



- 1 UV-curing using real-time IR spectroscopy.
- 2 IR spectroscopy of water-based systems.

CHARACTERIZATION OF POLYMERS USING INFRARED (IR) AND RAMAN SPECTROSCOPY

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Chemical characterization plays a key role in the development and optimization of high-quality polymer products. Many spectroscopic and chemical methods of analysis require samples to be dissolved. Such methods cannot therefore be used for the many adhesives and paints/lacquers that are insoluble.

Solids and surfaces can however be analyzed by infrared (IR) spectroscopy using special recording techniques.

Methods

- ▮ Specular and diffuse reflection
- ▮ Photoacoustic detection
- ▮ Attenuated total reflection
- ▮ IR microscopy/IR imaging
- ▮ Real-time IR spectroscopy
- ▮ Rheo-optical IR spectroscopy
- ▮ Raman spectroscopy/Raman microscopy

- ▮ Protein identification
- ▮ PM-IRRAS and VCD

Examples

Photoacoustic detection (PAS)

Strongly pigmented and highly crosslinked polymers can be analysed by PAS. Appropriate selection of the experimental parameters also allows the distribution of components in the top millimeters of the sample to be determined. Using this method, for example, the diffusion of adhesive components into the surfaces of substrates can be investigated.

Real-time IR spectroscopy (RTIR)

RTIR is used for characterizing curing and drying processes for adhesives, paints/lacquers and printing inks for defined atmospheres, temperatures, geometries and layer thicknesses. The method allows up to 100 spectra per second to be recorded and so means that

even rapid processes such as the UV-curing of acrylates can be monitored.

Portfolio of the Fraunhofer IFAM

- Recording of spectra without sample preparation or change to the material under test
- Analysis of surfaces and thin layers
- Identification of unknown samples
- Monitoring the curing and drying of adhesives and paints/lacquers as a function of external conditions (temperature, atmosphere, geometry)
- Depth-profiling
- Distribution