Application Note

260-AT-0243

Fiber product analysis using ATR PRO ONE VIEW

Introduction

The molecular structure analysis of fiber material is very important method to evaluate new materials, to manage quality control of products, and to use for forensic purpose and criminal investigation. Because many of fiber materials are made differently through mixing with several materials and dye compounds to meet various kind of colors and feelings. As required in JIS L 1030, infrared spectroscopy is widely used in molecular structure analysis of fiber material. And ATR method is powerful way to perform measurements in terms of non-pre-treatment, non-destructive and easy-handling. JASCO's new FTIR accessory, ATR PRO ONE VIEW, is designed to perform the measurement and the sample observation simultaneously. This accessory allows to perform measurements with observing the sample contacted with prism, and to obtain visual image with color information. And software Spectra Manager enables to save spectra and the image together, which makes it possible to access both information easily to analyze sample efficiently. In this application, the measurements of fiber products are shown with using ATR PRO ONE VIEW.

Keyword: Fiber, Sample image, Material analysis, ATR

Measurement condition

Instruments: FT/IR-4600
Detector: DLATGS
Resolution: 4 cm^{-1}
Accumulation: 50 times
Method: ATR
Accessory: ATR PRO ONE VIEW
Prism: PKS-D1V

Fig.1 ATR PRO ONE VIEW

Specification of ATR PRO ONE VIEW

Prism	Observation diamond Non-observation ZnSe, Ge (Option)
Sample contact area	f1.8 mm (Diamond)
Reflectance	One
Incident angle	45º
Pressure resistance	700 kg/cm^2 (Diamond)
Measurement wavenumber range	10000-300 cm^{-1}* 10000-30 cm^{-1}*(Option)
Observation (USB camera)	View: 1.1 x 0.8 mm, LCD: 5 inch VGA
Software	SP data format with image, wavelength tool, image processing function
Size, Weight	182(W) x 166(D) x 205(H) mm 2.0 kg
Accessory	Pressure tip (2 type)

* High performance diamond prism kit (PKS-D1V): 10000-300cm^{-1}
* Wide range diamond prism kit (PKS-D1VF): 10000-30cm^{-1}

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Measurement result

2.1 Fiber image

As shown in Fig.2, the fiber image captured by ATR PRO ONE VIEW, micro size sample was enabled to set in the center of the prism and to observe the red fiber clearly in 1.1 x 0.8 mm field. This result was realized by the features, measurement and observation in parallel, and user can select the measurement point with measuring spectra.

The software allows to measure sample size and to save IR spectrum with images. These features support users to manage data efficiently. In writing report about foreign material or claim analysis, images make it more weighty.

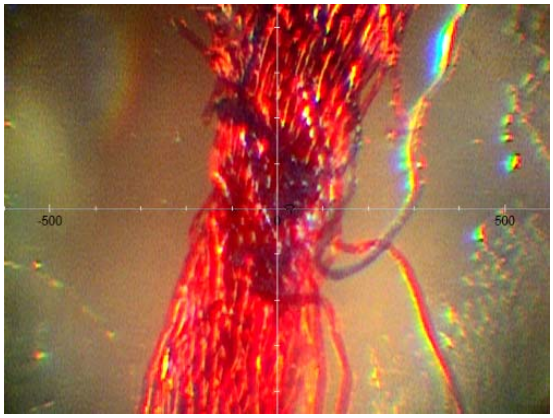

Fig.2 Fiber image captured by ATR PRO ONE VIEW

2.2 Blended fiber analysis

Fig.3 shows the images and IR spectrum of neutral color cloth, beige and greenish brown.
In images, even if the neutral color sample, color is observed clearly.

The peaks around 1640, 1550 cm^{-1} assigned as amide I, II are observed in the spectrum (A).
On the other hand, the peaks assigned as nitrile (2300 cm^{-1}) and carbonyl (1720 cm^{-1}) are observed in addition to amide I, II peaks.

These results indicates that (A) is made of pure wool and (B) is made of mixture of acrylic and wool.

As mentioned above, using ATR PRO ONE VIEW allows to observe sample position, contact situation, shape and color and to unity management of the data.

ATR PRO ONE VIEW exercises its performance in various fields such as quality control and criminal investigation.

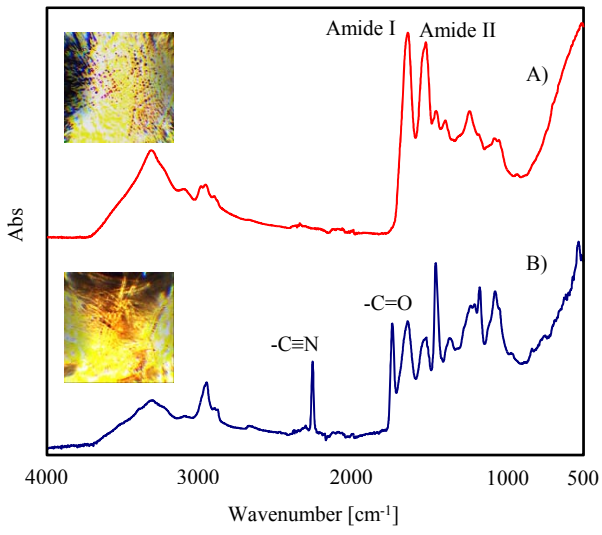

Fig.3 IR spectra and images of beige cloth (top) and reddish cloth (bottom)

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