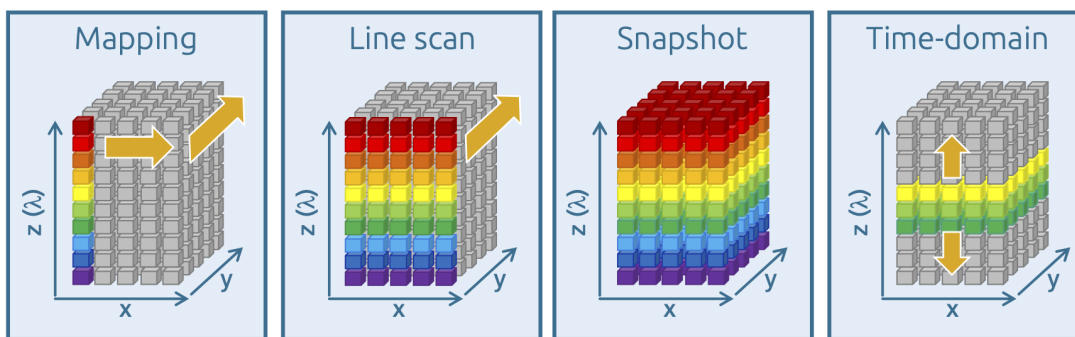


Imaging spectroscopy

Imaging spectroscopy is an umbrella term for all techniques and possibilities for recording spectra that produce an image of a sample or measurement surface. It is a powerful tool for visualizing the relationships between the observed process and the properties of the sample in the surface or in its entirety, in addition to the two-dimensional recording of spectra. This can be, for example, an arbitrarily selected quality characteristic or a quality class or a parameter for the subsequent processing or effect of the sample. In some cases, the 'image' is visually processed for the human eye, especially in IR and RAMAN spectroscopy due to the spectral range used or the low intensities. The use of the term 'imaging spectroscopy' is not uniform. It is always necessary to question which of the following techniques is actually used.



Options for recording a spectroscopic image

In mapping (also known as 'whiskbroom imaging'), a spectral image is built up point by point, i.e. a complete spectrum is recorded with each individual measurement and then either the spectrometer optics or the sample is moved accordingly. Such a procedure is time-consuming, but often offers the highest spectral resolution. In pushbroom imaging, a typical method of hyperspectral imaging, an entire line is spectrally recorded for each individual measurement and the image is constructed by merging the lines. Due to the dispersive structure of such spectrometers, the spectral resolution is often lower (approx. 1-2 nm) than with mapping methods. On the other hand, current detectors can be read out at several hundred Hertz, so that such imaging is also suitable for process spectroscopy. The so-called 'snapshot' method records all wavelengths at all points of the image simultaneously. The detectors used for this usually only allow multispectral imaging. Finally, the 'time-domain' method should be mentioned, in which one or more wavelengths are imaged on the detector for the entire image and a scan is made across the wavelengths. Similar to mapping, there is also a time delay here; the sample or examination area must not change or move during this period.