

Measurement of scattered foreign materials by using the Measurement Assist function and the Sample Search function

Introduction

Recently, foreign material analysis by Raman Spectroscopy is frequently performed (ref.: JASCO Raman application data 260-AN-0010). This is because Raman spectroscopy is a method which enables to obtain the information on molecular structure as well as IR spectroscopy. In addition, it has several features to allow non-destructive and non-contact measurement without sample preparation, measurement in depth direction with about $1\mu\text{m}$ of spatial resolution, and easy identification of the inorganic material because of easy measurement in low wavenumber range. However, some of the users who analyze the foreign material by micro FT/IR are saying that it is difficult to do by the Raman system. Therefore, JASCO developed a special measurement program as a software of NRS-4100 with intuitive user interface which is easy to use even for beginner of Raman or FT/IR user. For example, it has the functions such as “Measurement Assist” function which enables the easy measurement by supporting at wizard form from focus adjustment to condition setting/measurement, “Real time data processing” for executing the automatic operation such as peak detection, or “User advice” function (patented) for performing in real time basis the operation procedure or advice for spectra.

This time, utilizing the functions of newly-developed software for NRS-4100, the measurement of scattered foreign materials was implemented rapidly and easily as reported below.

System configurations

- NRS-4100 Raman spectrometer
- Automatic imaging system
- 532 nm laser (100 mW)

Sample search function

In measurement program of NRS-4100, “Sample search” function is provided which determines the measurement position automatically from size or contrast of observation image when the automatic stage is mounted. The screen of “Sample search” function is shown in Fig. 1, in which the search was implemented so that only foreign materials that is larger than given size were detected. The measurement points were displayed in observation image, and then as a view of search result the images of determined sample position were displayed. It is also possible to select only the desired position from the result view and to implement the mapping measurement of whole sample region based on searched shape.

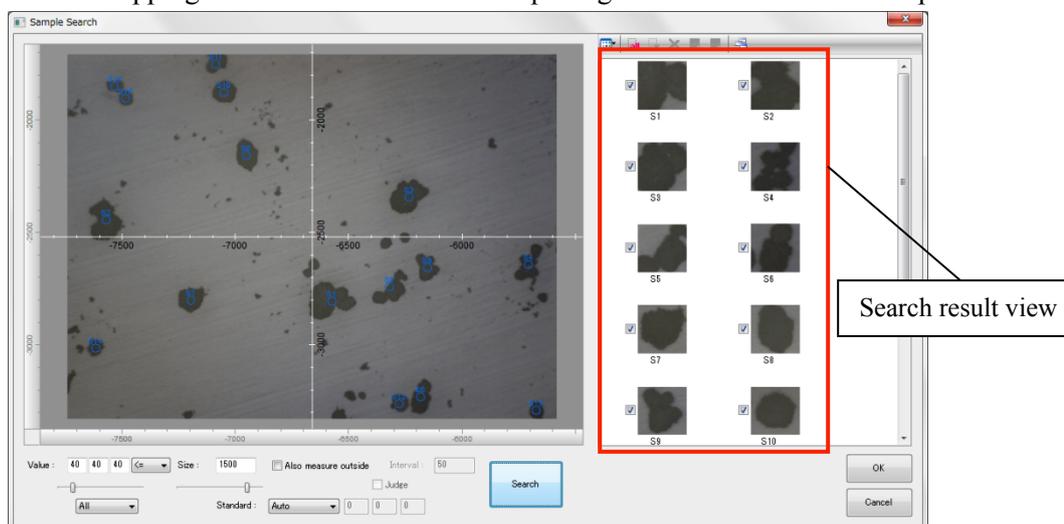


Fig. 1 Image of sample search function

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Application of the “Measurement assist” function

The concept of “Measurement assist” function that JASCO developed is to enable anyone to implement Raman measurement easily, by guiding at wizard form the several measurement conditions that are essential to Raman measurement. The screen is configured enabling to operate intuitively using slide bar or tabular form.

This time, the sample search result performed in Fig. 1 was regarded as a measurement point, and then the scattered foreign materials on substrate were measured. The foreign materials at 16 positions detected from sample search result were regarded as measurement points. In the setting screen of “Measurement assist” function, the measurement condition setting can be assisted by displaying each point where the measurement condition needs to be set following the “User advice” function, which is shown in Fig. 2.

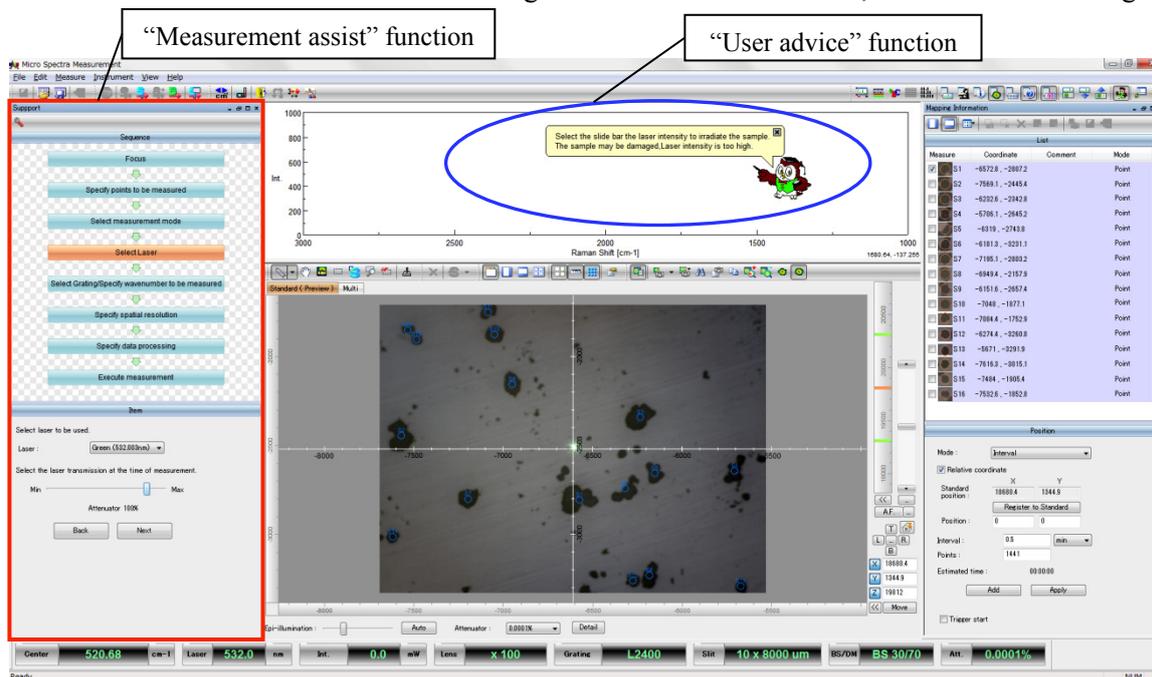


Fig. 2 Measurement screen when using “Measurement assist” function (with displaying the “User advice” function)

Three spectra and their mixture spectra were observed as obtained spectra of foreign material. The typical spectra are shown in Fig. 3. From the characteristic of spectra at 16 points, it was determined that 10 points of them are for titanium oxide (anatase type), 2 points of them are for barium sulfate, 2 points of them are for tristearin, and 2 points of them are for the mixture of titanium oxide and tristearin. It is also possible to analyze such as more specific scattering condition by the mapping measurement of the mixture.

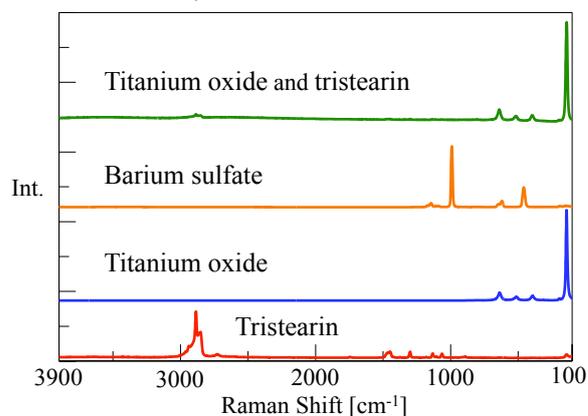


Fig. 3 Spectra of foreign materials

Summary

Thus, by using the “Measurement assist” function or “Sample search” function of NRS-4100, it is possible to perform smoothly a sequence of measurement starting from determination of sample position to measurement condition setting and measurement.