

Identification of Foreign Substances by Micro FT-IR Imaging

Overview

Micro FT-IR is a useful means of analyzing foreign substances, but the usual process of sampling – measurement yields only very limited information. However, the use of micro FT-IR imaging with foreign substances provides visual information over a broader range than was formerly possible.

Method

Micro FT-IR uses a detector consisting of multiple elements for two-dimensional measurements. It renders visible the distribution of characteristic functional groups etc in chemical compounds.

Example I

Visible imaging confirmed the presence of fibrous foreign substances (Fig. 1) which appeared to be of the same type of fiber. However, when they were measured by micro FT-IR, they were found to be a combination of two different types of fiber, cellulose and polypropylene. Figure 2 shows an IR image of the fibrous foreign substances; Figure 3 shows the FT-IR spectra for points A and B in Fig. 2.

Measurement conditions;
 Method: Micro-transmission imaging
 Wavenumber range: 4000 – 900 cm^{-1}
 Wavenumber resolution: 8 cm^{-1}
 Measured area: 350 μm x 350 μm
 Effective element size: 5.5 x 5.5 μm /pixel

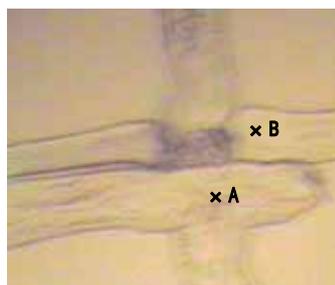


Fig. 1 Visible image of fibrous foreign substances.

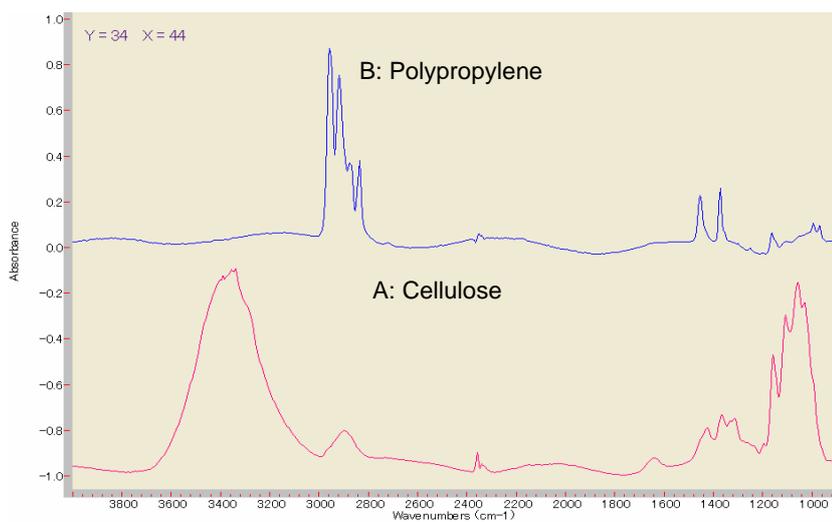


Fig. 3 FT-IR spectra of fibrous foreign substances (Points A and B).

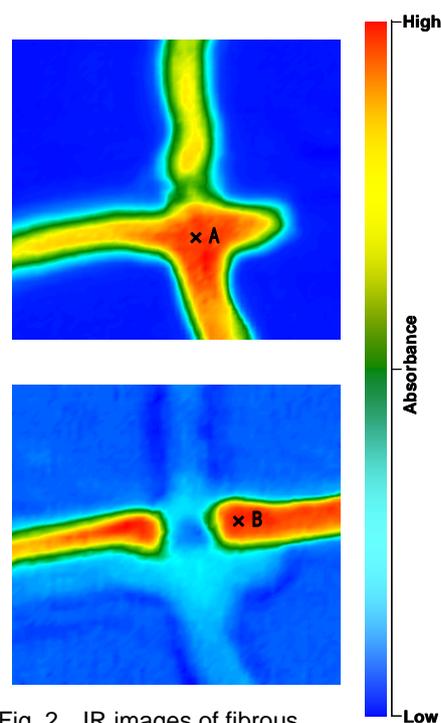


Fig. 2 IR images of fibrous foreign substances.

Example II

The micro FT-IR imaging of contamination on a metallic surface (Fig. 4) was measured. The results showed that the contamination consisted principally of two types: esterified compounds and silicone oil. Figure 5 shows the IR image of the contamination on the metallic surface, and Figure 6 shows the FT-IR spectra for Points A and B in Fig. 5.

Measurement conditions;
 Method: Micro reflection imaging
 Wavenumber range: 4000 – 900 cm^{-1}
 Wavenumber resolution: 8 cm^{-1}
 Measured area: 350 μm x 350 μm
 Effective element size: 5.5 x 5.5 μm /pixel



Fig. 4 Visible image contamination on the metallic surface.

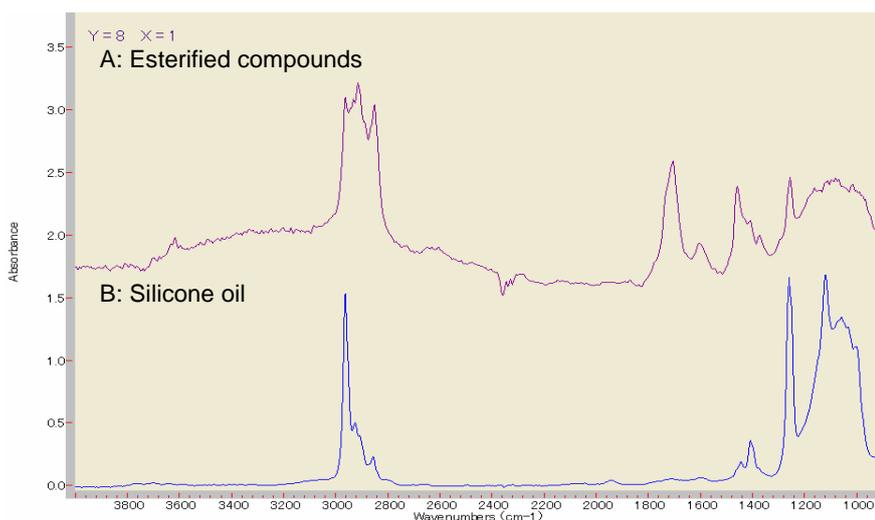


Fig. 6 FT-IR spectra of contamination (Points A and B) on the metallic surface.

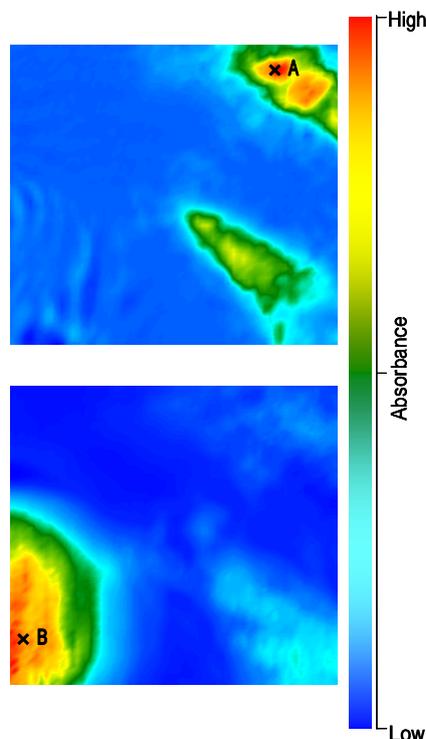


Fig. 5 IR image of contamination on the metallic surface.

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