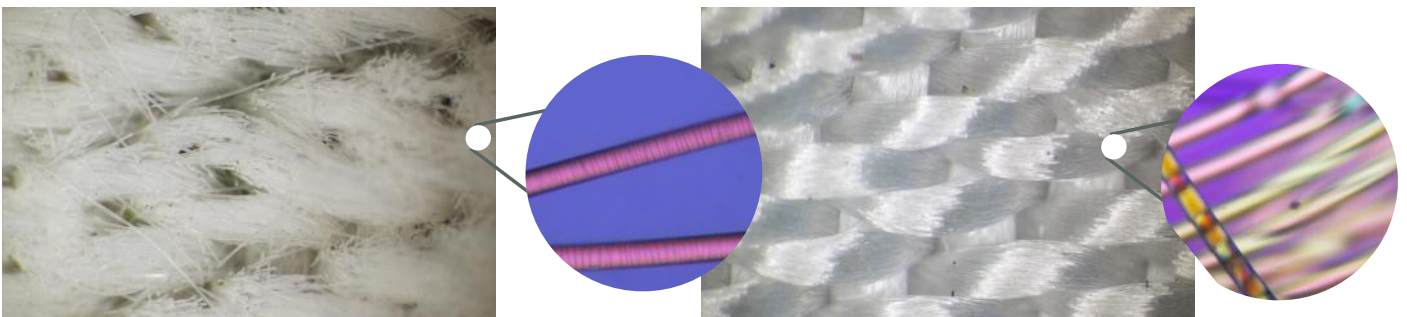
Following on from categorisation using microscopy, fibrous samples can be analysed using the FTIR to establish their type and material. The image on the left is a sample of material gathered from an airport X-ray scanner. We were asked to analyse the contents and establish the quantity of a certain type of fibre with the sample.

02



Optical image of an unknown particle observed within a sample of debris. The particle was established to be a traceable ceramic meaning the origin was quickly established.

03



Comparative images displaying the yarn fibres of this webbing to have been subjected to environmental stress cracking in service causing them to become embrittled, most likely due to UV radiation. Areas of the webbing, more protected from UV radiation, were established to be nominally free from embrittlement. FTIR analysis revealed the material to be polypropylene which is known to be susceptible to UV attack. A change of fibre was recommended for the application of the webbing.

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