FTIR spectroscopy

FTIR (Fourier Transform InfraRed) spectroscopy is an important tool in material analysis. At Innventia, apart from the standard set-ups, we have also two advanced spectroscopic techniques; dynamic FTIR spectroscopy and imaging FTIR spectroscopy. Innventia has a long experience of analysing material properties with FTIR spectroscopy. Also, there is a reference database of spectra of various materials as a helping tool for the material identification.

What can we do for you?

Inventia offers extensive characterisation possibilities, e.g.:
- chemical composition
- analysis of product defects
- identification of impurities
- local chemical composition
- relative content and distribution, location or homogeneity of different components
- chemical variations along a sample
- molecular interactions
- viscoelastic properties.

A broad range of materials can be analysed, for instance:
- complex polymeric materials
- single fibres
- wood
- pulp
- paper
- films
- composite materials
- packaging materials,

where:
- bulk
- surfaces
- layered structures

of mentioned materials can be analysed separately.

A list of set-up possibilities related to FTIR spectroscopy is appended.

Please contact us for a discussion about how we may help you!

Contact
For more information, please contact Dr Jasna Stevanic Srndovic (jasna.stevanic@innventia.com, +46 8 676 7225). We look forward to your inquiries!
## FTIR Spectroscopy

### Static FTIR Spectroscopy
This standard static mode is used for qualitative analysis of different materials.

- **Measuring mode:** Transmission
- **Spectral resolution:** 4/8 cm\(^{-1}\) (0.1 cm\(^{-1}\) - 32 cm\(^{-1}\))
- **Spectral range:** 4000 cm\(^{-1}\) - 400/700 cm\(^{-1}\)
- **Detector:** DTGS/MCT
- **Sample thickness:** ca. 20 µm - 40 µm
- **Measuring area:** Ø 12 mm

### ATR FTIR Spectroscopy
This mode is used for qualitative analysis of surface of various materials.

- **Measuring mode:** ATR (i.e. attenuated total reflection)
- **Crystal:** ZnSe
- **Contact area:** Ø 2 mm
- **Penetration depth:** 2 µm
- **Spectral resolution:** 4/8 cm\(^{-1}\) (0.1 cm\(^{-1}\) - 32 cm\(^{-1}\))
- **Spectral range:** 4000 cm\(^{-1}\) - 650 cm\(^{-1}\)
- **Detector:** DTGS
- **Sample thickness:** up to 1 cm

### Dynamic FTIR Spectroscopy
This technique is based on a combination of FTIR spectroscopy with DMA (i.e. dynamic mechanical analysis). It gives possibility for analysing molecular interactions in complex polymeric systems. Here, macroscopic property, i.e. viscoelasticity, of a polymeric material is closely coupled to submolecular cooperation, i.e. ultrastructure, depending on local environment in a polymeric material.

This technique is fulfilled with dynamic 2D FTIR (i.e. two-dimensional FTIR), which is evaluating technique providing useful information about inter- and intra-molecular interactions in complex polymeric materials.

- **Measuring mode:** Transmission
- **Spectral resolution:** 4/8 cm\(^{-1}\) (0.1 cm\(^{-1}\) - 32 cm\(^{-1}\))
- **Spectral range:** 3950 cm\(^{-1}\) - 700 cm\(^{-1}\)
- **Detector:** MCT
- **Sample thickness:** ca. 20 µm - 40 µm
- **Sample size:** 20 mm × 25 mm

## Imaging FTIR Microscopy

### Imaging FTIR Microscopy
This technique is based on a combination of static FTIR spectroscopy with light microscopy. It gives possibility for analysing chemical compositions on micrometer level of various materials. Also, distribution and location of different components across the thickness of a sample can be measured as well as its homogeneity.

- **Measuring mode:** Transmission
- **Pixel resolution:** 25 µm and 6.25 µm
- **Spectral resolution:** 4/8 cm\(^{-1}\) (2 cm\(^{-1}\) - 64 cm\(^{-1}\))
- **Spectral range:** 4000 cm\(^{-1}\) - 720 cm\(^{-1}\)
- **Detector:** Linear Array MCT
- **Sample thickness:** ca. 20 µm - 40 µm
- **Measuring area:** up to 10 mm × 10 mm

### Imaging ATR FTIR Microscopy
Surface of samples as well as layered structures can be analysed using this mode.

- **Measuring mode:** ATR (i.e. attenuated total reflection)
- **Crystal:** Ge
- **Contact area:** Ø 600 µm
- **Penetration depth:** 0.5 µm
- **Pixel resolution:** 6.25 µm and 1.56 µm
- **Spectral resolution:** 4/8 cm\(^{-1}\) (2 cm\(^{-1}\) - 64 cm\(^{-1}\))
- **Spectral range:** 4000 cm\(^{-1}\) - 720 cm\(^{-1}\)
- **Detector:** Linear Array MCT
- **Sample thickness:** up to 0.8 cm

### Point Mode FTIR Microscopy
Chemical composition of samples can be analysed, but also chemical composition in layered structures, due to a possibility of running the system in so called line scan mode.

- **Measuring mode:** Transmission
- **Aperture:** 100 µm and 25 µm
- **Spectral resolution:** 4/8 cm\(^{-1}\) (0.5 cm\(^{-1}\) - 64 cm\(^{-1}\))
- **Spectral range:** 4000 cm\(^{-1}\) - 700 cm\(^{-1}\)
- **Detector:** MCT
- **Sample thickness:** ca. 20 µm - 40 µm
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