

## Foreign material analysis using both Mixture Analysis function and new library

### 1: Introduction

A certain level of technique was necessary to identify successfully the IR spectrum of unknown sample which consists of multiple components by using conventional spectrum searching method, because those process was usually very complicated. In order to analyze multi-component sample, first step was to search the spectrum from library, which is the most similar to the spectrum of the main component, then to calculate the difference spectrum by subtracting the searched spectrum from the spectrum of the sample and to analyze other components through re-searching. It is basically possible to analyze 2<sup>nd</sup> component in the sample if such method is repeated several times, however searching accuracy declines depending on the number of components in sample, and a certain level of technique to analyze spectra properly is necessary. This time, new function named [Mixture Analysis] has been added to our standard search engine [KnowItAll] for easy analysis of the sample with multiple components. [Mixture Analysis] enables to search spectra for multiple components sample (Max. 4 different components) easily without any data processing such as difference spectrum calculation. In addition, JASCO has newly added approx. 400 kinds of Organic, Inorganic, Polymer spectra to our standard library with 10000 spectra. Those 400 spectra have been created through our measurement results for the past 3 years, which include not only foreign material analysis data but also Food Additives, Polymer and Fiber data.

Following experiment was done to search foreign material inside of fiber by using [Mixture Analysis] and newly upgraded library with 10400 spectra. As the result, this sample was analyzed to have multiple components.

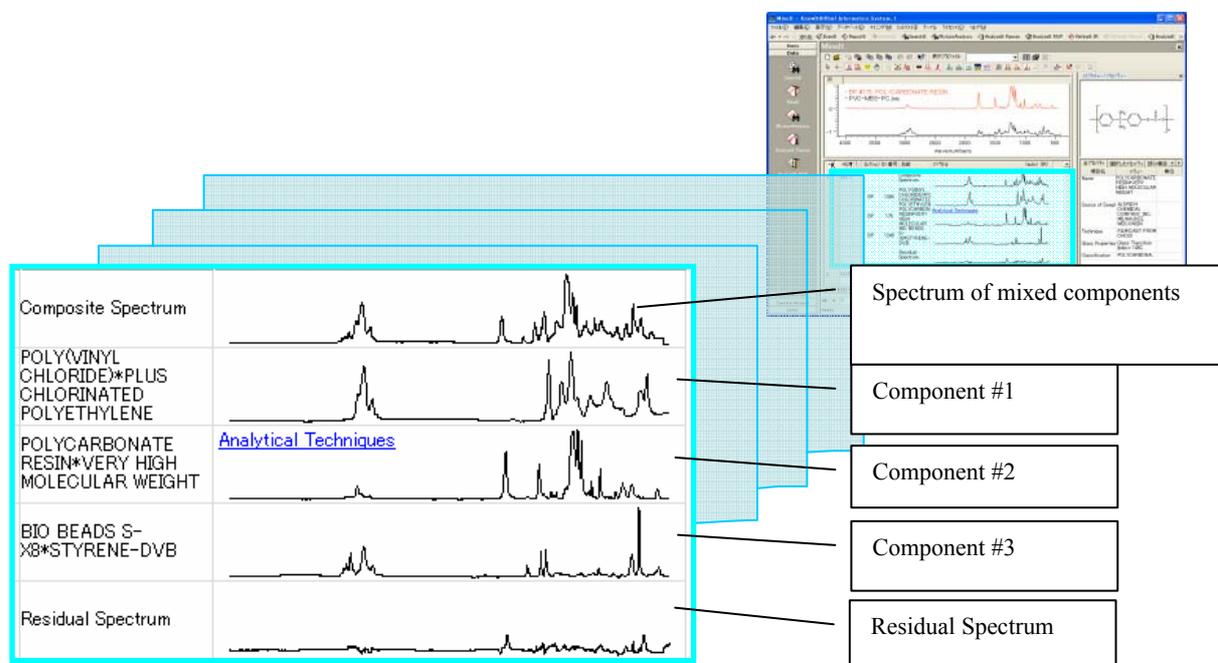


Fig. 1 Search result of unknown sample by using of KnowItAll [Mixture Analysis]

## 2: Measurement conditions

Instrument Model: IRT-5000

Method : Microscope Transmittance measurement  
(KBr Plate method)

Resolution : 4 cm<sup>-1</sup>

Accumulation : 50 times

Aperture size : 100 μm<sup>2</sup>



Fig. 2 Photo of foreign material

## 3. Results and discussion

The search results by using [Mixture Analysis] are shown in Fig. 3 for the foreign material contained in the fiber. By these results, unknown sample was identified as calcium carbonate and clay, that is, silicate. For reference, the results by using conventional [SearchIt] are shown in Fig. 4. In this case the spectrum of silicate was searched and then calcium carbonate was identified by calculating the difference spectrum and re-searching.

As explained in the above, for the analysis of sample with multi-components, [Mixture Analysis] was proved to be a powerful tool and in addition, the foreign material was successfully identified by utilizing the standard library with 10400 spectra.

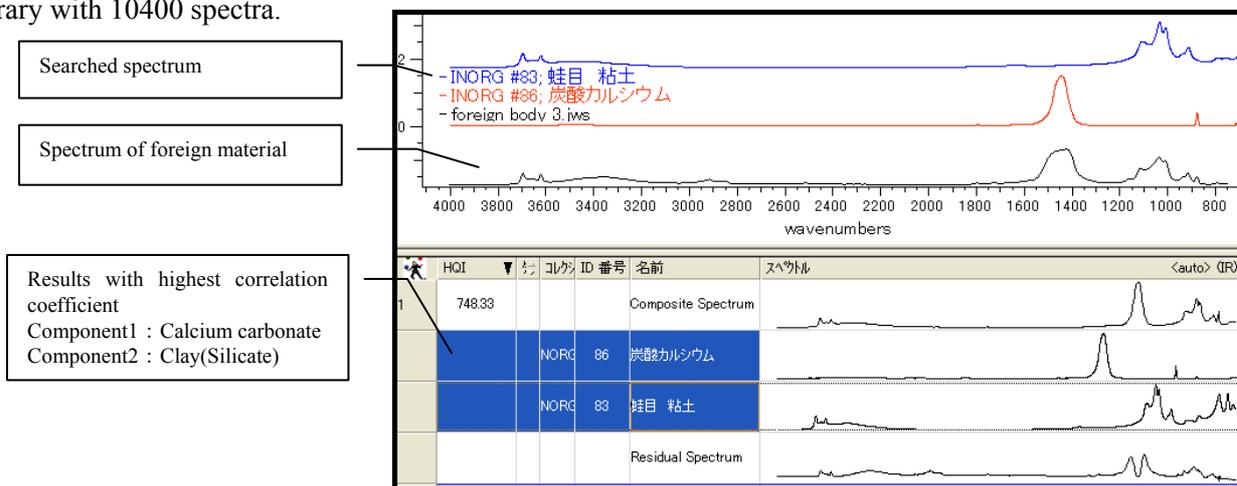
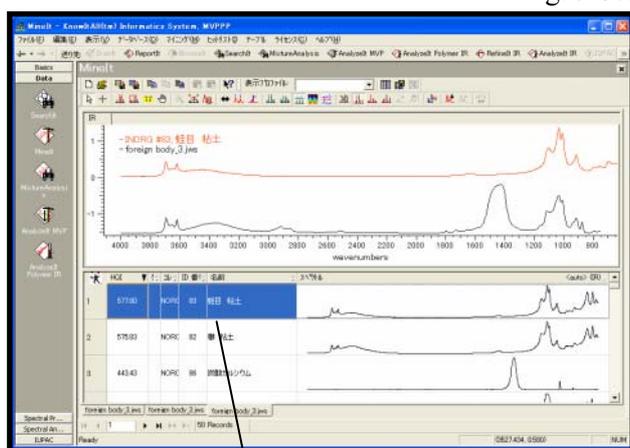
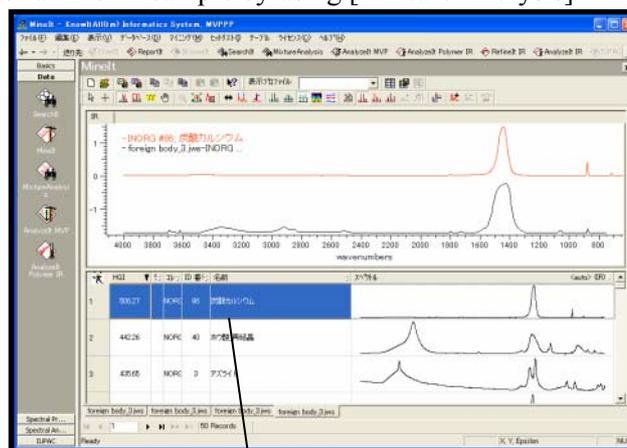


Fig. 3 Search of unknown sample by using [Mixture Analysis]



Clay(Silicate)

Search result of component 1



Calcium carbonate

Result after re-search of difference spectrum

Fig. 4 Result of unknown sample analysis by using [SearchIt]