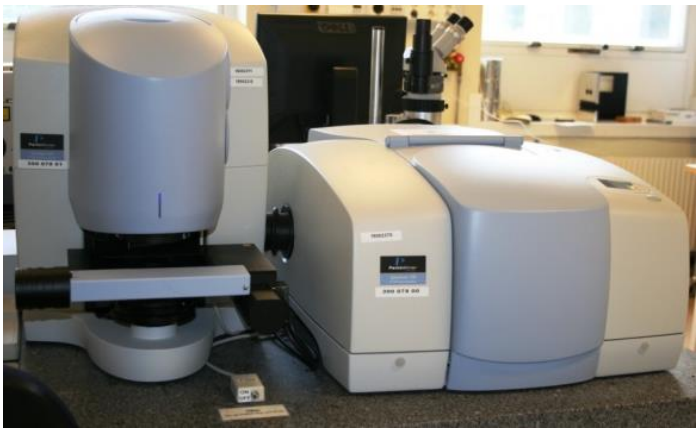
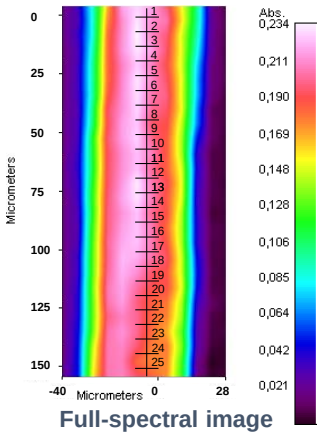


Sample



Full-spectral image

FTIR spectroscopy - advanced material analysis

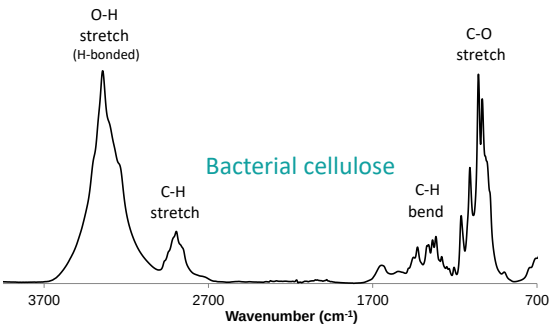
Do you need to characterize the chemical composition of your material? FTIR (Fourier Transform InfraRed) spectroscopy is an important tool in material analysis. In addition to the standard set-ups, we have advanced techniques such as dynamic FTIR spectroscopy and imaging FTIR microscopy.

Are you curious about ...

- chemical composition?
- 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?

Our reference database of spectra of various materials is a helping tool for the material identification.

We can analyse a broad range of materials. Bulk, surface and layered structures can be analyzed separately.



FTIR spectrum of bacterial cellulose

Spectroscopic material properties

Because the **fingerprints** of many organic compounds are unique, **FTIR** spectroscopy is most commonly used to **provide** qualitative compound identification.

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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: about 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. The technique utilizes dynamic 2D FTIR (i.e. two-dimensional FTIR), which is an evaluation 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: about 20 µm - 40 µm
- Sample size: 20 mm x 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 analyzing 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: about 20 µm - 40 µm
- Measuring area: up to 10 mm x 10 mm

Imaging ATR FTIR Microscopy

Surface of samples as well as layered structures can be analyzed 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 analyzed, 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: about 20 µm - 40 µm

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