Application Note

250-MT-0210

Mapping measurement using IQ Mapping function of IRT-5000

Fig. 1 FT/IR-4100 + IRT-5000

<Introduction>

IR mapping measurement which can visualize molecular structure has been suggested traditionally, however the IR mapping measurement has not been widely utlized because of the several reasons as below.

- Auto stage is required, which will make the instrument too expensive.
- It takes quite a long time for measurement.

Regarding the measurement time, using the system utilizing multi-elements detector enables to shorten the measurement time in more than double digits in comparison with conventional system, and the IR mapping measurement has been gradually used.

This time, we are now introducing IQ Mapping which was newly developed in order to solve another problem which is the necessity of auto stage. The IQ Mapping is a technique allowing Mapping measurement with manual stage by scanning IR light, and is applicable to ATR as well as ordinary transmittance/reflectance mapping. We would like to show an example of impurity analysis using IQ Mapping of the IRT-5000 (Fig. 1).

<Measurement 1: Mapping by manual stage >

Mapping measurement was implemented for multi-layer film (Fig. 2)

[Measurement conditions]
Mode: Transmittance, Detector: Mid-MCT, Resolution: 4 cm^{-1},
Accumulation: 1
Cassegrain: 16×, Aperture : 50 × 50 µm,
Measurement points: 9 × 9 Sampling area: 400 × 400 µm

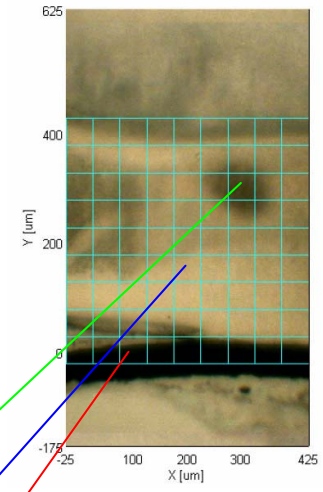
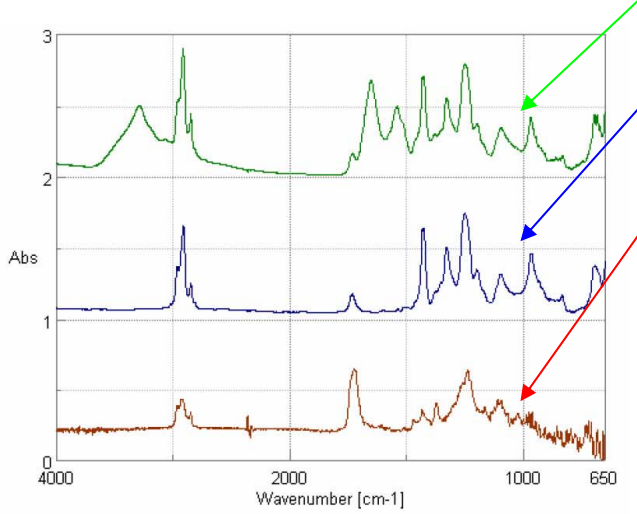
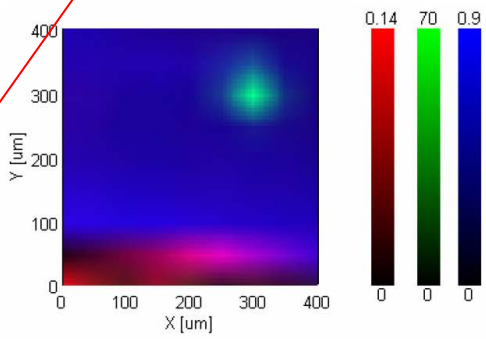


Fig. 2 Observation image (Yellow-green grid shows measurement points.)





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By analyzing the spectra in Fig. 3, it was confirmed that multi-layer film roughly consisted of two components, PVA (red), PVC (blue), and protein(green) was existing in the multi-layer film. By showing color distribution map utilizing specific peaks for each component on the RGB display (Fig. 4), components distribution became clear, enabling to detect the impurity which could not be identified by observation image.

<Measurement 2: ATR Mapping>

Combining IQ Mapping with ATR method enables the measurement without any contamination, as the number of contact between sample and prism is only one.

The sample shown in Fig. 5 was measured by using ZnSe as ATR prism.

<Measurement conditions>

Detector:	MCT-N
Resolution:	8 cm^{-1}
Accumulation:	8
Cassegrain:	ATR-Z-5000,
Aperture:	20 × 20 µm
Measurement points:	6 × 6
Sampling area:	100 × 100 µm

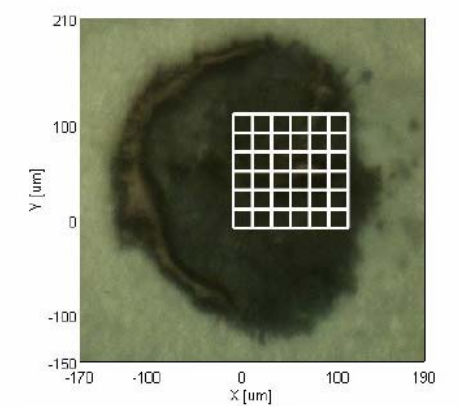

Fig. 5 Sample observation image
(White grid shows measurement points.)

As a result of mapping measurement, spectra of different components were obtained, depending on different measurement point (Fig. 6).The sample measured was a mixture of water-based and oil-based marker, and specific peaks for each could be identified as in Fig. 6. Color distribution map using the specific peaks for each component at 1666 cm^{-1} and 1282 cm^{-1} is shown in Fig. 7. As shown, mapping measurement can detect different components of the sample which appear to be only one component by visible image, assuring accurate qualitative analysis.

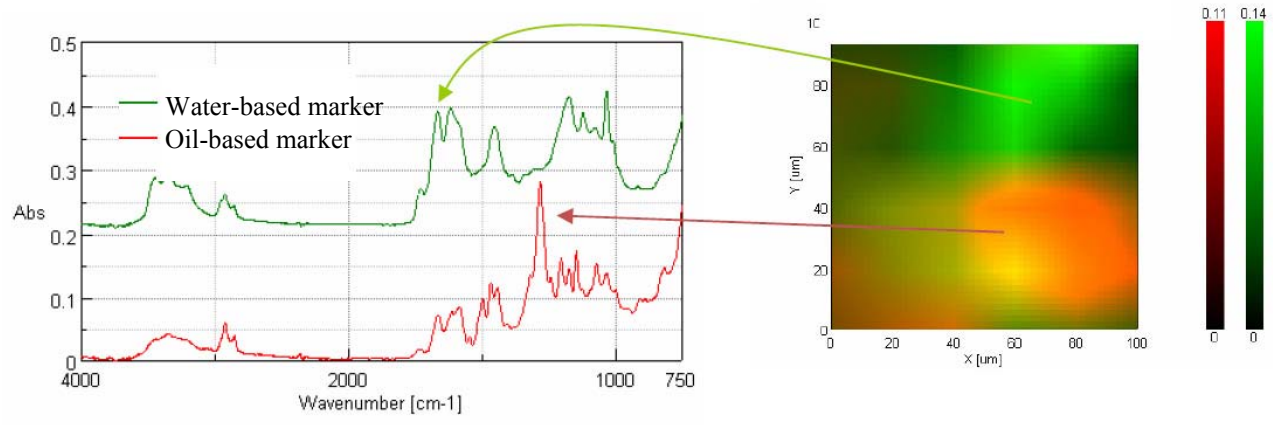

Fig. 6 Measured spectra of impurity

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