Application Note

200-MR-0213

NIR Imaging of tablet surface by using IR Microscope

<Introduction>

Near IR light is widely used for non-destructive analysis as an evaluation method in food and pharmaceutical industry due to it's characteristics such as transmitting the glass container and weaker peak absorbance than Mid-IR light. Recently, this NIR analysis technique is introduced to the Process Analytical Technology which has been proposed by FDA, and it is used for evaluation of uniformity of mixed samples inside of vials, evaluation of water content by in-line measurement, and evaluation of contents in tablet by using of NIR microscope. There are are various analysis methods using NIR spectroscopy such as dispersive type, filter type and AOTF type, while FTIR is considered to be better method due to several advantages such as wave number expandability, high through put and high accuracy of wavenumber . JASCO IR Micro scope system IRT-5000/7000 has a unique feature as option which is detachable detector unit,which makes it possible to extend the measurement range up to NIR in one single FT/IR system. This time, we analyzed the distribution of components on tablet surface by NIR imaging system which consists of FT/IR-6100 and IRT-7000 with NIR expansion.

Fig. 1 Detector replacement by using detachable detector unit

<Experimental>

Imaging of cross section and surface of general medical tablet (pain-killer) was measured by using NIR Microscope system.

<Measurement Condition>

Multi channel IR Microscope (NIR version)

- Light source : Halogen
- Beam Splitter : CaF_2
- Detector : InGaAs (Single element)
- Measurement mode : Reflection
- Resolution : 8 cm^{-1}
- Accumulation : 50 times
- Aperture size : 200 × 200 µm
- Measurement points : Surface : 58 × 58 points
  Cross Section : 30 × 40 points

Fig.2 IR Microscope IRT-7000

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<Result>

Fig. 3 shows NIR spectra obtained by measuring the point in each layer on cross section of tablet. Fig. 4 is NIR Imaging which describes the color distribution map utilizing the height of each specific peak. As the result, this imaging data (Fig. 4) indicate that this tablet consists of 3 components in 4 different layers. In addition tablet surface was measured and the color distribution map of surface layer was obtained by utilizing the peak height ratio of Acetylsalicylate. This result clearly shows non-uniformity of surface material as shown in Fig. 6.

As a conclusion, it can be said NIR Micro Imaging system enables to visualize tablet surface by non-destructive method. Such application is considered to be a very useful tool and solution in the fields of pharmaceutical development and quality control, where there are uncertain factors during the process.

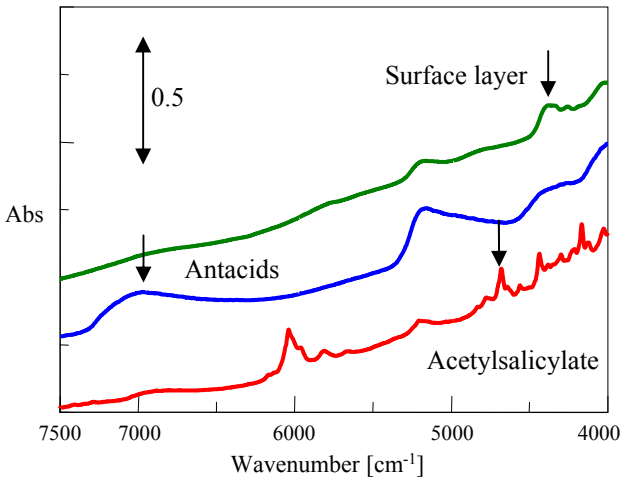

Fig. 3 NIR Spectra of each elements

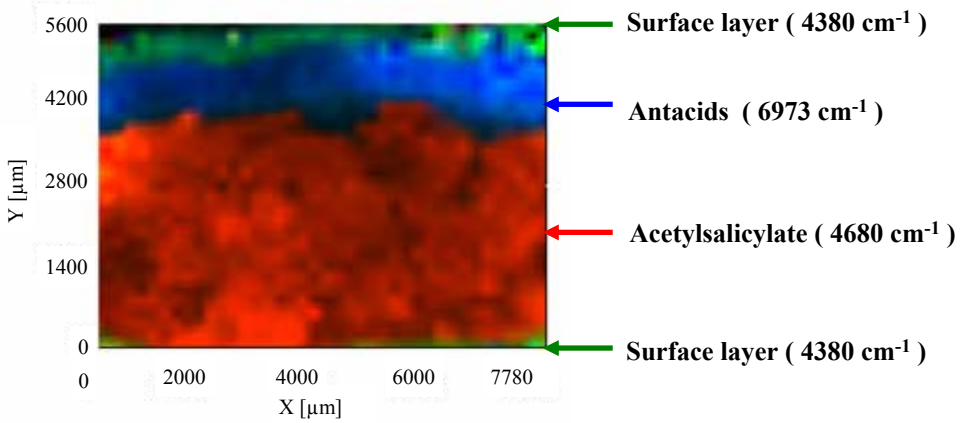

Fig. 4 NIR Imaging of tablet cross section

Fig.5 Picture of general medical tablet (Pain-killer)

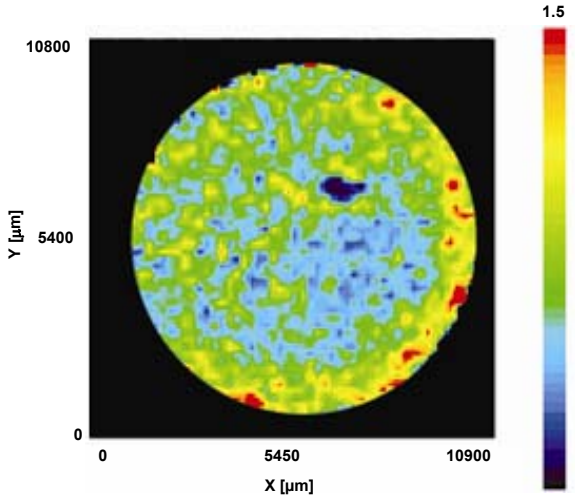

Fig. 6 Imaging of surface layer Peak ratio : 4380 cm-1 / 4680 cm-1

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