Fluorescence Fingerprint Measurement System

A line-up of fluorescence fingerprint measurement systems to match your measurement objectives

EEM Basic
For raw material differentiation and process confirmation

◎Basic system that consists of F-7100 fluorescence spectrophotometer equipped with an automatic filter accessory.
◎Fluorescence fingerprints can be acquired in about 2 to 3 minutes per sample.

■ Instrument exterior

Model F-7100 Fluorescence Spectrophotometer

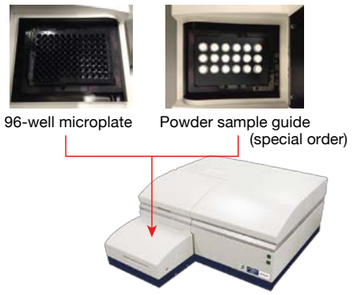
■ System configuration example

Main unit	**Model F-7100** Fluorescence Spectrophotometer
Optional items	● Automatic filter accessory ● Solid sample holde
Optional programs	● Dedicated analysis software

EEM Multi
An automatic multi-sample differentiation system that accommodates microplates

◎Enables continuous multi-sample measurements of fluorescence fingerprints by using a microplate accessory.
◎96 liquid samples can be continuously measured with a microplate, and 18 powder samples can be continuously measured with a powder sample guide.

■ Instrument exterior



Model F-7100 Fluorescence Spectrophotometer
(Microplate accessory installed)

■ System configuration example

Main unit	**Model F-7100** Fluorescence Spectrophotometer
Optional items	● Automatic filter accessory ● Microplate accessory ● Powder sample guide (special order)
Optional programs	● Dedicated analysis software

EEM Direct
Optical fiber-type differentiation system

◎Large samples or with irregular shapes can be directly measured using an optical fiber without need to place them in the sample compartment.
◎The spot irradiated by excitation light from the optical fiber is approximately 5 mm, so microscopic regions can be measured.

■ Instrument exterior

Model F-7100 Fluorescence Spectrophotometer
(Optical fiber accessory installed)

■ System configuration example

Main unit	**Model F-7100** Fluorescence Spectrophotometer
Optional items	● Optical fiber accessory (special order) ● Optical fiber: One bifurcated optical fiber (2 m)
Optional programs	● Dedicated analysis software

Science for a better tomorrow

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CAUTION: For correct operation, follow the instruction manual when using the instrument.
Specifications in this catalog are subject to change with or without notice, as Hitachi High-Tech Science Corporation continues to develop the latest technologies and products for its customers.
NOTICE: The system is For Research Use Only, and is not intended for any animal or human therapeutic or diagnostic use.
These data are an example of measurement; the individual values cannot be guaranteed.

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Fluorescence Spectrophotometer
Hitachi Fluorescence Fingerprint Measurement and Discrimination System

F-7100

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Inspire the Next

Science for a better tomorrow

What is a fluorescence fingerprint?

A fluorescence fingerprint is an optical fingerprint containing information about a sample.

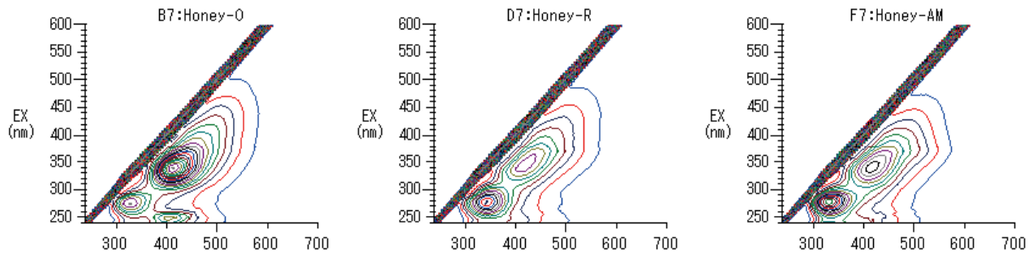
- ○ A fluorescence fingerprint contains information about organic compounds, including the type of substance, environmental load, concentration, and other factors.
- ○ A sample can be easily classified by a statistical analysis of its fluorescence fingerprint.

■Examples of measured substances that exhibit autofluorescence.

Food products : agricultural products, fruits, beverages, meat, fish, edible oils, etc.
Materials : resins and adhesives, mineral oil, paper, paint, detergents, etc.
Environmental : environmental water
(river water, lake water, ocean water, etc.), soil, plants, etc.

Example: Fluorescence fingerprint of honey

The fluorescence fingerprint of honey varies depending on the type of flower nectar collected. Fluorescence fingerprinting can be applied to acceptance testing of raw materials and for discerning mislabeling and fakes.



〈Orange〉 〈Chinese milkvetch〉 〈Acacia〉

Three fluorescence patterns were observed in honey originating from orange blossoms. On the other hand, two fluorescence patterns were observed in honey from Chinese milkvetch and acacia. While the fluorescence fingerprints of Chinese milkvetch and acacia look similar, they can be distinguished by a multivariate analysis of the intensity ratio of two peaks.

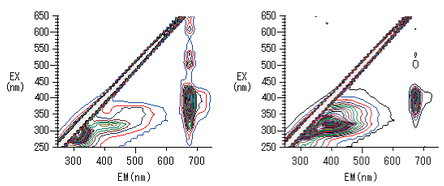
Fluorescence fingerprint measurement process

Even an inexperienced analyst can measure a fluorescence fingerprint with a minimum amount of preparation.
Fluorescence fingerprint results are output through use of a discrimination library.

① Sample preparation
▼
② Sample mounting
▼
③ Fluorescence fingerprint measurement

Fluorescence fingerprint results

Measuring a sample takes only a matter of minutes!



Discrimination library

Pass Fail

Easily differentiate samples!

Discrimination examples :
• Pass-Fail • Type • Classification • Mixture • Mislabeling and false identification

◎ Prepare multiple samples (pass-fail, type-discrimination, classification, mixture, etc.) with known properties in advance.
◎ Measure the fluorescence fingerprint of the known samples, and prepare a discrimination library.
◎ Measure the fluorescence fingerprint of the unknown samples, and make discrimination by consulting the discrimination library.

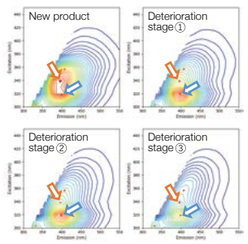
What is possible with fluorescence fingerprint?

Fluorescence fingerprint measurements in a matter of minutes. Obtain an expanding body of knowledge. The solution you have been looking for is simple.

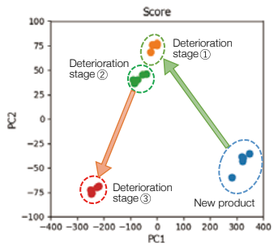
Quality control : ● **Check the degradation state of raw materials and control expiration dates** ● **Detect abnormal raw materials** ● **Inspect shipment products (identity confirmation)**

Evaluating the degree of deterioration in freshness of vegitable oil

Fluorescence fingerprint



Discrimination library

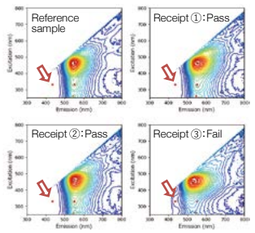


*The arrows within the fluorescence fingerprints indicate wavelengths where there is marked change.

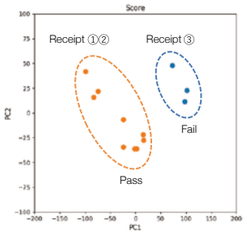
Fluorescence fingerprinting is effective for evaluating the deterioration in freshness of raw materials.When degradation has occurred, the fluorescence fingerprint changes due to organic matter (principal component analysis).

Confirmation of crude drug identity

Fluorescence fingerprint



Discrimination library

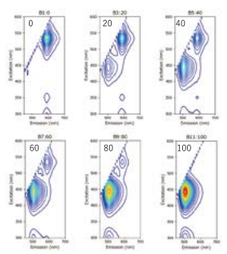


Anomalous peaks were detected based on turmeric raw materials from different lots. By using the discrimination library, a sample was determined as “Fail” (PLS-LASSO differentiation).

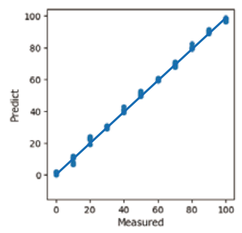
Component detection : ● **Active ingredients at multiple wavelengths** ● **Understanding multicomponent process variables**

Evaluating the mixing ratio of composite raw materials

Fluorescence fingerprint



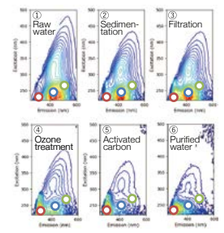
Calibration curve using wavelength of 757



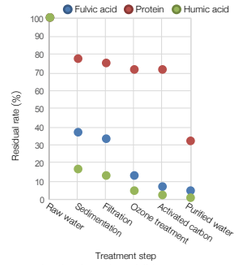
While an ordinary calibration curve is prepared using a single wavelength, high precision quantitative determinations can be made using multiple wavelengths (PLS-LASSO regression).

Ascertaining residual organic substances in treated water from a water purification plant

Fluorescence fingerprint

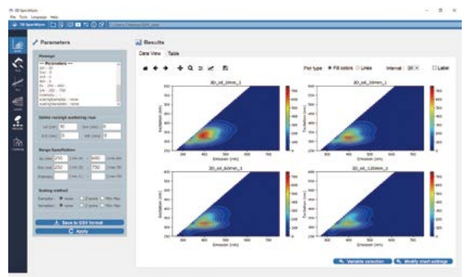


Change in residual amount



The residual fraction of organic substances that cause bad odors, in addition to trihalomethanes, can be ascertained by measuring the fluorescence fingerprint following each treatment step in a water purification plant(PARAFAC analysis).

Software



3D SpectAlyze(analysis tool)

Easy to use! Analysis software specifically for fluorescence fingerprinting.

Fluorescence fingerprints can be analyzed by following simple steps. 3D SpectAlyze can automatically select the optimal wavelength for differentiation, calculate the formulas for the discrimination library, resolve peaks from multiple components, and more.

Explanatory video available here